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THE 2015 WIRED 100

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#1 OLIVER SAMWER

WHY HE'S THE MOST POWERFUL PLAYER IN EUROPEAN TECH

HOW TO CREATE EDIBLE ENERGY GEL

MAKE ARTISANAL TOOTHPASTE

BUILD AN ARCADE CABINET

SEP 15
WIRED.CO.UK

INDIA'S MICA MINING CRISIS

PLUS EUROPE'S 100 HOTTEST STARTUPS

IDEAS | TECHNOLOGY | DESIGN | BUSINESS


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PHOTOGRAPHY: MATILDE GATTONI (THIS PAGE); OLAF BLECKER (FRONT COVER). GROOMING: MIRIAM JOCHIMS. STYLIST: STEPHANIE WUESTEMANN

Above: In India, mica mining is keeping many children out of school. This young woman, Nikita, campaigns to keep them in class. "People ask me 'Why should we send our kids to school if there are no jobs?'" she tells WIRED

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FEATURE

The mica miners

Mica is used in electronic devices and car paint – and it's dug by Indian labourers caught in a culture of debt and corruption



THE NEW MASERATI GHIBLI IS POWERED BY A RANGE OF ADVANCED 3.0 LITRE V6 ENGINES WITH 8-SPEED ZF AUTOMATIC TRANSMISSION INCLUDING, FOR THE FIRST TIME, A V6 TURBODIESEL ENGINE.

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Official fuel consumption figures for Maserati Ghibli range in mpg (l/100km): Urban 20.5 (13.8) – 37.2 (7.6), Extra Urban 39.8 (7.1) – 56.5 (5.0), Combined 29.4 (9.6) – 47.9 (5.9). CO_2 emissions 223 – 158 g/km. Fuel consumption and CO_2 figures are based on standard EU tests for comparative purposes and may not reflect real driving results. Model shown is a Maserati Ghibli S at £68,913 On The Road including optional pearlescent paint at £1,776, 20" machine polished Urano alloy wheels at £2,205 and Red brake callipers at £432.

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PHOTOGRAPHY: ANNA JAMIESON



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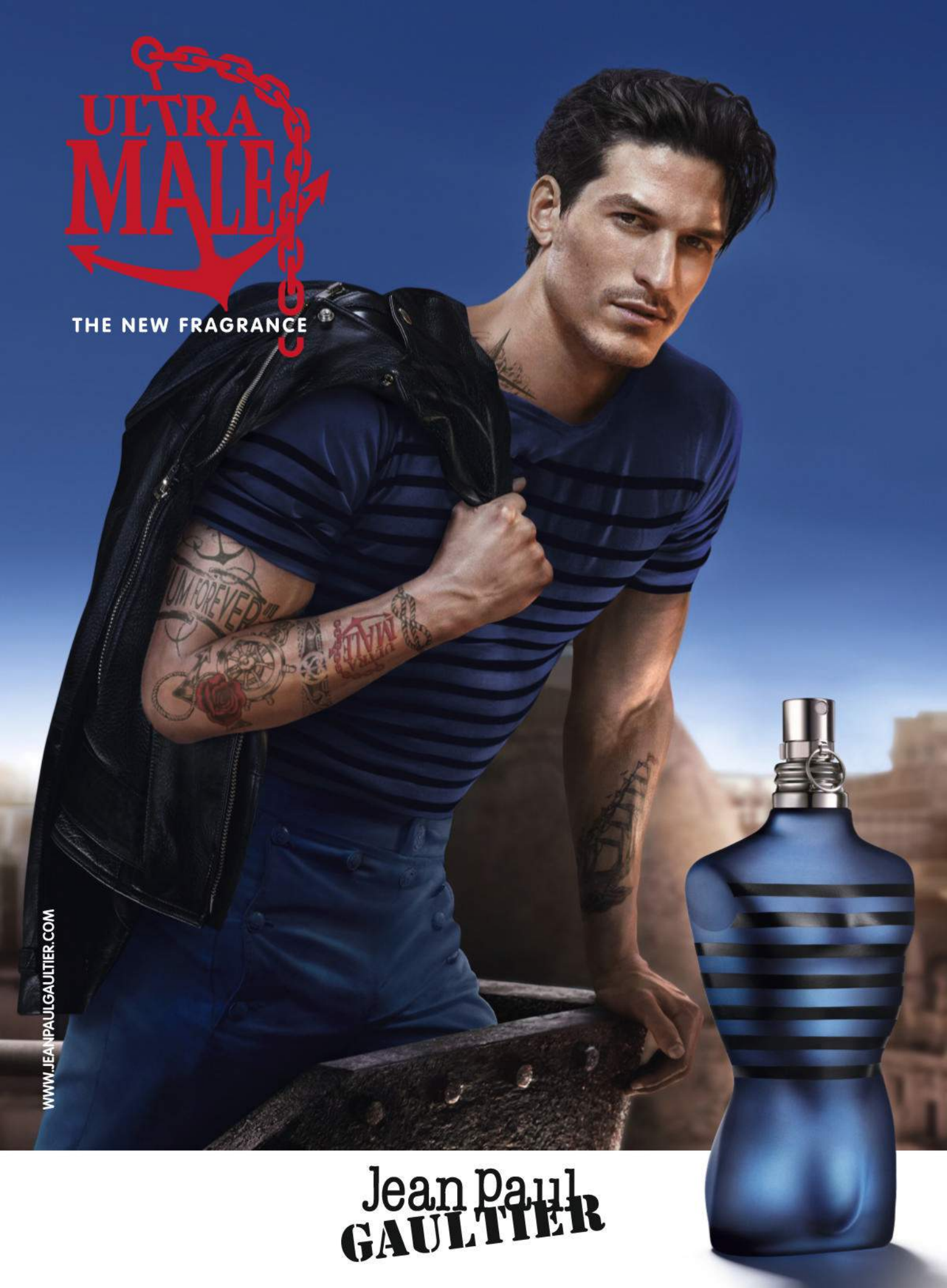
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WIRED LOGO: SET DESIGN BY VICKY LEES. PHOTOGRAPHY: KATE ANGLESTEIN. HANDMADE PERSPEX LETTERS LIT WITH LOW, DIRECT LIGHT, CREATING A 3D EFFECT WITH SHADOWS


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GREG WILLIAMS

Our annual report, *Europe's 100 Hottest Startups*, was edited this year by Williams, who is WIRED's deputy editor: "It's always tricky, as the scene moves so quickly. Fortunately, we have a great network with a deep local knowledge of who's exciting."



OLAF BLECKER

As a Berlin-based photographer, Blecker was perfectly placed for a lightning-fast shoot with Oliver Samwer – co-founder of Rocket Internet and #1 in our WIRED 100: "You have to admire Oliver for his vision. He could only spare a few minutes – it was a power shoot."



JOÃO MEDEIROS

WIRED's science editor spends time with the mental athletes capable of memorising 80-digit numbers: "They train their memories a lot and are pretty competitive, but still friendly. Studying how they do it may well make all our brains more resilient."

MITCH PAYNE

WIRED got wet and wild this month, when Mitch Payne photographed Team GB athlete Lizzie Neave putting waterproof speakers to the test on her canoe: "Seeing Lizzie gunning it down the rapids was incredible – I did worry about dunking something electrical in that much water, but everything (and Lizzie) came out unscathed."



MARK NIXON

Surprisingly, WIRED does not have an interrogation room. So when we needed one for our profile of cyberpsychologist Mary Aiken, photographer Mark Nixon stepped in: "It's just a sheet of MDF with a hole, in front of a sparse room. It's based on a cell photo, but I have some experience, too – I was arrested aged ten for stealing biscuits."





DAN BURN-FORTI

Photographer Burn-Forti took a whistle-stop tour of Europe to photograph just a few of our 100 hottest startups: "We shot ten portraits, in five countries, in as many days. The time constraints made the shoots very spontaneous – but that just adds to their charm."



JONATHAN BALL

Cardiff-based illustrator Ball provides the opening image to the How To section this month – how to cast concrete using LEGO: "It sounds like a great idea – though I'd rather live in a house made of LEGO. The image is 3D CGI, but I wanted it to look hand-drawn."



REBECCA SWARBRICK

WIRED's tablet producer doesn't just ensure our app edition hits devices on time – her super-neat handwriting has graced many a feature, including the WIRED 100: "I used a brush for a bold, free style. I don't think a robot could do it – letters need a personality."

PHOTOGRAPHY: DAN BURN-FORTI; OLAF BLECKER

OFF-PAGE

Want to air your views on WIRED?
Get in touch:
rants@wired.co.uk



MAGAZINE
JOIN THE COMMUNITY

"I must thank Ben Hammersley for his fascinating article on Estonia (The e-resident, 07.15). I read it on the way to giving a talk on the possibility of moving the justice system online. The piece inspired me to mention it to my audience. I must become an e-Stonian." **Graham Ross, via email**

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MAGAZINE
OF LITTLE INTELLIGENCE

"Why is 'stock market data' the first thing that comes to DeepMind when asked about the possibilities of this algorithm (Inside Google's super-brain, 07.15)? You could be solving cancer or the water crisis, but you're thinking about the stupid stock market!" **Amine Rehioui, via Facebook**

MAGAZINE
FANTASY ISLAND

"Attempting to create a digital replica of all life on the island of Moorea is another example of an environmental model that will predict nothing (Digital desert island, 06.15). Over 99.99 per cent of species are <1mm. Model *them* before thinking about the planet." **Peter Austin, via Facebook**



From the WIRED Money stage, #1:

"The reality is it's almost impossible to keep everything out. We must assume it will get in." **Mike Lynch, Invoke Capital, on cybersecurity**

EVENT
FROM THE WIRED MONEY STAGE, #2

'Bitcoin is not smooth jazz. Bitcoin is punk rock. Deal with it'

Andreas M Antonopoulos, entrepreneur and author



MAGAZINE
RIPPLE FARM

"Not enough is done to harness sea power, so it's good to see wave farms as a solution (Surf's up, 07.15). Plans for a 10mW farm off the coast of Cornwall should worry investors though – that's enough to power a laser pointer and not a lot else." **Oli, via email**

"I'm pretty sure this is Skynet masquerading as a startup (Server in the clouds, 07.15). Nice try, cyborg John Connor." **Sam Lundin, via wired.co.uk**


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FROM THE EDITOR

We spend a lot of time with crazy startups at WIRED – meeting insanely ambitious mission-driven founders, as well as those running horribly boring businesses that happen to generate billions in revenue. Our team mines events from Berlin to Budapest in search of the next Skype or Supercell, and we've got pretty good at cutting through the hype to identify who you need to know about. If we were VCs, we'd be charging you 20 per cent on any upside of our tips, plus healthy percentage fees to fill the office with lab-grown truffles.

Maybe that's the future business model for media... Actually, forget about it – we're simply here to get excited about the companies that are putting Europe's tech firms on the global map.

This month we pool our collective knowledge to bring you not one but two of our annual research projects. In the supplement, we scour Europe for the 100 hottest startups – those generating the most buzz and prompting local admiration in the ten most energised cities that our editors visit. And in the main magazine, we reveal the 100 most influential individuals in the wider WIRED world, as nominated by more than 200 people in our network. The only rules for nomination to the WIRED 100 are that the individuals must have a strong European connection, if not a base here; and they are being judged on their influence today, rather than historic achievements or funding raised.

It's worth explaining our methodology for both projects, as we take a great deal of care to ensure our surveys are as objective as they can be. For the European startup supplement, collated by deputy editor Greg Williams with help from WIRED contributing editor David Baker, we decided which ten European cities were on a roll, and then interviewed all our local friends, from investors to policymakers, to tell us who they felt should be in our list for their city – with their own investments or business interests not counted. For the WIRED 100, as in each of the past five years, we wanted to identify not success nor wealth, but influence: that special ability to touch the culture, to build scalable success, to connect millions of people. From investors to inventors, engineers to e-commerce innovators, we collated hundreds of suggestions on little paper tabs (paper!) on our office walls, and with the input of the WIRED team put them in order. We excluded anyone from Condé Nast for avoidance of conflict, as well as names not closely linked to Europe.

Now all that's needed is for you to tell us who we missed, who we over-promoted, who shouldn't be in the WIRED 100 at all. You know how to tell us: @WiredUK and rants@wired.co.uk



Martha Lane Fox: crossbench peer and 50th on our list

PHOTOGRAPHY: OLAF BLECKER

DMA MAGAZINE OF THE YEAR 2014 • DMA TECHNOLOGY MAGAZINE OF THE YEAR 2014 • BSME ART DIRECTOR OF THE YEAR, CONSUMER 2013 • PPA MEDIA BRAND OF THE YEAR, CONSUMER 2013 • DMA TECHNOLOGY MAGAZINE OF THE YEAR 2012 • DMA EDITOR OF THE YEAR 2012 • BSME EDITOR OF THE YEAR, SPECIAL INTEREST 2012 • D&AD AWARD: COVERS 2012 • DMA EDITOR OF THE YEAR 2011 • DMA MAGAZINE OF THE YEAR 2011 • DMA TECHNOLOGY MAGAZINE OF THE YEAR 2011 • BSME ART DIRECTOR OF THE YEAR, CONSUMER 2011 • D&AD AWARD: ENTIRE MAGAZINE 2011 • D&AD AWARD: COVERS 2010 • MAGGIES TECHNOLOGY COVER 2010 • PPA DESIGNER OF THE YEAR, CONSUMER 2010 • BSME LAUNCH OF THE YEAR 2009



David Rowan

Eruptor disruptor

This dramatic flash is a lightning storm raging at the top of a volcano. The light show, observed at the peak of the Calbuco volcano in Chile in April 2015, is a phenomenon known as volcanic lightning. In a recent *Geology* paper, co-author Steve McNutt, a volcanologist at the University of South Florida, explained that this happens when particles of ash and lava shoot out of the crater and rub together, generating bursts of static electricity. "Inside the flash, the temperature can reach up to 30,000°C, and it can melt ash and rock particles," McNutt says.

Volcanic lightning has only recently started to be researched in its own right. Although it is independent of other weather conditions, there are similarities to thunderstorms – particularly when the volcanic plume is higher than seven kilometres and ice starts to form inside it. "This is referred to as a 'dirty thunderstorm'," McNutt says.

His research also found that volcanic lightning can leave behind a trail of glassy spheres measuring about 50 microns in diameter. Scientists can use them as an evolutionary chemical "signature", which could help to better understand previous volcanic activity. Get ready to flashback.

Gian Volpicelli



PHOTOGRAPHY: FRANCISCO NEGRONI



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Limited Edition - ***nabucco***

Quiet, please – global takeover in progress

OnePlus is taking on Apple with a high-end, low-cost smartphone

SHENZHEN-BASED STARTUP OnePlus expected to sell 50,000 units of its new smartphone in 2014 – its first year of production. It ended up selling more than a million. "We realised people making Android phones weren't passionate about the phone itself; they were just interested in distribution," says co-founder Carl Pei, 25 (*pictured*). With a team handpicked from China's top technology companies including Oppo, Xiaomi and TenCent, Pei's company sells a high-end smartphone at below £200. Its goal for 2015: five million sales. "We had to build out the team very quickly. Our hardware team is now close to 100 people," Pei says.

The OnePlus One runs on an Android-based Cyanogen operating system (the team is currently building its own OS, called Oxygen) and only retails through its website. It now sells to 35 countries across North America and Europe, as well as India, Taiwan, Hong Kong and Indonesia. The startup drummed up demand for the phones using virtual-reality launches and invitation-only sales. "People started selling OnePlus invites on eBay," Pei says. "It was a great way to make the product more special." A second model, the OnePlus 2, was on schedule to launch at the end of July.

Pei intends to keep the company lean, with razor-thin margins and low inventory. "Our margins are so thin that we are basically giving the phone away for free, but we want to monetise eventually," he says. "We will own and control everything from end to end, so we will have a deep integration with users. You just turn on your phone, log in and buy things without entering payment information." We're rooting for the little guy. **MV** *oneplus.net*



The OnePlus One has two cameras, a 2.5GHz processor and an LCD screen



PHOTOGRAPHY: GABRIELA HASBUN. THANKS TO THE WARWICK HOTEL, SAN FRANCISCO

A PLACE OF REFLECTION

THIS HOME IS MADE TO DISAPPEAR. DESIGNED BY AUSTRIAN studio Delugan Meissl, the two-person housing unit, Casa Invisibile, can be lifted from its foundation and moved to a different location in a couple of days. The 3m x 14m x 3m prefabricated wooden structure is designed to slot snugly inside a commercial truck. "When we built our first prototype, it was loaded on to a lorry and transported to the spot we had chosen," says Dietmar Feistel, one of the studio's partners. "You just need to prepare some kind of foundations, and connect it to the water and electricity systems. It took only one day to set the house up."

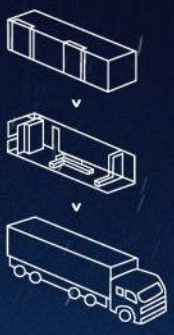
Casa Invisibile's ceiling, walls and floor each consist of three layers of timber glued together to combine strength and insulation. "We didn't think about it as a permanent house for the whole year," Feistel explains. "It's more of a holiday or weekend home." He adds that the building could also be fitted with wheels and transformed into a mobile home to circumnavigate housing laws: "In Austria, you can't move a real house wherever you want without authorisation, but a mobile house can be placed anywhere in the landscape."

Now the studio is looking for a manufacturing partner to produce the Casa Invisible to scale. The challenge is in keeping the finished product cheap and customisable. "Maybe consumers would like to use a different material for the interior, or to make it bigger or smaller," Feistel says. "We want to provide more choices." **Gian Volpicelli** *dmaa.at*

Fireproof mirrored panels help Casa Invisible to blend in wherever it is

PHOTOGRAPHY: CHRISTIAN BRANDSTAETTER
ILLUSTRATION: VAHRAM MURADYAN; GIACOMO GAMBINERI





HOME DELIVERY
The Casa units are designed to fit on the back of a lorry. For a bigger home, order more units and connect them



Netflix without the restrictions (or legality)

Popcorn Time is holding Hollywood to ransom



'IF NETFLIX PROVIDED THE SAME STREAMING SERVICE AS US – THE LATEST SHOWS, NOT REGION-LOCKED – POPCORN TIME WOULD NOT HAVE MADE IT'

Hollywood has a new arch villain. Popcorn Time, a website launched in early 2014, puts a slick veneer on illegal content streaming, with a Netflix-like interface coupled with a vast library of pirated torrents.

The app was first developed by a small group of Argentinian developers, who halted work on the project in March 2014 after movie industry bodies and ISPs threatened legal action. But it became too popular to shut down. A community of independent coders quickly took up the reins, launching a number of Popcorn Time offshoots ranging from popcorntime.io to popcorn-time.se (the latter now claims millions of users and 100,000 downloads of the app per day). In January, Netflix CEO Reed Hastings singled it out as a major competitor to Netflix in a letter to shareholders.

"We have designers, we have people working on Android, people working on the desktop version, people managing the forums," says Robert English, a Canada-based programmer and self-appointed spokesperson for PopcornTime.io. According to English, Popcorn Time won't go away until traditional streaming services abandon geolocked content and restrictions on VPNs. "If Netflix provided the same service we do – the latest shows, the latest movies, not region-locked, Popcorn Time wouldn't have made it. All the content is already available online. We don't host or create any content."

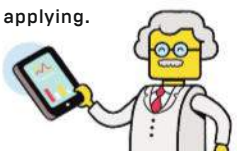
There are other reasons Popcorn Time is so popular – streaming is faster than downloading torrents, it's easy to use with a cleanly designed interface and claims to be virus-free. It's also usable wherever you live. "We're more popular where Netflix isn't available," notes English. He also claims that the site's biggest draw isn't that it's free, but the size of its library.

Until legal competitors can improve their offerings – an impossible scenario, given the nightmarishly complex network of content rights and original shows – Popcorn Time will continue to thrive. "It's possible that we'd stop developing Popcorn Time when there was something [legal] out there that had the same feature set," English admits. "But I can't say that right now because we're not there." **Chris Stokel-Walker**
popcorntime.io





BLOCKADEMIA
Listen up, LEGO-holics with academic ambitions – Cambridge University wants you. The institution has received £2.5m from the LEGO Foundation to fund a LEGO professor, who will study the role of play in children's learning. We'll be applying.





A MAY FAIR AFFAIR

THE QUIET AFTER THE STORM

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CSI: Abuse Detective

Mary Aiken is helping Interpol profile cybercriminals

Mary Aiken is a cybercrime expert. Having studied online sex offenders, self-harmers and human traffickers, the Irish psychologist heads the CyberPsychology Research Centre at Dublin's Royal College of Surgeons, where scientists study how technology distorts human behaviour. Her work has caught the eye of TV crime franchise *CSI* – this year, *CSI: Cyber* will have Patricia Arquette playing a cyber psychologist heading up an FBI unit based on Aiken's real-life work.

"The same way *CSI* helped the world to understand forensic crime, *CSI: Cyber* will do that for cyber-psychology," Aiken says. "Some people still see technology as merely mediating human behaviour, but we're talking about an immersive, disinhibiting environment that has the capacity to fundamentally alter behaviour."

As part of her work, Aiken advises Interpol on child protection, Europol on organised crime and the White House on human trafficking. *CSI* producers got in touch after hearing about her White House project, in which she presented data with a team of MIT network scientists to show how image-recognition technology could identify profiles on classified sites being used for human trafficking. "The problem is that we have a needle in the haystack in terms of criminal behaviour online," Aiken says. "We need to be better at making sense of that data."

Aiken says the long-term aim is to use the psychology behind destructive online behaviour to prevent it. The research she is overseeing should help us better understand what makes certain people vulnerable online, and may even steer some potential cyber-menaces on to the right track. "I'm working on a project with Interpol at the moment looking at youth risk-taking online," she says. "We know the pathway into criminal behaviour for youths in the real world: the wrong family, home, street, etc, but we don't know much about the pathway into cybercrime. That's what we need to shed light on."

Aaron Rogan *cypsy.com*



Mary Aiken: "Forensic science dictates that every contact leaves a trace. This is most true online."

PHOTOGRAPHY: MARK NIXON



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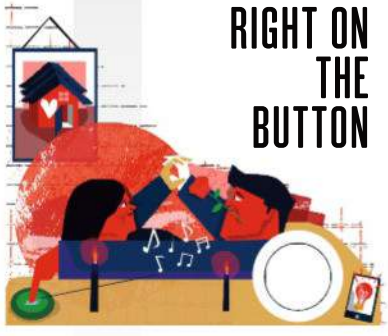
HERE'S A BOMBSHELL FOR YOU: stockpiled US nuclear missiles are making their return. This unarmed bomb was fired from a cannon-like Davis gun into a pool of water in a test carried out in New Mexico earlier this year. Conducted by Sandia National Laboratories, a research centre working for the US Department of Energy, the test is part of the US Nuclear Life Extension Program, where Sandia develops, tests and upgrades the structure of existing weapons so there will be no need to build new ones.

The blast pictured here is the first in a series of three experiments to test the B61-12, a new type of nuke that will consolidate and replace four models of missiles currently in the US stockpile. Sandia engineers wanted to test how the B61-12's nose would respond when hitting a soft target – in this case, a pool containing 5,000 litres of water. "The nose assembly is mechanically identical to the real thing," explains the experiment's lead engineer, Tyler Keil. "This is attached to an impact body that mimics the mass properties of the rest of the B61 assembly to make the test as realistic as possible."

The pool was fitted with viewports to allow cameras to capture the bomb's behaviour underwater so Keil can reassess its design before the next launch. We expect it to make another splash. **Gian Volpicelli** *sandia.gov*



ILLUSTRATION: RAJ DHUNNA



RIGHT ON THE BUTTON

Shortcut Labs' Flic button lets you remotely control features on your smartphone. A forum for creative suggestions for the $39 (£25) IoT device during its Indiegogo campaign threw up some imaginitive uses. Here are four we like. SE ***flic.io***

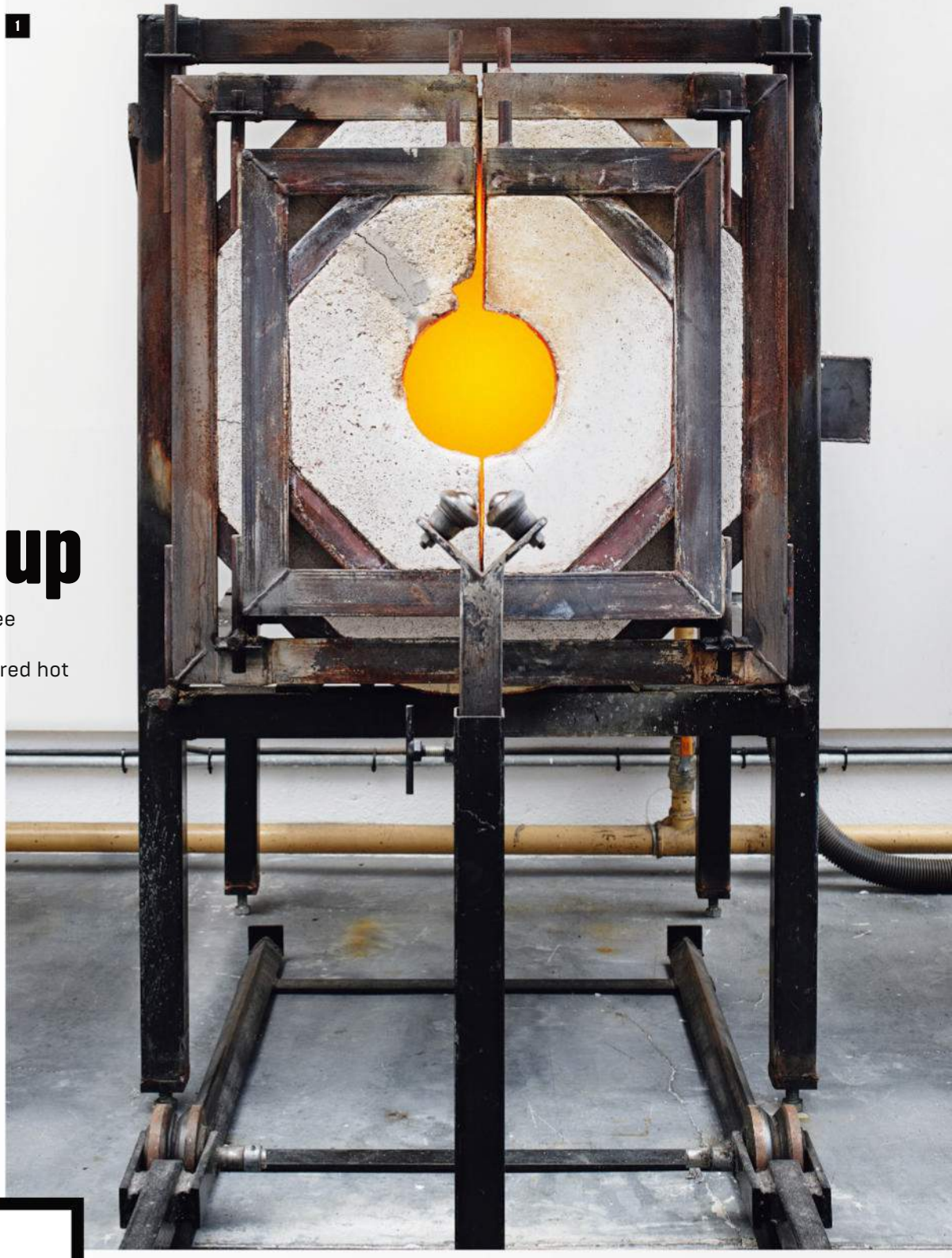
PRIVACY
Left something NSFW open on your device, or forgot to shut the payment page for your partner's present? One click of the Flic and you could instantly erase your browser's history and open WIRED.co.uk.

SECURITY
Shortcut turned the Flic into a panic button for older people to activate if they fell. But one forum member suggested a twist for those in trouble: one click sends your GPS location and calls for help.

ROMANCE
Want to turn your bedroom into a love shack? According to this popular idea, a click of the Flic would tweak the lights to a seductive red and start playing Marvin Gaye's "Let's Get It On".

HOME
Make your smart home even smarter by linking your networked household devices to different Flics around the house. Cold? Hit a Flic twice to turn the heating up. Home late? Tap a Flic to turn the lights on.

1



Glass blown up

Mind the 1,000-degree melt: our series on industrial tools gets red hot

GLASS MAY SEEM FRAGILE, BUT MAKING IT IS HARD WORK, ACCORDING TO BRITISH glassmaker Michael Ruh. “Often glassmaking is perceived as a delicate process,” says Ruh, who has been handblowing glass in his south London studio for 20 years. “But you are manipulating the glass, it’s a really forceful and physical endeavour.” The cliché he hears most often is about it being described as a dance. “It’s like that to a certain extent,” he says, “but only if you think of dancers training for a performance, sweating their nuts off to look graceful.”

A small glass could take as little as ten minutes, whereas Ruh’s biggest project – a chandelier comprising more than 220 glass tubes – took two and a half months. The tools of the trade haven’t changed much, but the method of production varies from place to place. Ruh takes the Scandinavian approach, making his creations while sitting down and using his workbench as another tool for shaping. Take a look inside his studio. **Sophia Epstein** *michaelruh.com*

1
HEATING DRUM
In order for glass to be shaped it must be kept at a very high temperature, so when it gets cooler the mixed air and gas flame inside the drum is used to heat it up again. "The glass cools down quickly, so we need to reheat it frequently," says Ruh. "You have about a 30-second window of opportunity to work with the heat that you've got." And this magic moment has a peculiar name, he says: "It's called a glory hole."

2
SOFIETTA
Here Ruh is using a conical-shaped tool called a sofietta – the solid cone blocks the opening, so by blowing through the end of the metal pipe, air is pushed into the glass object. "Sometimes we use this tool to inflate the piece of glass," says Ruh. "In this instance I am blowing into it to chill the neck of the hollow object so it doesn't get too floppy."


2

TOOLKIT

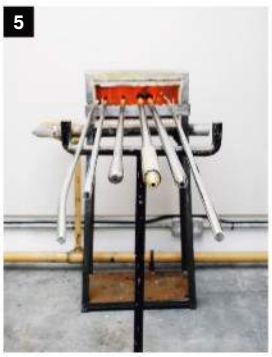

3

3
TOOLS
Once the glass has been taken from the furnace, it is shaped into blocks using these blackened cup-shaped tools (*top*). From there it is inflated, then gravity can be used to stretch it, or it is shaped using any and all of these tools. The diamond shears (*centre*) are used to pull and stretch the glass, and folded newspaper pads (*left*) are soaked in water and used as protection by Ruh as he shapes the glass using his hands.

4
FURNACE
The furnace runs 24 hours a day, seven days a week. "It burns hotter than 1,100°C," says Ruh. "Inside it is a crucible which contains the molten glass." The glass is removed from the furnace by dipping a metal rod into the molten material and twisting it, "like you would gather honey out of a jar with a chopstick".


4

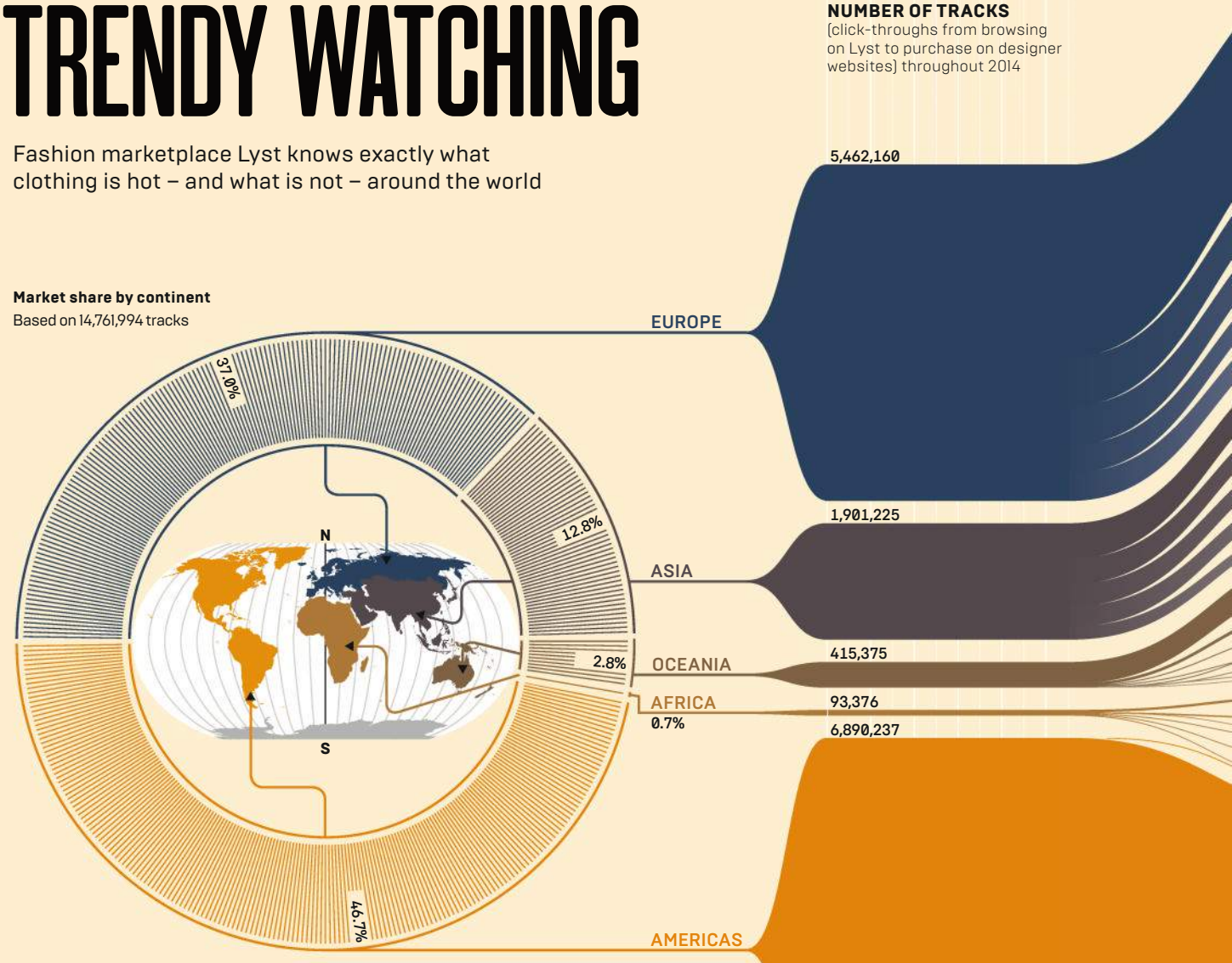
5
METAL RODS
"All of the irons that we use for making the glass need to be heated so that the molten glass from the furnace will adhere to them better," says Ruh. To this end, each hollow metal rod is warmed up over this small flame before being used to take the glass from the furnace. Air is then blown through the rod to expand the glass.


5

PHOTOGRAPHY: SUN LEE

TRENDY WATCHING

Fashion marketplace Lyst knows exactly what clothing is hot – and what is not – around the world



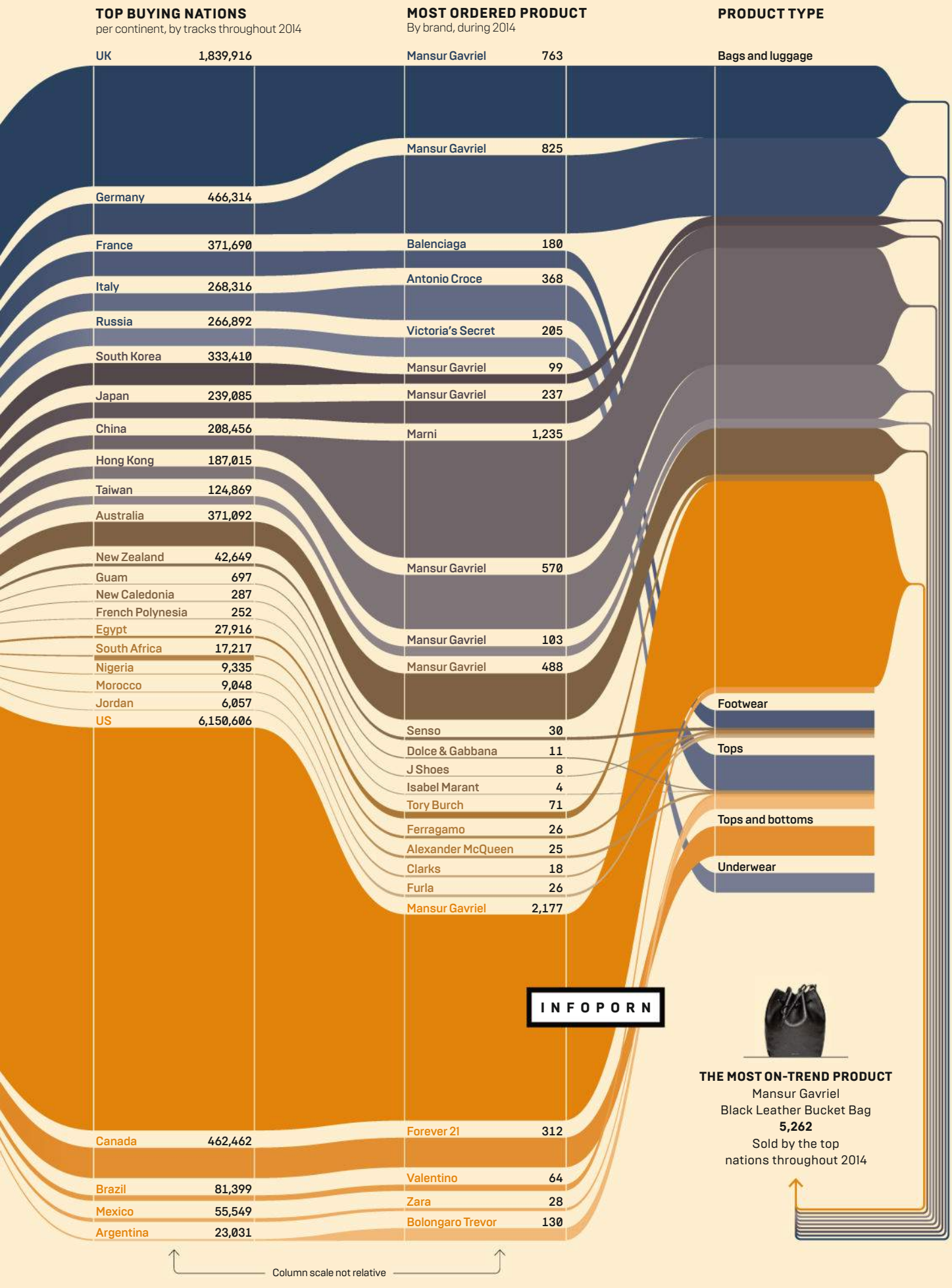
EARLIER IN 2015, LONDON-BASED FASHION MARKETPLACE LYST noticed an unusual uptick. When winter storm Juno snowed New Yorkers in, pageviews for lingerie brand Agent Provocateur rose by 500 per cent – mirroring a similar spike in Craigslist posts asking for, ahem, "friends". "It was obvious people were cosying up," says Caroline Ohrn, Lyst's head of data.

Processing more than 100 million points in analytics data every day across two million users and 180 countries puts Lyst in a unique position to spot fashion trends around the world, as illustrated in this infographic. Mansur Gavriel, for example, is the top-selling designer in major countries around the world, with 2014 sales of its Bucket Bag ensuring bags and luggage was by far the marketplace's most popular product type.

Dig deeper and the data reveals that shoppers in less traditionally fashion-conscious countries are pretty patriotic: Michael Kors and Tory Burch are among the US's top five most-bought designers, and living in the adopted home of denim, Americans spend 42 per cent more on jeans than the British. Mature markets such as France and Italy, meanwhile, are more adventurous, with local designers Balenciaga and Dolce & Gabbana sitting shoulder to shoulder with Nike and Golden Goose. "That is indicative of French culture," says Ohrn. "Buying a few classic pieces but mixing them with a cooler style."

And if you're wondering what you should be looking for when buying your killer outfit, "Rockstud" and "Fringe" are Lyst's top searches. But some things never change – the most-searched for colour is still black. **Ed White** *lyst.com*

INFOGRAPHIC: FRASER LYNESS


TOP BUYING NATIONS
per continent, by tracks throughout 2014
MOST ORDERED PRODUCT
By brand, during 2014
PRODUCT TYPE
UK 1,839,916
Germany 466,314
France 371,690
Italy 268,316
Russia 266,892
South Korea 333,410
Japan 239,085
China 208,456
Hong Kong 187,015
Taiwan 124,869
Australia 371,092
New Zealand 42,649
Guam 697
New Caledonia 287
French Polynesia 252
Egypt 27,916
South Africa 17,217
Nigeria 9,335
Morocco 9,048
Jordan 6,057
US 6,150,606
Canada 462,462
Brazil 81,399
Mexico 55,549
Argentina 23,031
Mansur Gavriel 763
Mansur Gavriel 825
Balenciaga 180
Antonio Croce 368
Victoria's Secret 205
Mansur Gavriel 99
Mansur Gavriel 237
Marni 1,235
Mansur Gavriel 570
Mansur Gavriel 103
Mansur Gavriel 488
Senso 30
Dolce & Gabbana 11
J Shoes 8
Isabel Marant 4
Tory Burch 71
Ferragamo 26
Alexander McQueen 25
Clarks 18
Furla 26
Mansur Gavriel 2,177
Forever 21 312
Valentino 64
Zara 28
Bolongaro Trevor 130
Bags and luggage
Footwear
Tops
Tops and bottoms
Underwear
Column scale not relative
INFOPORN
THE MOST ON-TREND PRODUCT
Mansur Gavriel
Black Leather Bucket Bag
5,262
Sold by the top
nations throughout 2014

HOW WILL ARTIFICIAL INTELLIGENCE ADVANCE IN THE NEXT 20 YEARS?



THE BIG QUESTION

MARIAN BARTLETT

CO-FOUNDER AND LEAD SCIENTIST, EMOTIENT

"We underestimate how hard vision is because our brains do it so well. The human brain has evolved for millions of years to be able to make sense of light patterns. Until ten years ago, getting a computer to recognise even simple objects in natural images has been elusive. Now, with advances in machine learning – many of which are inspired by our understanding of the brain – computers can recognise something as nuanced as facial expressions. This will transform the way we interact with machines. In the next 20 years it will be commonplace for devices to respond to non-verbal signals such as attention and mood." **Kathryn Nave**

CHARLOTTE GOLUNSKI

CO-FOUNDER, SENSE

"Research is underway to allow computers to be able to recognise what is being said, understand what sounds mean and recognise objects in a scene. Once we achieve this, there is the challenge of 'data fusion'. We understand the world around us by fusing information from different sources simultaneously. This helps us make faster, more accurate decisions, but is still very difficult for computers. When this challenge is solved, AI will have more use cases than we can imagine today."



JOHN GORDON

VICE-PRESIDENT, IBM WATSON SOLUTIONS

"All innovations start with a moment when a person sees something previously overlooked and recognises its potential to change the way we live. Today, new cognitive computing systems put science behind serendipity to help us see the world differently. From inspiring chefs to find new flavour combinations to helping pharmaceutical researchers spot promising treatment pathways, cognitive systems will help us accelerate our work and inspire our thinking, ushering in the next era of human innovation."



MATTHIAS SCHEUTZ

PROFESSOR OF COGNITIVE AND COMPUTER SCIENCE, TUFTS UNIVERSITY

"Data-driven statistical machine learning will allow us to surpass human performance in many areas, from solving the hardest crossword in the blink of an eye to proposing architectural designs for cities. For autonomous systems such as service robots, it will be critical to attain sufficient moral competence in order for them to navigate the complexities and intricacies of human social and moral norms without causing us unnecessary harm."



OREN ETZIONI

CEO, ALLEN INSTITUTE FOR ARTIFICIAL INTELLIGENCE

"What if a cure for an intractable cancer is hidden within the tedious reports on thousands of clinical studies? In 20 years' time, AI will be able to read – and more importantly, understand – scientific text. These AI readers will be able to connect the dots between disparate studies to identify novel hypotheses and suggest experiments which would otherwise be missed. AI-based discovery engines will help to find the answers to science's thorniest problems and ultimately revolutionise science."



RICHARD SOCHER

FOUNDER AND CTO, METAMIND

"One challenge is understanding and retaining connections between facts and concepts. If a machine could achieve this, it could become a domain expert, answer tough questions and make difficult inferences autonomously. Another major practical challenge is efficiency. Today's AI approaches require tremendous amounts of computing power. Developing more efficient and effective algorithms will be key to making the technology ubiquitous and valuable."



ILLUSTRATION: OWEN FREEMAN

The cloud that turns gamers into Titans.

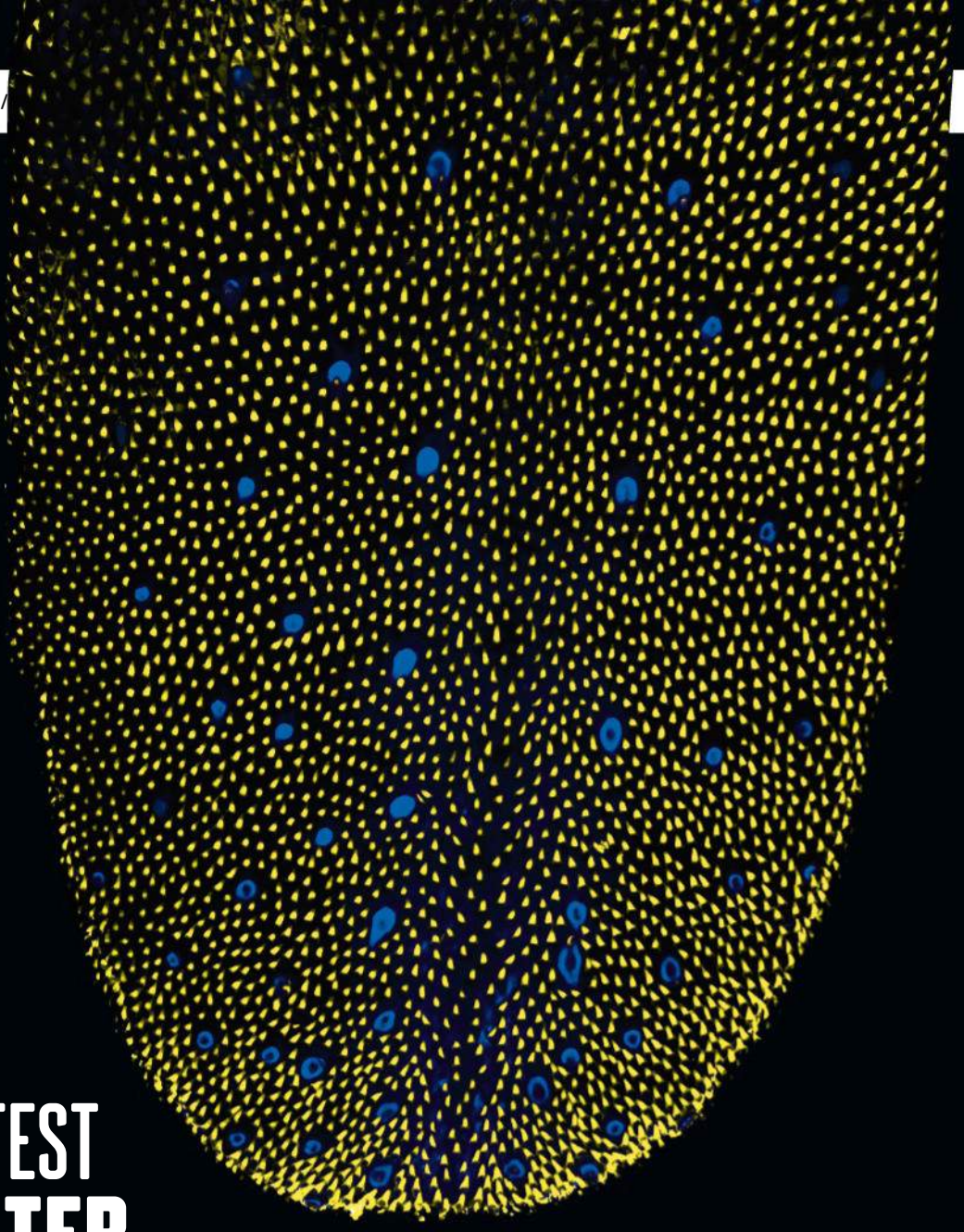
Gamers now have bigger and more exciting worlds to conquer. Using Microsoft Azure, Respawn Entertainment runs the massive universe of Titanfall, surrounding players with AI-driven characters and delivering a real-time experience unlike anything that's come before.

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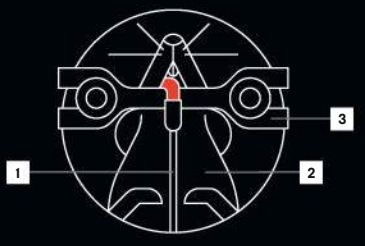
Microsoft Cloud



MOUSE TONGUE

The blue dots are taste buds. When they absorb drops of sweetener and dye they start to glow green, and the sweetness-specific taste cells will glow brighter than the others.

TASTE TEST
A BETTER MOUSETRAP



THE RODENT RIG

[1] A small suction hose pulls out and holds the tongue of an **[2]** anesthetised mouse. It's kept steady on a **[3]** steel brace.

It's tough to watch taste buds in action – you can't clamp a microscope on to a subject's tongue. As a result, researchers typically study taste cells in a Petri dish. But for bioengineer Myunghwan Choi and his colleagues at Harvard, a disembodied taste bud is useless. "All the microarchitecture is destroyed," Choi says. And without the microarchitecture – from taste pores to capillaries – scientists can't fully understand how mice (and people) receive the flavour of Camembert at a molecular level.

So, to examine a live mouse tongue under a microscope, Choi's team invented an apparatus that wouldn't look out of place in *A Clockwork Orange*. First, researchers stain the anaesthetised rodent's tongue with dye designed to glow under infrared light. Then they use a suction hose to pull its tongue out, and they steady it on a steel brace. The researcher then drips artificial sweetener on to the tongue and beams it with infrared laser light. When a taste pore absorbs the sweetener, the taste cells attuned to sweetness start to fluoresce. It's the first proof that taste cells specialise in the flavours they encounter.

The technique Choi uses to study tongue cells in action has already been used to observe neurons. So the next step is to use two laser microscope setups (and one mouse) to film the tongue and the brain at the same time, revealing the complete mechanism of taste. Perhaps science will finally discover why string cheese is so popular.

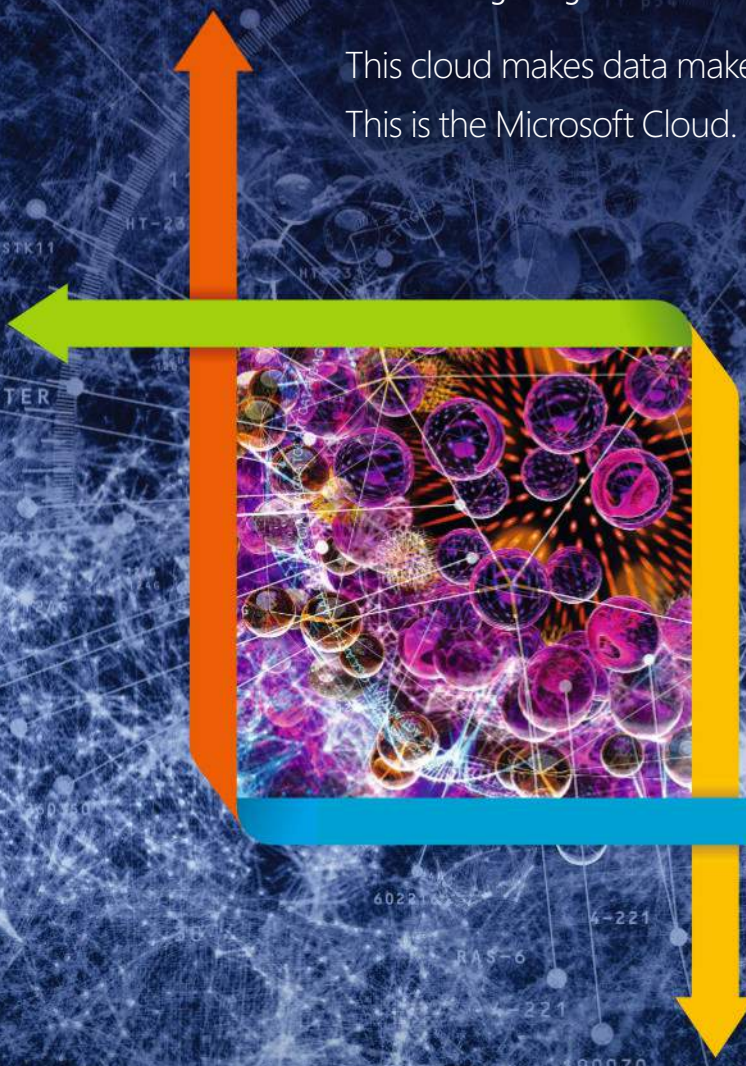
Jonathon Keats

ILLUSTRATION: GORAN FACTORY; COURTESY OF HARVARD MEDICAL SCHOOL

The cloud that is helping cure cancer.

Research that once took years now happens in hours. Using Microsoft Azure and HDInsight, scientists and engineers at Virginia Tech harness supercomputing power to analyse vast amounts of DNA sequencing information and help deliver lifesaving treatments. Now the next big breakthrough might not be found in a test tube, but in big data.

This cloud makes data make a difference.
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Microsoft Cloud



There's science in sludge

Italy's Museo della Merda proves that even cow dung has its productive uses

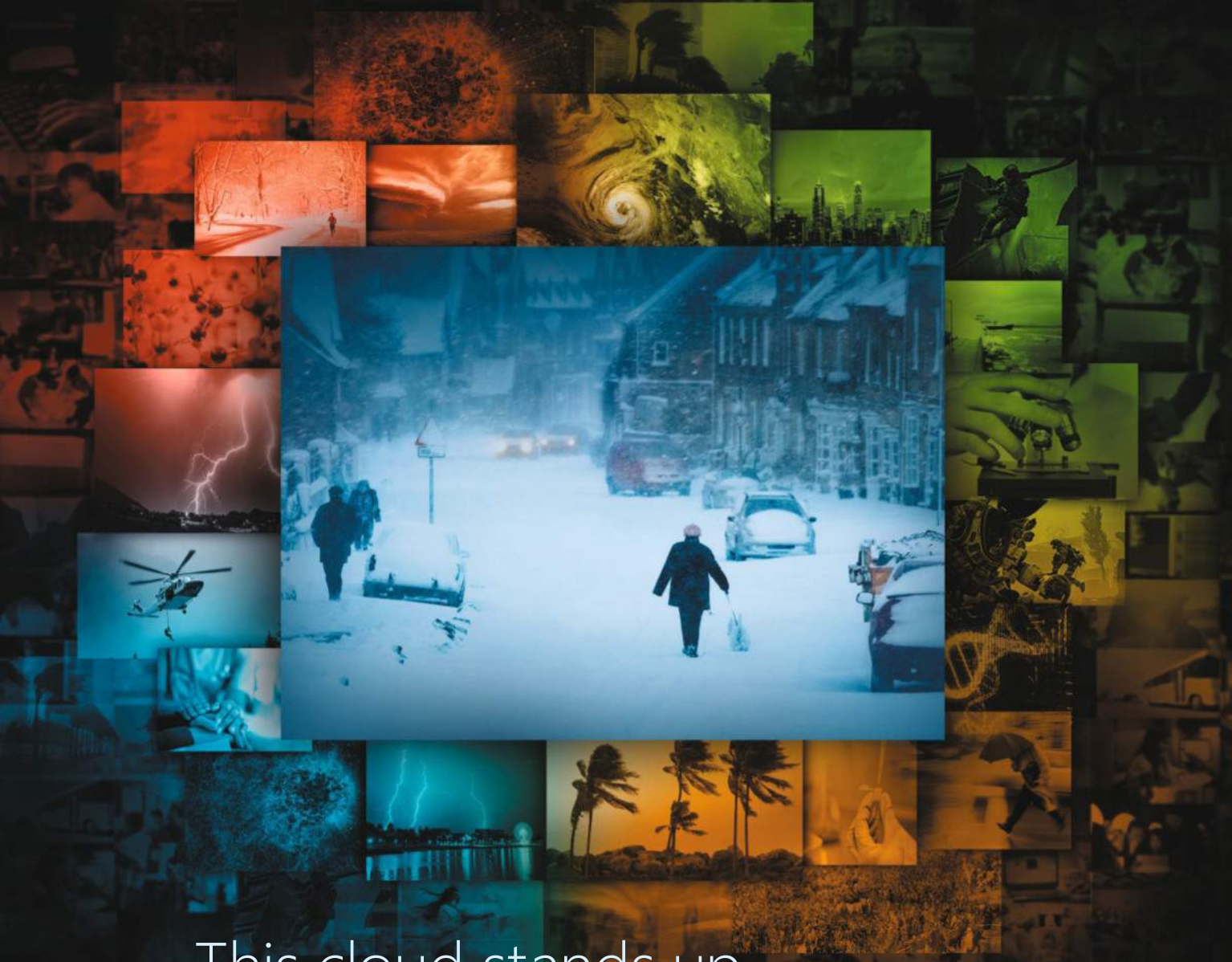
The light in these vials is created by the luciferase enzyme

THIS EERIE GREEN LIGHT IS PRODUCED NATURALLY BY BIOLUMINESCENT bacteria that feed off an unusual source: cowpats. They are part of an installation at the newly opened Museo della Merda (the Shit Museum), run by Italian cheese farmer Gianantonio Locatelli, to celebrate the power of dung. The museum is housed in a small castle on the grounds of Locatelli's farm in Castelbosco, northern Italy, which is heated using energy from harvested methane. Installations in the nine rooms reflect the idea that waste can be transformed into something worthwhile, from old medical remedies that used excrement to a hut built out of dung bricks. "Our main idea is that from shit, though a very lowly existing material, it is possible to obtain so many things," says Locatelli.

The idea came to Locatelli when he realised his 2,500 cows produce 150 tonnes of organic waste every day, and it was a challenge to get rid of it. So he decided to turn his farm into an industrial factory. Using eight anaerobic digesters, he extracts methane from the manure, which is then transformed into enough energy to power the farm several times over. "But biogas only represents ten per cent of all the material that comes out of the digesters," says Locatelli. The solids are converted into two types of fertiliser and the leftovers turned into bricks sturdy enough to be used in construction. The future of waste looks bright. **Sophia Epstein** *theshitmuseum.org*

PHOTOGRAPHY: HENRIK BLOMQUIST

WIRED	TIRED	EXPIRED
FreeBree	**Free Kevin**	Freemium
Me Books	Kindle	**Paper**
Spotify Running	**YouTube autoplay**	Netflix recommendations
UberBOAT	UberPool	**uberX**
Dollar Beard Club	**Dollar Shave Club**	Three Comma Club



This cloud stands up to any storm.

Microsoft Azure scales to enable AccuWeather to respond to 10 billion requests for crucial weather data per day. This cloud rises to the challenge when the weather is at its worst.

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Microsoft Cloud

Can cookery lessons be the salvation of São Paolo's favelas and ultra-tough women's prisons? Brazilian chef David Hertz is building a food-education network to prove that cooking can be transformative. He's the founder of Gastromotiva, which teaches favela residents to cook, and then to train others – boosting work opportunities as well as their self-respect.

Hertz, 41 (*pictured, without hat, alongside his cooks*), left Brazil to travel for seven years when he was 19. He returned with a passion for food. "Gastronomy became my guideline," he says. He trained to be a chef – and realised that food could bring people together in socially beneficial ways. "I visited a favela and thought: what if, through cooking, the residents could become what they're meant to be? By interacting with others through cooking, you learn confidence, discipline and collaboration. I call it social gastronomy."

Hertz set up Gastromotiva to offer free culinary programmes for disadvantaged youths. It has trained 1,200, many of them now cooks working in Brazil's restaurants, and who in turn are encouraged to go back to their communities and train others. Gastromotiva is also incubating food businesses inside the favelas of São Paolo. "My first trainee has a catering business that employs 20 people," Hertz says.

The movement is about to go into its fourth Brazilian city, with 25 full-time staff and around 50 part-time, funded by grants and restaurant revenue. Next up: expanding the movement to Venezuela. "Our goal is to reach more than 50,000 people in workshops that multiply our methodology in low-income communities," the TED Fellow says. "We've trained prisoners and jobless immigrants. We've built a network. These people who never had a say now have a voice." **David Rowan**
gastromotiva.org

THE FOOD MULTIPLIER

David Hertz is using viral dynamics to empower the poor

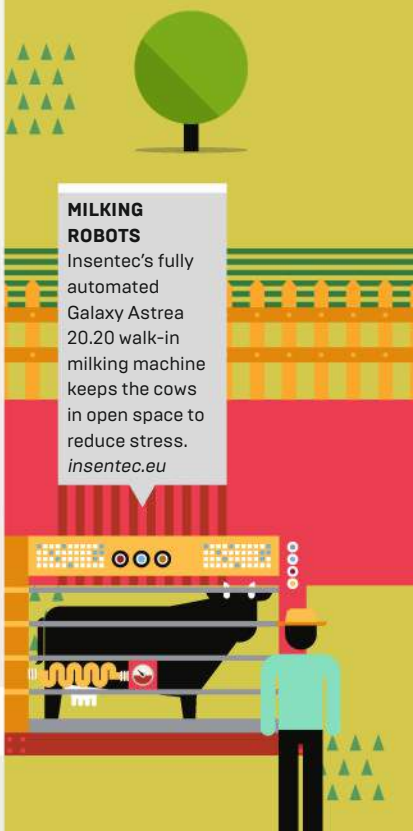


Farmville gets an upgrade

FARMERS, ADD A TOOL TO YOUR HEAVY machinery – your smartphone. From soil-monitoring sensors to sheep-herding drones, the internet of things has reached the countryside. But so have the bots, and automation is requiring rather fewer humans.

"Younger generations don't want to be farmers," says Saverio Romeo, principal analyst at Bath-based Beecham Research and co-author of the report "Towards Smart Farming: Agriculture Embracing the IoT Vision". "Robotics enables agricultural systems where you don't need as much labour, and the technology allows you to optimise the land you have through data." Data is gathered through sources ranging from weather stations to infrared cameras. This data allows farmers to refine the amount of feed their livestock require, or remotely control their connected tractors and combine harvesters. "We are moving towards more and more autonomous systems," says Romeo, "so the farmer in the vehicle is almost not needed." Here's the cream of the current crop. **Sophia Epstein**

PHOTOGRAPHY: ANGELO DAL BÓ. ILLUSTRATION: FERNANDO VOLKEN TOGNI





FLYING FARMER
SenseFly (a Parrot company) makes the eBee Ag – a UAV that flies pre-programmed routes over crops. Data is transmitted live for analysis. *sensefly.com*

MULTISPECTRAL CAMERAS
Wheat growers at Washington State University are analysing the phenotypes of crops using 3D, infrared and thermal imaging cameras. *wsu.edu*

AERIAL SHEEPDOGS
Paul Brennan of SkyFly Photography used one of his surveying UAVs to replace his brother's sheepdog in March 2015.

OVULATION ALERTS
Inseminating cattle relies on timing; sensors from Swiss company Anemon send an SMS when cows are in heat. *anemon-sa.ch*

CONNECTED VEHICLES
John Deere's JDLink connects tractors to farmers and dealers, so inspections and maintenance can be monitored. *deere.co.uk*

ORANGE PICKER
Energid is developing a pneumatic orange-picking robot that uses six cameras to locate and carefully harvest the ripe fruit. *energid.com*

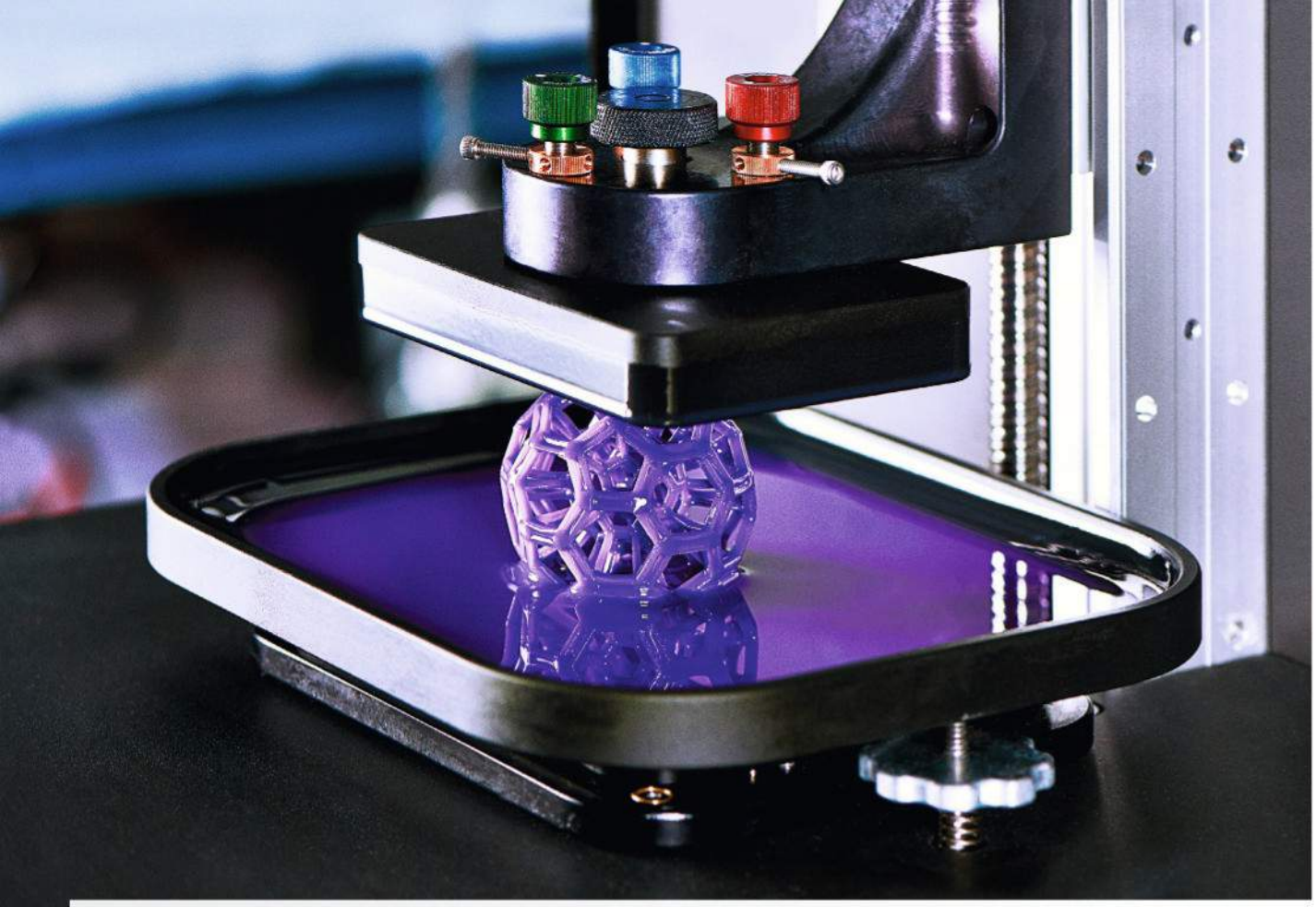
FAKE FISH
Scientists at the Pacific Northwest Laboratory have built a sensor-filled "fish" that can check how factors, such as hydropower facilities, impact real fish. *pnnl.gov*

HEAD TRIMMER
Lettuce must be thinned as it grows, so the heads don't crowd each other. Usually done by hand, Blue River Tech's robot can do this for you. *bluerivert.com*

NUTRITIONAL LIGHTS
Philips's City Farming LED lights can be used for indoor farming. It claims its custom "light recipes" optimise crop growth. *philips.co.uk*

SUPER GREENS
Israeli startup Green Onyx grows Khai-Nam – a vegetable nutritionally comparable to a mix of kale, broccoli and spinach. *greenonyx.biz*

BEE TRACKERS
To study bee behaviour, Mark O'Neill of UK firm Tumbling Dice has built tiny trackers that he's glueing to the backs of bees in Kew Gardens. *tumblingdice.co.uk*



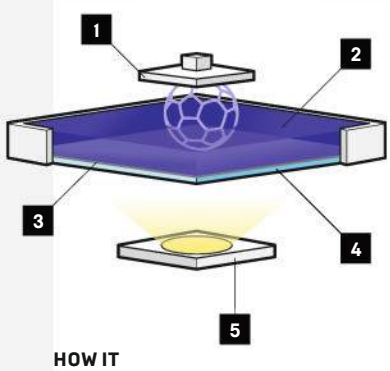
The UV 3D printer that's disrupting 3D printing

Regular 3D printers are just 2D printers on repeat, according to Californian chemist Jason Rolland. So his company, Carbon3D, created a machine that works up to 100 times faster than today's standard machines by continuously "growing" objects out of a pool of resin.

Traditional 3D printers are too slow, Rolland says: they work by sandwiching individual layers on top of one another at a pace of just a few millimetres per hour. "Carbon3D takes your speed down from hours to minutes," says Rolland, the startup's vice president of materials. Carbon3D recently developed a resin that can withstand high temperatures. "This gets us into industries like aerospace and automotive under-the-hood applications," he adds.

The company has patented its own method, continuous liquid interface production (CLIP), which relies on a balance of oxygen and UV light to liquify and solidify materials at precise points in the printing process. UV light rapidly solidifies resin, and oxygen counteracts the effect, ensuring that a thin liquid layer remains in the tray. To make the object, a small overhead platform dips into this permanently liquid source: as it pulls the resin out of the pool, the UV light solidifies it.

Carbon3D has tailored this process so that it can be used to create a range of materials, from rigid plastics to silicone rubbers. Its prototype machines are currently being tested at Ford, as well as sportswear and visual-effects companies. Carbon3D believes it will be able to print objects up to 1,000 times faster than regular machines. "It fulfills the original promise of 3D printing," Rolland says. And makes the process look cool. **Emma Bryce**
carbon3d.com



HOW IT WORKS

1 The Carbon3D's build platform lifts continuously as an object is printed.
2 UV-curable resin sits in a reservoir.
3 UV light is beamed through an oxygen-permeable window.
4 A "dead zone" of uncured resin makes it possible to print an item without stopping.
5 The UV light projects the object in cross sections, slice by slice, from below.

PHOTOGRAPHY: SPENCER LOWELL

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The web's unofficial publisher

Matt Mullenweg's software powers a quarter of all websites. Now he's targeting e-commerce



HIS MAN IS BEHIND 24 PER CENT of all the websites on the internet – from Google Ventures to *The New York Times* and eBay. Matt Mullenweg built WordPress: the open-source publishing platform which turned ten in June. With 328 employees working across 36 countries, it operates as a distributed company (Mullenweg, 31, tends to work from home in San Francisco himself), which has a freemium business model – the software is free, but 80 per cent of the company's revenue comes from users who pay a subscription for extra features or a domain name.

Mullenweg (*pictured*) took on the reins of CEO at Automattic, the company behind WordPress, in January 2014 after working purely in product development. Here he talks to WIRED about the company's move into the world of e-commerce with its acquisition of plugin WooCommerce, his investment strategy and future plans. MV *automattic.com*

WIRED: WordPress has quietly grown into a giant. What have you learned in building this platform?

Matt Mullenweg: WordPress is about to cross 24 per cent market share – which means it powers 24 per cent of all websites on the internet. A lot of the learning came from when I was a teenager, when the internet first got going. The web was actually more open in some ways: it was the dawn of Web 2.0. The idea that the web can be open and interconnected and give people control over their own destiny – I found that very exciting and wanted to work only on software that supported that. What I've learned about growth is that it's still largely word of mouth. All of our competitors like Wix and Squarespace have to spend $50 million to $60 million a year in advertising to get a much smaller numbers of users. With WordPress, if you look at the growth curve, it's just happy people telling their friends about it. Now we sign up 60,000 sites a day, but these are people who heard or read about us, they didn't see us in an ad in a magazine. That's what is most valuable.

'AT WORDPRESS WE TRY TO GIVE EVERYONE ACCESS TO THE SAME WEB TOOLS THAT WIRED AND THE NEW YORKER HAS'

Aside from Automattic, you've been an astute early-stage investor in startups such as Summly and SmartThings, which were both acquired by large companies. What's your strategy?
A lot of times with an investment, I'm looking for something that if I wasn't doing WordPress I would enjoy working on. It's not necessarily for a monetary return because I'm not a professional investor. It's things that really fascinate me, and I want to connect to the entrepreneurs. Open-source anything fascinates me, physical things fascinate me, be that home automation or 3D printing. I love when digital goes into the real world, like startups such as [food delivery service] Munchery. You can tell when the entrepreneur is obsessed with their area. That's how I am with publishing and web stuff – I'm gonna do this for the rest of my life, whether anybody else cares or not.

You have done away with a lot of standard workplace rules like having an office, recruitment through interviews and so on. Which ones have worked and which ones didn't?
We never get too attached to any way of working. For a while we tried to be totally flat – I had 45 to 50 people reporting to me. But that didn't work. I couldn't give everyone the time they needed. So we found something in the middle. We have 48 autonomous teams, some as small as three people and some as large as 15, each like a little universe. It's better than one person alone, but few enough that you can cover for each other and make each other better. There has to be a plan, but at the same time there must be flexibility so the teams can experiment with products.

'THE PLAN IS TO POWER 75 PER CENT OF THE INTERNET. IF IT'S ON THE WEB AND IT COULD BE BETTER, THAT'S AN AREA WE ARE LOOKING AT'

What do you think needs to be fixed in the online world?
E-commerce is one area. We are moving into that in a pretty public way. It's way too hard to have an independent store online, even to do basic things. If you want to sell home-made bracelets, it involves getting a merchant account, setting up with a bank and so on. It's easier for your friends to Venmo you money. WooCommerce, the company we just acquired, does make it easier, but they could be even better.

The other thing that's very important to me is net neutrality. With WordPress, we try to give everyone access to the same tools that the WIREDs and *New Yorker*s of the world have. We did the same with the access to internet, and we can't have some sites be faster than others just because they pay more. In a world like that, WordPress could have never have existed.

Any regrets?
The thing I would do differently is pay attention to international growth earlier on. WordPress is available in so many languages and international communities are key to making the software better. Last year was the first year where non-English downloads surpassed English.

You've reached your ten-year milestone. What's next?
The plan is to power 75 per cent of the internet. In May, we launched e-commerce as our new business interest. We wanted to increase our breadth beyond publishing. If it's on the web and it could be better and it frustrates people, that's an area we are looking at. We want it to be an open-source software and want people to have control and power over their identity online. That's the beauty of open-source - WordPress is basically billion-dollar software given away for free.

PHOTOGRAPHY: OLIVIER METZGER; SAMUEL GUIGUES

EARLY ADOPTERS

WHAT'S EXCITING...

TIM LANGLEY
CEO and co-founder, CANDDi



"For fitness junkies who like listening to music during workouts, I'd recommend **SMS Audio's BioSport biometric earbuds**. They have an embedded heart-rate monitor, so you can check your fitness without resorting to sweaty wrist or chest bands. I wear them while jogging – the readings are pretty accurate and the sound quality is great."

WHAT'S EXCITING...

EMMA CARR
Director, Big Brother Watch



"Everybody wants to know the secret to winning. In his book ***Winners: And How They Succeed***, Alastair Campbell sets out exactly what it takes through a mix of case studies and direct advice from some of life's winners, including Arianna Huffington, José Mourinho, Steve Jobs and Bill Clinton. Whatever industry you work in, this is certainly worth a read."

WHAT'S EXCITING...

ELAINE WARBURTON
Co-founder and CEO, QuantuMDx Group

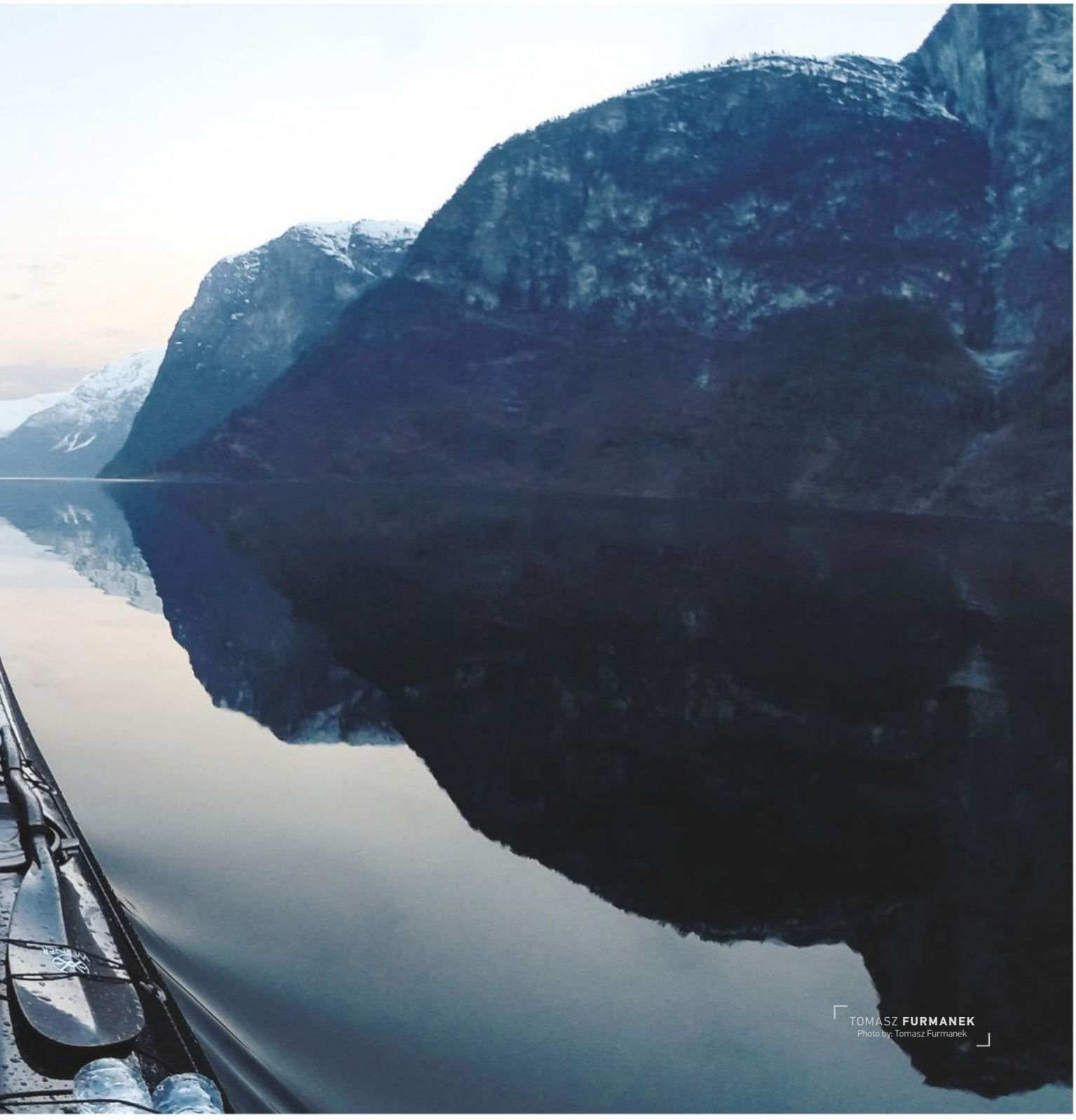


"While many people reach for their Fitbit in the pursuit of the quantified self, I've gone one step further and had a fascinating **P450 genetic screen** to determine which pharmaceutical drugs my body can process. After all, what can provide more information about you than your DNA? I love personalised medicine."
Sophia Epstein

GoPro
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TOMASZ **FURMANEK**
Photo by: Tomasz Furmanek

HERO4
CAMERAS

NEW



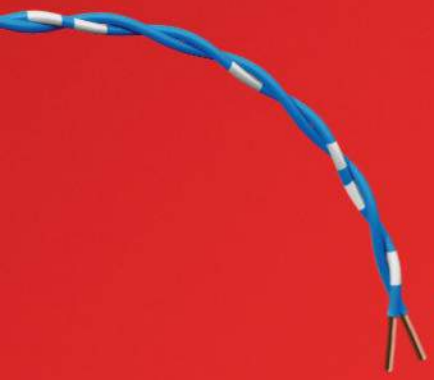


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Highest percentage of headline speed delivered over 24 hours, Ofcom Nov 2014. Comparison relates to download speeds against BT and Sky 'Fibre to the Cabinet' services. DOCSIS® 3 is a registered trademark of CableLabs.

GEAR

QUIET REVOLUTION

HARLEY-DAVIDSON PROJECT LIVEWIRE

Few bike manufacturers are more associated with the thrum of the internal-combustion engine than Harley-Davidson. However, Project LiveWire represents a shift away from the muscle of old. Harley's first electric bike swaps the classic 60° V-twin engine for a longitudinally mounted, three-phase AC induction motor, which produces 74hp and 8,000rpm. Peak torque is 70.5Nm as the bike goes from 0-100kph in four seconds and tops out at 148kph. A full recharge takes 3.5 hours and the average range is 85km. *£tbc projectlivewire.harley-davidson.com*

WIRED **LOVES**

FETISH

The longitudinally mounted electric motor is shaped to allow the rider to "hug" the bike

WORDS: JOE MINIHANE. PHOTOGRAPHY: MITCH PAYNE

ON-BOARD MOTOR

EVOLVE CARBON STREET SKATEBOARD

Getting up to speed on a traditional longboard requires plenty of flat space and skill. But this 8.5kg, 122cm, electric-powered carbon fibre and Kevlar effort means you can get away without the former – although you'll still need some of the latter in order to stay upright. Evolve reckons you can squeeze about two hours (or 45km) out of a single charge. It also helps that the motor forms part of the deck, meaning there's no unsightly power pack. *£1,185 evolveskateboardsuk.co.uk*

WIRED **LOVES**

The Carbon Street uses a 250W brushless motor, powered by a 35V Li-poly battery



You can swap these street wheels for all-terrain MBS Roadie tyres

VOLKSWAGEN PASSAT

The Passat uses a simple graphic with a diminishing bar and an audible "beep" to tell you when to go forward or reverse. It's the most intuitive setup here – and will brake to stop you hitting anything. It's also the only system on test to feature a "drive away" function that guides you out of the space. In common with the group, it struggled with perpendicular parking, requiring a stream of manoeuvres and taking over 30 seconds to park in a supermarket. While attempting to parallel park in a narrow space, the VW gave up, leaving WIRED at an angle, far from the kerb. **7/10** *£200 option on SE, SE Business, GT & R-Line. Vehicles from £23,460 to £37,170 volkswagen.co.uk*

TEST

Parallel and perpendicular parking

Drive away function



Hands-free parking

Which cars are best at putting themselves away?

Self-parking systems all work in a similar way. Ultrasonic sensors on the side of the car measure the available space and, if it's large enough, alert the driver via a dashboard display to select reverse. The steering inputs are autonomous but the driver retains control of the throttle, brake and (on manual cars) the clutch. The driver must respond to a series of prompts to select forward or reverse until the car is happy it's finished the job. The technology is still relatively crude, but in the future, autonomous cars will be able to park themselves.

WORDS: ALISTAIR WEAVER.
PHOTOGRAPHY: MITCH PAYNE; CHRIS HOARE

HOW WE TESTED

WIRED lived with each of the cars for a week, carrying out a series of parking manoeuvres in everyday conditions. When the systems allowed, we attempted parallel and perpendicular procedures. These included parking on Victorian streets in London and in supermarket car parks. We included real-world hazards, such as parking next to motorbikes. In each case, WIRED followed the manufacturer's instructions.

FORD FOCUS

The Focus coped well with parallel parking between two cars, but the sensors failed to identify a parked motorbike, and only emergency braking avoided a rather costly collision. It also struggled with perpendicular parking, striking a kerb in a supermarket car-park test. **5/10** *Standard on Titanium X model; £375 on Zetec and Titanium. Vehicles from £18,595 to £26,985 ford.co.uk*

MERCEDES C-CLASS

The C-class shares much of its tech with the S-class luxury saloon. Several times, though, the Active Parking Assist sensors failed to read an appropriate space, whether parallel or perpendicular. In common with all the cars here, the C-Class was also inconsistent on kerb distance. **6/10** *Standard on C-Class (except the SE model, £1,295 extra). Vehicles from £30,185 to £70,345 mercedes.co.uk*

TOYOTA AURIS

The Toyota Auris is the only model here not to offer perpendicular parking – and it left WIRED unconvinced by its ability to parallel park. It steered into a kerb, narrowly avoiding damage to the alloy wheel and declared itself complete even when the front wheels were pointing out into the road. **4/10** *Standard on Excel models. Vehicles from £21,685 to £23,995 toyota.co.uk*

ALL YOU NEED IS AN IDEA

July 2014
2014 Digital Creative Competition launches

PLAY WITH OUR PIXELS

August 2014
WCRS submit concept for Women's Aid

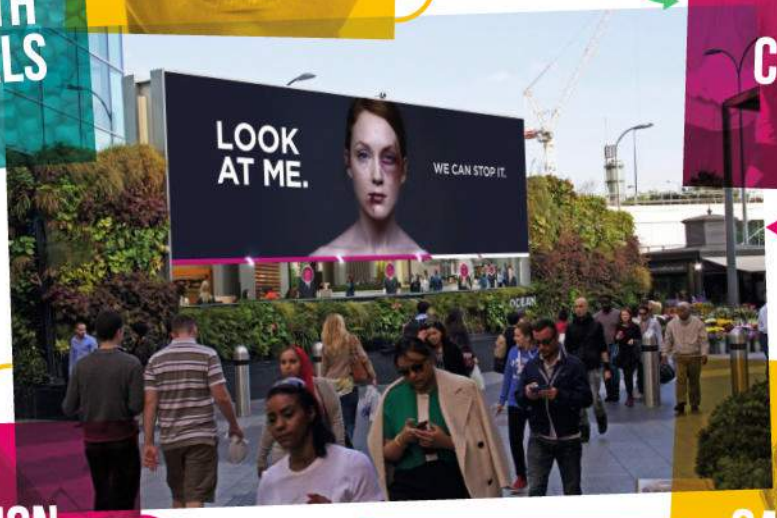
WCRS ENTER

September 2014
12 industry experts judge the entries

JUDGING

October 2014
1st Prize: Interactive Category
The IMAX, Waterloo

AWARD CEREMONY



CAMPAIGN GOES LIVE

March 2015
International Women's Day

3 DOOH LOCATIONS

World's first use of gaze recognition technology

WORLDWIDE REACH

326m coverage views in over 20 countries

CANNES GOLD

June 2015
Gold Cannes Outdoor Lion
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OCEAN

TEST

Return of the Mac

Apple's new MacBook turns out to be a competitor to the iPad Air



HOW WE TESTED

WIRED used Geekbench 3 to put the MacBook's processing power through its paces. This is a cross-platform tool that measures the computer's ability to carry out real-world tasks and investigates the true potential of each of the cores in a multi-core system. It also uses a stress test to measure the system's stability.

Further pressure was applied with real-world multitasking, including editing with Adobe Lightroom and video streaming in multiple browsers.

Having no extraordinary computing capabilities and with a starting price of £1,049, the new MacBook isn't exactly an impulse purchase. Indeed, for many, this notebook won't even begin to make sense. But since when was that a concern for Apple fans?

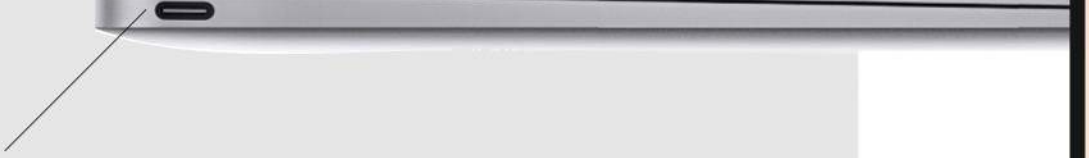
With such a skinny chassis, interior space is at a premium. To ensure every millimetre is used, most components have been reconfigured. The result is a beautiful feat of engineering.

Given its price, it would have been a serious misstep to not equip this device with a Retina display. Thankfully, Apple supplies the full 226ppi. Not only is the screen sharp and bright, but the bezel is super thin, which adds to the overall delicate look. Despite this, it doesn't feel fragile, even when open – WIRED carried it around in one hand and didn't detect any flex. At just 0.92kg, it is light enough to be a constant companion.

The keyboard is likely to divide opinion. The new butterfly mechanism that sits underneath the keys provides improved stability, but the lack of travel feels undeniably strange at first. That said, you do get used to it – it even reduced WIRED's typos. >

WORDS: KATIE COLLINS. PHOTOGRAPHY: WILMA. ILLUSTRATION: ANDREW RAE





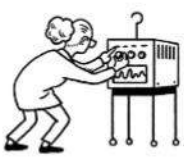
PORT IN A STORM
Apple has bravely given the MacBook only a single port – the USB-C – which it hopes will become the new standard across all platforms

The large trackpad is the recipient of some of Apple's newest ideas – the Haptic Engine provides tactile feedback such as a double-click sensation or action notifications; Force Touch senses the level of pressure applied, potentially adding subtlety and depth to your gestures. In practice, though, WIRED kept either forgetting about these, or finding them to be not as fast or effective as one might expect.

Yet for all this innovation, a surprisingly weak set of components sits under the hood – a 1.1GHz dual-core Intel Core M processor, 8GB of on-board memory and 256GB of flash storage. As a result, the off-the-peg MacBook is a bit of a wimp, and is easily outpaced by the current MacBook Air. The iPad Air – which also sits nicely in this super-slim group – is half the price, but can't match the MacBook for practicality. The MacBook isn't noticeably sluggish in use, but nor is it lightning-fast either – it can handle most web browsing and documents, but you can forget editing raw image files. For the Geekbench 3 benchmarking tests, the MacBook gets a single-core score of 2,414 and a multi-core score of 4,562. For context, this puts the MacBook below Geekbench's baseline scores of 2,500 and 5,112, which are from the mid-2011 Mac mini.

Of all the MacBook's features, it is the ports – or lack thereof – that have grabbed headlines. Whereas the Air, depending on model, can have two USB 3 ports, a Thunderbolt 2 and an SD card slot, plus a headphone socket and MagSafe 2, the MacBook does away with all (save the headphones hole) for a single USB-C that takes care of both charging and connectivity. The downside is you'll almost certainly need an adaptor if you want more than one thing plugged in, although we managed without quite nicely. On the plus side, as it's USB, you can top up your MacBook's power from an external battery, as you would your iPhone. And speaking of battery life, WIRED got an impressive full day out of it, despite using the notoriously power-hungry Chrome browser.

So, who is the MacBook actually for? Despite its expense, it's most likely to be a capable second computer, useful for mobile work (and to impress in meetings as a trophy laptop), while the heavy lifting gets done elsewhere. Is it underpowered? Yes. Do we still want one? Oh, yes. **8/10** *From £1,049 apple.com*



MAC-TO-MAC COMPARISON
Still undecided? WIRED sizes up Apple's tiny tech titans

MACBOOK
Screen 12-inch LED-backlit IPS; 2,304 x 1,440p
Processor 1.1GHz/1.3GHz dual-core Intel Core M
RAM 8GB
Storage 256GB/512GB
Height 0.35–1.31cm
Width 28.05cm
Depth 19.65cm
Weight 0.92kg
Graphics Intel HD Graphics 5300
Connectivity 802.11ac (a/b/g/n) Wi-Fi; Bluetooth 4.0
Ports USB-C; headphones
Camera 480p
Battery Up to 9hrs hours wireless web; 10hrs iTunes film playback
From £1,049

MACBOOK AIR
Screen 11.6-inch LED-backlit; 1,366 x 756p
Processor 1.6GHz i5/2.2GHz i7 dual-core Intel Core M
RAM 4GB/8GB
Storage 128GB/512GB
Height 0.3–1.7cm
Width 30cm
Depth 19.2cm
Weight 1.08kg
Graphics Intel HD Graphics 6000
Connectivity 802.11ac (a/b/g/n) Wi-Fi; Bluetooth 4.0
Ports 2 x USB 3; Thunderbolt 2; SD; MagSafe 2; H/phones
Camera 720p
Battery Up to 9hrs wireless web; 10hrs iTunes film playback
From £749



FETISH

The set uses 16 shades of grey and 16 shades of red to represent the opposing sides

WORDS: JEREMY WHITE.
PHOTOGRAPHY: WILMA.
ILLUSTRATION: ANDREW RAE

CHECK THIS

CHESS SET BY XYZ INTEGRATED DESIGN

Design firm XYZ Integrated Architecture, creator of the 60 Red Chair, has brought a colourful approach to a very traditional game. The clear acrylic board is, in fact, a tray on which players can place any fitting object to create a board. The wooden chess pieces floating above are stripped down to the utmost, yet a resemblance to the classic figures is still distinguishable. And if regular chess isn't raunchy enough for you, the set's creators have exaggerated the "sexual characteristics" of the king and queen. Oo-er. *$2,900 xyz.com.ge/cheset.php*



WIRED LOVES



SPEED SCREWING

MAKITA 18V LXT AUTOFEED SCREWDRIVER

Makita's auto-feed screwdriver is designed to bring an end to fumbling for fixings while you're in the middle of a job. A strip of screws reloads the powered head ammo-style, to make securing everything from plasterboards to flat-pack furniture faster than ever. An overall weight of just 2.3kg and an anti-tilt system all but eliminates wonky insertions. *£396 makitauk.com*

Loaded strips come in belts of 50, and range from decking to drywall screws

Take on the tough stuff

WIRED gets hands-on with the latest tool technology

WORDS: JOE MINIHANE. PHOTOGRAPHY: WILMA; DAVE LIDWELL



BEGINNER'S WORKBENCH

CEL POWER8WORKSHOP PRO WS4E

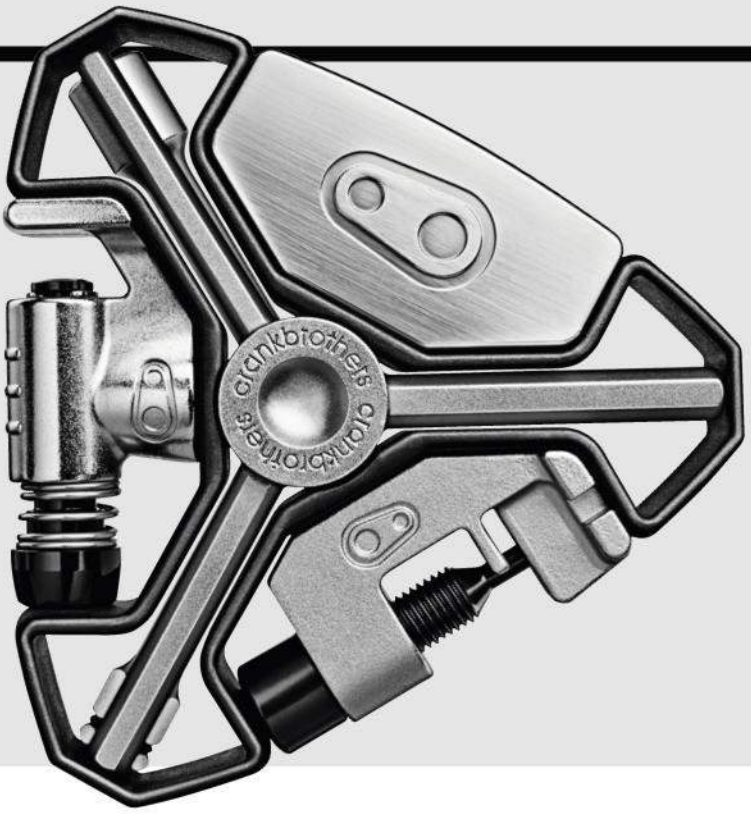
This all-in-one set is the ideal package for those looking to turn their potting shed into a serious workstation. As well as a hammer drill, jigsaw, circular saw, torch and assorted blades, it includes a solid-machined aluminium work surface. That means there's no need to fashion a creaky work bench from cast-off materials before you dive into the maker community. *£450 cel-uk.com*



MULTI-BARROW

AEROCART 8-IN-1 WHEELBARROW

Claiming to make a 90kg load feel more like 77kg, thanks to its two-wheel Turbo Lift system, Aerocart's 8-in-1 wheelbarrow does so much more than lug rubble and dirt. Its convertible design means it can double up as a sack barrow for carting boxes, and a dedicated strap means you can shift large pot-plants without having to coax a helper into some heavy lifting. *$89 worx.com*



TRAIL TOOL

CRANK BROTHERS Y16 MULTI-TOOL

This smart multi-tool from mountain-bike obsessives Crank Brothers is perfect for mechanical mishaps while on the trail. It comes with spoke keys, a chain tool, magnetised Allen key heads, Torx keys, plus Phillips and flathead screwdrivers. There's even a CO_2 inflator. And at just 260g you won't even notice it in your pack. *£40 crankbrothers.com*

The flat and round shovel heads use 16-gauge steel; the scoop is plastic



DIGGABLE TECH

BOSSE TOOLS SHOVELS

Whether you're digging out the allotment or clearing snow from the path, Bosse Tools' shovels are a cut above. All feature a durable D handle with an ergonomic rubber grip. However, it's the rotating centre bar that makes them stand out. This allows a greater range of body motion and a more upright stance, so shovelling is less back-breaking. Available in scoop, flat and round head. *From $69 bossetools.com*

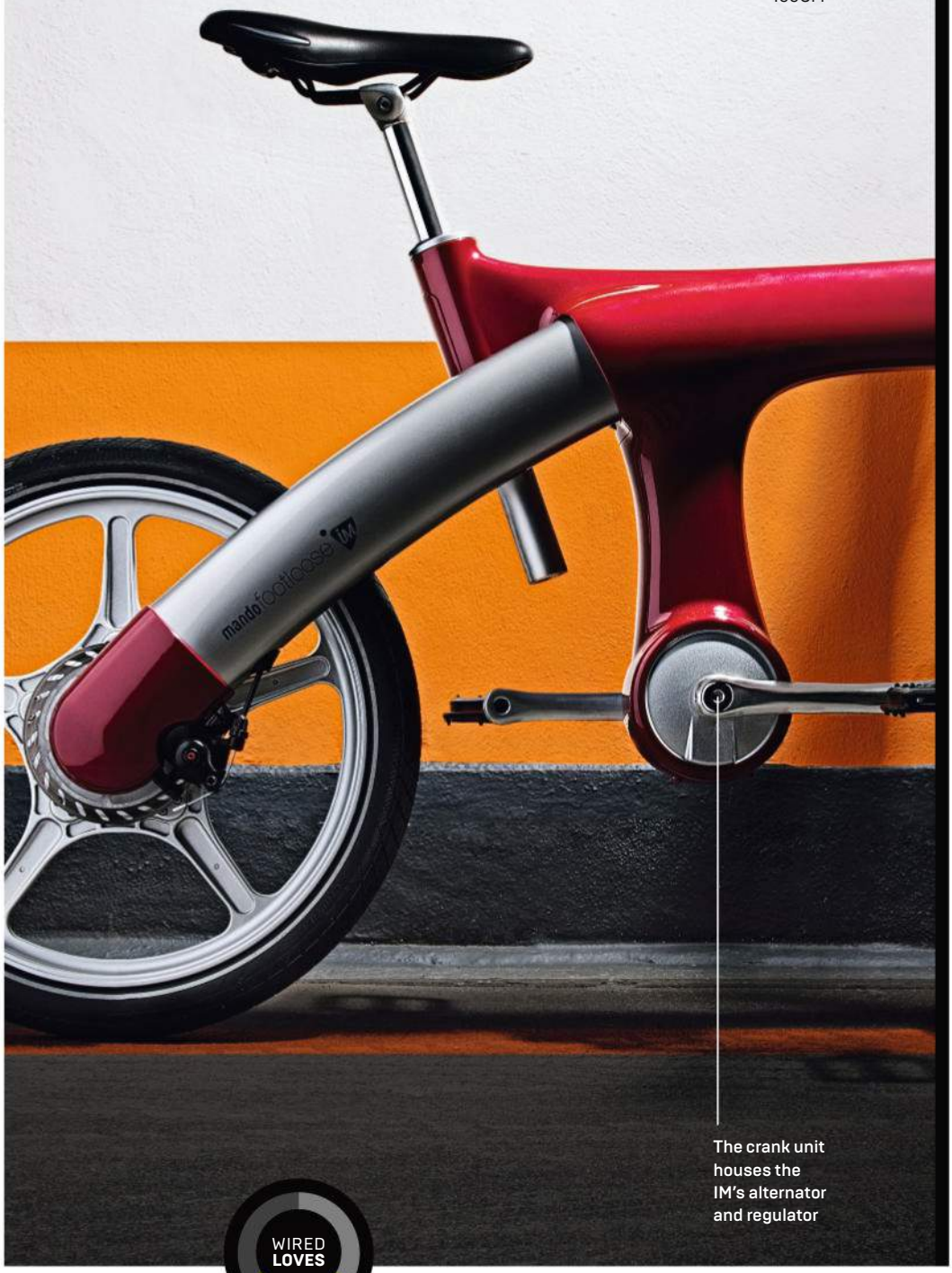
FANCY-FREE

MANDO FOOTLOOSE IM

Without a chain or a belt drive, Mando's Footloose IM is a standout proposition among e-bikes. Once they hop on and get pedalling, riders charge a 36V battery which powers a 250W dual-winding motor. Unlike the original Footloose, the Footloose IM isn't foldable, which for WIRED is no loss, as it means it looks sharper and costs notably less. A top range of 60km makes it ideal for commuters who don't want to join the Lycra brigade. *£1,999 www.mandofootloose.com*



155CM



The crank unit houses the IM's alternator and regulator

WIRED LOVES



1 OUTSOLE
Deeper than the previous version, the new 32mm outsole is designed to last longer

2 MEDIAL PATCH
Chuck Taylor's iconic signature patch (added 1932) is now stitched, rather than glued, to the boot

3 TONGUE
With a view to improve wearer comfort, the Chuck II has a foam-padded collar and non-slip padded tongue

STREET LEGEND REBOOT

When modern materials meet classic styling

4 INNER SOLE
Made from Nike's propriety Lunarlon foam, which is 30 per cent lighter than standard Phylon foam



Converse brought out its All Star basketball shoe in 1917; then, in 1921, a basketball player named Charles H "Chuck" Taylor walked into the company HQ complaining of sore feet and suggested improvements to the design. Converse made him its salesman and ambassador, and he continued working for Converse until shortly before his death in 1969. Since then, the company mantra has been "Don't fuck with Chuck". And it hasn't. Until now.

Nike acquired Converse in 2003 for $305 million (£198m) and has finally started tinkering with the product. The result is the Chuck Taylor All Star II. Re-engineered with a greater emphasis on comfort through technically advanced materials, the Chuck II even boasts higher-quality Tencel canvas. *£55 (low-cut) and £60 (hi-tops) schuh.co.uk*

FETISH

WORDS: JOE MINIHANE. JEREMY WHITE. PHOTOGRAPHY: WILSON HENNESSY; MITCH PAYNE



TEST

PHOTOGRAPHY: MITCH PAYNE, MATTHEW ALAND, MOHDE SINGH MUNK

Medium wave reception test

Which of these Bluetooth speakers kept our Olympic canoeist entertained?

HOW WE TESTED

To put the speakers to the test, WIRED used the Lee Valley White Water Centre (visitleevalley.org.uk). We sought the skills of Lizzie Neave (*pictured*), K1 Canoe Slalom Olympic athlete and World Cup gold medal winner. Each speaker was strapped to Neave's canoe for successive runs through the centre's white-water course. Neave assessed speakers for sound quality, ruggedness and volume, and WIRED recorded the action using a GoPro Hero 4 (gopro.com). WIRED separately tested speakers while submerged, and checked to see if they still worked properly afterwards.

WATERPROOF RATINGS
IPX1: Dripping water
IPX2: Dripping water tilted up to 15°
IPX3: Spraying water
IPX4: Splashing water
IPX5: Water jets
IPX6: Powerful jets
IPX7: Immersion to 1m
IPX8: Immersion beyond 1m



1. BRAVEN BRV-X

The BRV-X delivers on all its rugged promise. It was the only speaker to be clearly audible by Lizzie Neave throughout the entire course, and audio quality was excellent, especially the bass. Transmission range was also longest in test. The extra weight allows it to act as a smartphone charger, but it did affect the canoe's handling. **8/10** *£150 braven.eu*
Waterproof rating (WR) IPX7
Weight 8.36kg
Battery life 12 hours

2. ULTIMATE EARS MEGABOOM

Despite being the most stylish speaker on test, the MegaBoom proved unsuitable for rugged use. The screw cap and rubber port cover didn't work well, making it difficult to ensure it was watertight. It did perform well in and out of the water, with a strong and clear response, but it shipped water heavily and nearly sunk. Two test units failed after immersion. **5/10** *£250 ultimateears.com*
WR IPX7; floats
Weight 8.92kg
Battery life 20 hours

3. MONSTER SUPERSTAR BACKFLOAT

The lightweight BackFloat was quieter than its rivals, but it delivered clean treble and measured bass. Although only being IPX6 rated, it handled the rapids and was audible throughout, surviving brief submersions. The only problem was its shorter battery life. **8/10** *£120 shopmonster products.co.uk*
WR IPX6; floats
Weight 2.91kg
Battery life Seven hours

4. NYNE AQUA

The Aqua was the most buoyant of the floating speakers on test. Its rubberised coating survived impacts well, but a big drawback was its sound – a generally muted and flat response meant it was almost inaudible for Neave while out in the rapids. Back on dry land, switching on the EQ bass boost only highlighted its tendency to rattle at low frequencies. **6/10** *£140 nyne.com*
WR IPX7; floats
Weight 6.23kg
Battery life Ten hours

5. ECOXGEAR ECOXBT

Large, fairly heavy and well-protected, at first glance the EcoXBT looks good. Get closer, though, and it disappoints – the waterproof flap for the USB and aux-in ports is not permanently attached and the whole thing feels cheaply made. Sound quality was also weak, rendering it virtually inaudible to Neave while canoeing, and delivering rattly bass on land. **5/10** *£90 ecoxgear.com*
WR IPX7; floats
Weight 7.18kg
Battery life Ten hours

Jeep

COULD IT BE ANY MORE PERFECT?



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There's not a single cloud in the sky and yet it's the Jeep Grand Cherokee that really shines. With its dynamic looks, luxurious interior, innovative technologies and strong, yet efficient engines things really don't get any better. Perhaps that's why it's the most awarded SUV ever.* And should the weather take a turn for the worse, you can always turn on the heated seats.^

Jeep Grand Cherokee until 30th September available with £5,000 Jeep Deposit Contribution††, 3 Years Free Servicing† and 0% APR Representative. To book a test drive or for more information visit jeep.co.uk**

Jeep® with EXPO MILANO 2015

Model shown is the Jeep Grand Cherokee 3.0 litre V6 Summit at £51,995 OTR. OFFICIAL FUEL CONSUMPTION FIGURES FOR THE JEEP® GRAND CHEROKEE DIESEL RANGE IN MPG (L/100KM): EXTRA URBAN 43.5 (6.5), URBAN 30.4 (9.3), COMBINED 37.7 (7.5), CO_2 EMISSIONS: 198 G/KM. Fuel consumption and CO_2 figures are obtained for comparative purposes in accordance with EC directives/regulations and may not be representative of real-life driving conditions. Factors such as driving style, weather and road conditions may also have a significant effect on fuel consumption. †New Grand Cherokee models excluding SRT benefit from complimentary servicing covering the car for 3 years or 30,000 miles, including protection for the first MOT on all qualifying retail sales. For roadside assistance and warranty, see website for full terms and conditions. *Claim relates to Jeep Grand Cherokee nameplate over its lifetime. **Promotion available on new Grand Cherokee models registered by 30th September 2015. ††Jeep Deposit Contribution only available in conjunction with Jeep Hire Purchase. 0% APR Representative Hire Purchase available for a 3 year term with a minimum deposit of 10% required. Finance subject to status. Guarantees may be required. Terms and Conditions apply. Jeep Financial Services, PO Box 4465, Slough, SL1 0RW ^Excludes Laredo model. Specifications are correct at time of going to press (07/15). Please visit jeep.co.uk for latest information. Jeep® is a registered trademark of FCA US LLC.

IDEAS BANK

IAN LESLIE

Don't let curiosity be killed by cats

A few years ago a Reddit user posted the following question on the site: "If someone from the 1950s suddenly appeared today, what would be the most difficult thing to explain to them about life today?"

The most popular answer was this: "I possess a device, in my pocket, that is capable of accessing the entirety of information known to man. I use it to look at pictures of cats and get in arguments with strangers."

It's funny because it's true. Today, there is enough information in the world for every person alive to be given three times as much as was held in the ancient library at Alexandria. It was believed to hold the world's entire store of knowledge. Now nearly all of it is available to anyone with an internet connection. We ought to be living through a new golden age of intellectual exploration, a truly global and universal Enlightenment. It doesn't quite feel that way, does it?

When you looked around at your fellow commuters this morning, they were all locked into their smartphone screens, playing games or looking at pictures of a friend's puppy. Twenty years ago, at least half of them would have been reading a book or a newspaper. What they were reading might not always have been very edifying, but they were making at least the pretence of an interest in the world outside their own bubble.

We know the internet's irresistible power to entertain can distract us from even the smallest effort to enrich our understanding of the world. But there is a second, subtler way in which it endangers the spirit of enquiry. By making answers so abundantly available, it can even degrade our capacity to ask questions.



Ian Leslie is the author of *Curious: The Desire to Know and Why Your Future Depends on It* (Quercus)

Aristotle called curiosity "the desire to know". The itch of curiosity arises in what the psychologist George Loewenstein calls an "information gap": the gap between what you know and what you know you don't know. If you don't grow interested in your own ignorance, you quickly become incurious. The trouble is that Google and Wikipedia are so stunningly efficient, we spend little time inside that gap.

The questions we ask of the internet don't linger inside our minds for very long, and, as a result, they have little time to develop and deepen. When we get an immediate and perfectly serviceable answer, the question disappears, along with our curiosity. When Google's head of search, Amit Singhal, was asked if people are getting better at articulating their search queries, he sighed and said: "The more accurate the machine gets, the lazier the questions become."

None of this is to say that the internet is making us incurious. It can't do that: the wonderful thing about curiosity is that nobody can take it away from you. Indeed, Google and Wikipedia are the greatest tools for curiosity ever invented. Every day, they launch millions of journeys of intellectual exploration. But you have to decide to use them that way. Curiosity is a choice. According to psychologists, there are, broadly speaking, two types of curiosity. Diversive curiosity is the simple desire for new answers: it's what drives us to turn over a rock or click on the dailymail.co.uk sidebar. It requires minimal effort – it's more of an instinct. Epistemic curiosity is the quest for knowledge and understanding. It's about the pursuit of new questions. To someone who practises epistemic curiosity, an answer is just a tantalising reminder of what she doesn't yet know.

The internet is an amazing machine for generating diversive curiosity. But epistemic curiosity requires conscious effort: reading the book referenced in the Wikipedia page; not being satisfied with the first answer you get on Google. We also need more online spaces that cultivate the art of asking. Quora, for instance, is a showcase for great questions as much as a forum for answers. Kevin Kelly, founding father of US WIRED, put it like this: "When answers become cheap, good questions become more difficult and more valuable." Let those questions incubate in your mind, and don't let your curiosity be killed by cats.



ILLUSTRATION: MATT CHASE

CLIVE THOMPSON

The future of video goes way beyond niche broadcasting



Clive Thompson writes for US WIRED and is the author of *Smarter Than You Think: How Technology is Changing Our Minds for the Better* (William Collins)

When the streaming apps *Periscope* and *Meerkat* went live earlier this year, a strange trend emerged. People started broadcasting the contents of their fridges. Yes, their fridges. They'd stand in their kitchen and tour through their milk and odd leftovers. And when they weren't peeking inside their fridge, their viewers would demand they do so, using hashtags such as #showusyourfridge. (Even the Nasa astronaut Chris Hadfield felt the pressure during a livestream, when people in his audience typed, "Tell us about space fridges!".)

Whenever a new tool comes along, tech-savvy pundits write hyperoxygenated riffs on What It All Means. They're fascinated by high-stakes money questions. So the questions about livestreaming were mostly about fame and profit. Will people use it to create new forms of celebrity stardom? Will they upend news gathering or political campaigning? Will they pirate movies in real time?

Nope. They'll use livestreaming in the same way every new technology is used – to do things that nobody expects. Things like #showusyourfridge.

The real significance of a new medium isn't in how famous people use it or how businesses use it. It's in the mundane uses. You'd think we'd have learned this lesson by now. When a new form of communication suddenly becomes cheap and easy, people don't merely copy the stuff on TV and in Hollywood. They do new things. Weird things, too. Things which violate previous ideas about aesthetics and utility.

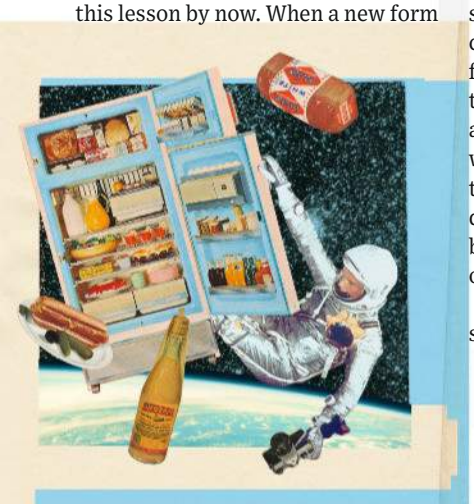
For most of the 20th century, shooting and distributing video was so expensive that people used it mainly for profitable, high-stakes purposes: TV, films, instructional video. When digital cameras and YouTube made it cheap, people began shooting things that previously would have seemed wasteful or silly: reaction shots, unboxing videos, extended cuts of puppies sleeping. The future of online video was never *The Sopranos*. It was Warhol's *Empire*, eight hours of the Empire State Building.

Sure, livestreaming will create hit shows and celebrities that resemble those in traditional broadcasting. In fact, it already has. Twitch, a site where you can broadcast yourself playing video games live, has 1.5 million broadcasters, many of whom have audiences so big that they get sponsors and do it for a living.

But the other 99 per cent – the long tail of users – are streaming to a tiny handful of people (a median of two, according to one study). Those tiny groups aren't an economic powerhouse. They aren't celebrities. They're something more consequential: a cultural shift. They're creating a new form of socialising, using Twitch to hang out and shoot the breeze, across state lines or even time zones, with video games as the glue. Even the folks who made all this software didn't see it coming. "It's an emergent behaviour," Twitch vice-president of marketing Matthew DiPietro says.

You can see similarly unexpected small-group behaviour on Meerkat. "We had one woman teaching a workout, and as people typed questions she'd alter her workout," Meerkat community director Ryan Cooley says. "The people watching the show are basically co-creating it." Houston programmer Adam Wulf streamed himself for two weeks while coding an iPad game. On average, only ten people were watching at any given time. But the fact that they were there improved his work. "People were watching, so I wanted to get it done," he explained. "I got better at cutting out features and paring it down."

These are audiences so small that they redefine niche. It's not something of interest to a small number of people – it's an uncountable number of somethings of interest to an infinite number of people, mundane in the aggregate but individually compelling. Not one fridge – but all of them.



GEOFF COLVIN

The robot takeover lacks empathy



Geoff Colvin is the author of *Humans Are Underrated: What High Achievers Know That Machines Never Will* (Portfolio)

F

or workers, educators and policy-makers, it has become one of the most troubling questions of our time: what will people do better than computers?

No job seems safe. Computers conduct discovery in lawsuits, sorting thousands of documents faster, more perceptively and far less expensively than human lawyers.

They drive cars better than people do. They write articles in papers (without your knowing it) and judge more accurately than people do the danger you pose to others when you cross international borders. They even perform some surgeries more proficiently than a human.

As technology gallops ahead, what will be left for us? That didn't use to be a problem. Over time and across economies, advancing technology has always increased jobs and raised living standards. But a growing number of economists and tech experts wonder if that will continue. Former US Treasury secretary Larry Summers is among the sceptics. He says that after a lifetime of believing otherwise, he's "not so



completely certain now" that technological progress will be good news for workers. He believes it will be "the defining economic feature of our era".

The usual approach to divining how humans will add value in the computer age has been to ask what computers cannot do. That's the wrong approach. Every time we try to answer that question, we're proven wrong eventually. Mainstream experts have long argued that computers would never be able to translate languages very well or play chess above a mediocre level; as recently as 2004, some very smart economists argued that driving a vehicle was just too hard for a computer ever to manage.

Don't ask what computers can't do. As their abilities multiply, we simply can't conceive of what may be beyond them. To identify the sources of greatest human value, ask instead what will be those things that we insist be done by or with other humans – even if computers could do them. These are our deepest, most essentially human abilities, developed in our evolutionary past, operating in complex, two-way, person-to-person interactions that influence us more powerfully than we realise. Empathy, working in groups, storytelling, social sensitivity, building relationships, leading – these are abilities that we will continue to value highly because we're hardwired to value them. But only in other humans.

As tech takes over more functions, employers increasingly demand these human abilities. When Oxford Economics asked global employers to name the skills they most want, they emphasised "relationship building", "teaming" and "co-creativity". The CIO of a major UK retailer, who oversees a staff of coders and assorted techies, told other CIOs at a private conference that what he most needs now are "people who are empathetic and collaborative... I can't have a good IT architect who has to be locked in a room."

These developments cast conventional career advice in a new light. Education in STEM, while still valuable, won't be enough. An advisory group of British educators and CEOs chaired by Roy Anderson, asked to recommend changes to secondary education in the UK, concluded that "empathy and other interpersonal skills are as important as proficiency in English and mathematics in ensuring young people's employment prospects". The group urged that these skills be taught to all secondary students, "but with the process of learning these starting much earlier in school life".

Technology is re-ordering the value of skills in a fundamentally new way. As we try to understand how, let's accept that we'll never know what computers can't do. But as technology advances, we can guide our children, our colleagues and ourselves, certain in the knowledge that we humans will continue to value most highly the abilities we find deeply compelling.

ILLUSTRATION: MARK LAZENBY; DAVID DORAN

ROBIN FARMANFARMAIAN

Patient power will fix our ills

In the past, the doctor-patient relationship was a one-way street. A patient visited a physician for a diagnosis, the physician told the patient his or her assessment, and the patient went home (hopefully) to comply with the physician's recommendations.

Healthcare will improve only when patients are seen by the healthcare system, and physicians in particular, as partners and decision makers. Imagine this. A teenager gets sick, allows her doctors to dictate her care... and it leads to a misdiagnosis, 43 hospitalisations, six major surgeries and three organs removed. That was me. At 26, I fired all my doctors, and not only did the decision likely save my life, it gave me back my life. I took control of my healthcare, worked with doctors who treated me only like a peer, got diagnosed correctly (Crohn's disease) and, with the correct meds, was in remission in 24 hours.

With the wealth of information available online today and the advent of sophisticated health technology, such as ingestible sensors and wearables that monitor patient activity, the doctor-patient relationship can now enter the second stage in its evolution.

Healthcare can now be two-way, where patients are more informed and empowered regarding their health. They can become more involved in their own healthcare by researching their conditions, tracking their symptoms and measuring their progress. Physicians, in turn, can save time, see more patients and engage in more productive, insightful one-on-one discussions.

The new era of doctor-patient relationships means that patients are no longer on the sidelines when it comes to their health. In fact, the role of the patient has shifted from benchwarmer to star player, meaning visiting the doctor is like checking in with a coach: patients come to their appointment, review their progress, >



Robin Farmanfarmaian is senior VP of Arc Programs, VP of Invicta Medical and executive director of the Organ Preservation Alliance

listen to the physician's recommendations, go home and try to improve.

The patient's new role means improved health outcomes overall. Research shows that giving patients more autonomy and involvement in their healthcare actually increases the effectiveness of treatment.

Patient-driven healthcare also means patients have the information they need to improve their health daily. Wearable and sensor tech can give patients immediate feedback that helps them get better about taking their medication, eating well and exercising. In the next few years, this industry will explode and we'll be tracking everything. By 2019, the wearable-medical-devices market will be worth $5.8bn (£4bn) a year and there will be 5.5 billion users of mobile and wearable biometrics worldwide.

One of the tools that's empowering patients is the electronic medical record (EMR). Patients who have access to their own data make better-informed decisions, and the key to this is the EMR. Physicians worldwide are starting to see this, especially in the UK, and want a comprehensive picture. According to the 2012 Accenture Doctors Survey, 54 per cent of doctors are routinely accessing clinical data about patients seen by different health organisations.

In the US, more than 40 per cent of patients would switch doctors to access EMR. They can share this information with their physician, and the two can collaborate as colleagues. Collaboration, engagement and the sharing info improve health outcomes.

Patients need to stand up for themselves and demand the information, technology and resources they need to succeed in driving their own healthcare, and only then will we see dramatic improvement in outcomes.





DAVID LEWIS AND MARGARET LEITCH

Fat is a neuro-cognitive issue





David Lewis and **Margaret Leitch** are the authors of *Fat Planet: The Obesity Trap and How We Can Escape It* (Random House)

"Eat less, move more" must rank among the most misleading pieces of dieting advice ever offered. Not only does the adage minimise the difficulties of losing weight, it ignores the reality of the way our food is mass-produced, advertised and marketed.

Multinational food companies promote hyper-rewarding foods that are both energy-rich and nutritionally poor. Packed with sugar, salt and fat, they do us little or no good while tasting absolutely delicious and being almost impossible to resist. Why does unhealthy food taste so great?

Tastiness has far less to do with micronutrient content than the amount of energy the food delivers. The brain's energy requirements are astronomical. The adult brain, although accounting for just two per cent of body weight, demands 20 per cent of the energy consumed at rest (the resting metabolic rate or RMR). Among children, whose brains grow rapidly, energy demands vary between 43 per cent and 85 per cent of RMR. Which explains why anything that tastes sweet and is high in energy proves so appealing to youngsters.

Our primary nutrient sensor is located in the hypothalamus, deep within the brain. Regulating a host of physiological behaviours, this region is, like all of the brain, able to change in response to experience. Known as "plasticity", it's a blessing and a curse. On one hand, it enables us to learn and adapt to circumstances. On the other, when chronically exposed to hyper-rewarding food, it creates a craving for gratification over nutritional needs.

Energy-dense foods cause the release of the neurotransmitter dopamine – dubbed the "gas pedal of pleasure" – together with other brain-pleasers such as endogenous opiates, beta-endorphins and endocannabinoids.

This tsunami of hormones underpins the intensely pleasurable feelings that are produced by consuming combinations of sugar, fat and salt. As we seek to repeat the rewards through further consumption, the brain sets out to restore balance (maintain homeostasis) by depleting or "pruning" dopamine receptors. In order to get the same food "fix", more and more has to be consumed. After a while this creates tolerance – more usually applied to the diminished sense of delight or momentary escape people get from drugs and alcohol. The fact that the term is now being employed in connection with food demonstrates the biological liability imposed by our present obesogenic food environment.

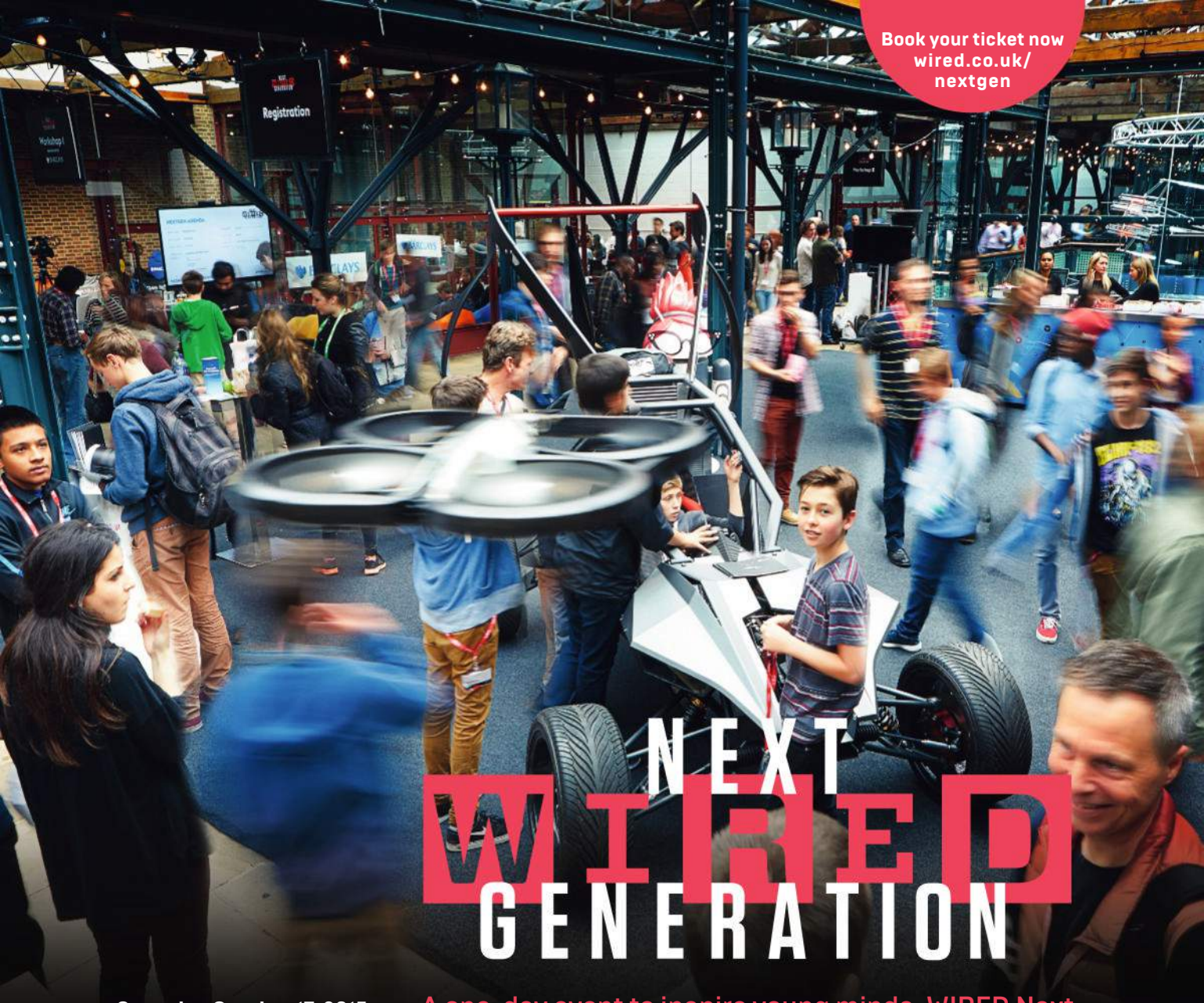
Once someone has learned to prefer high-energy-dense foods – which typically occurs early in life – hypothalamic and reward signalling become sluggish when faced with healthier foods which are not so immediately rewarding. As a result these tend to be avoided – most people would sooner eat an ice cream than an apple.

This fact is being exploited by Big Food. Produced cheaply and mass-marketed successfully, high-energy-dense products are the fast track to huge company profits and also ever-expanding population waistlines.

Obesity is not the result of eating too much and moving too little, as those involved in producing, advertising and selling food would have us believe. The obesity pandemic results from a series of endocrine, metabolic, neurocognitive and physiological adaptations, fostered by abundance.

There is no such thing as the "wisdom of the body". Rather, the body responds to the inputs it receives with the result that we humans are busily digging our graves with our teeth.

ILLUSTRATION: ALEX MOORE; KENNY PARK. PHOTOGRAPHY: COLIN HATTERSLEY



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Shaw's company ScanLab is using 3D scanning to document and explore Arctic ice floes and Roman ruins.



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PHOTOGRAPHY: SCOTT LONDON

Feel the burn

A five-storey mesh dancer, a giant game of fire *Tetris* and – if rumours are to be believed – a hacked Boeing 747 are just a few of the oversized artworks on show at Burning Man (August 30 to September 7).

But here, such awe-inspiring projects are the norm – the Nevada desert festival has a reputation as an alt-art showcase.

"It's a bit like a laboratory for creativity," says Scott London, a long-time photographer of the event who, with fellow snapper Sidney Erthal and author Jennifer Raiser, has collaborated on *Burning Man: Art on Fire* (Race Point Publishing).

"Many artists who started at Burning Man now show at the most renowned museums," explains Erthal.

Although the influx of Silicon Valley money (billionaires Larry Page and Elon Musk are playa players) has upped the ante, one thing remains unchanged: the art gets burned. "It adds an extra dimension," says London. "All we have are the memories, and maybe a few good photographs."

As 70,000 people don their dust masks and head to Black Rock City for Burning Man 2015, Erthal and London pick their landmark pieces – and what to see this year. **Oliver Franklin-Wallis**

burningman.org >

Erthal and London share their favourite Burning Man artworks

El Pulpo Mecanico <<

Art cars – or "mutant vehicles" to use Burner parlance – are a long-standing tradition at Burning Man. Duane Flatmo's 7.6m kinetic sculpture (*see opening page*) was a 1973 Ford 250 in its previous life. The tentacles shoot 9m flames, consuming up to 900 litres of propane per night. Its fiery entrance was in 2011, but it will return this year. *elpulpo mecanico.com*

Zoa Fertility 2.0 ^

Californian art collective the Flux Foundation created *Zoa* for 2012's "Fertility 2.0" theme. Its seed-pod-inspired wooden structure is lined with sensor-activated LEDs – but when the wood shell is burned, it reveals a steel sculpture, which hosts a pyrotechnic show. *fluxfoundation.org*

The Super Pool >

Jen Lewin's *Super Pool* consists of more than 200 interactive pads spread over 450m^2. The sensors measure the length and speed of a foot press, which triggers LEDs to react – with individuals collaborating to produce intricate light shows. After a successful debut in 2014, it's due to return on an even grander scale. *jenlewinstudio.com*





Pulse and Bloom >

Artist Shilo Shiv Suleman, architect Saba Ghole and neuroscientist Rohan Dixit collaborated to produce 2014's *Pulse and Bloom*. Each 4m-tall flower has heart-rate monitors in its stem; touch one, and the LEDs lining the flowers' petals will pulse along with your heartbeat. *pulsebloom.com*

PHOTOGRAPHY: SIDNEY ERTHAL; SCOTT LONDON

Truth is Beauty >

San Franscisco-based Marco Cochrane builds art on an epic scale. The second in his *Bliss Project* trilogy, 2013's 17-metre-tall *Truth is Beauty* uses 7,600m of steel pipe and 1,500 LEDs. Cochrane also distributed 10,000 "together we stand" wristbands as part of a wider campaign for women's safety. His third and final piece, *R-Evolution*, will make its debut in July. *marco cochrane.com*









Where to find Burning Man: 40°47'13.0"N 119°12'16.0"W

Mens Amplio <

Built by Don Cain and art collective The Department of Spontaneous Combustion in 2013 – with the help of neuroscientists – *Mens Amplio* is a 4.5m brain. Participants don an EEG headset, causing LEDs, neon tubes and flame effects to mimic their brain activity on a huge scale. *twitter.com/mensamplio*

Tablet extra!
Download the WIRED app to see more Burning Man photos

THIS YEAR'S MUST-SEE ARTWORKS

1 Fire Tetris
This 8m structure lets you play the classic game – in flame. Blocks "fall" down a grid made of fire-squirting nozzles. *firetetris.com*

2 The 747 Project
San Francisco-based Big Imagination wants to retool an old Boeing 747 into an open-topped mutant vehicle. *bigimagination.org*

3 The Blunderwood Portable
Burners can stand on the keys of this giant-sized 1920s typewriter, and tap out massive messages. *blunderwood.com*

4 Serpent Mother
Last on the playa in 2006, this 51m robotic snake has been fully revamped by its creators, the Flaming Lotus Girls. *flaminglotus.com*



David Bracey: "Our fountains can do Mexican waves and bounce around."

PLAY AND SPRAY

DAVID BRACEY IS TURNING LANDMARKS INTO ARCADE GAMES

The fountains in London's King's Cross have been gamified. Since March, the 1,080 floor-mounted jets in Granary Square have been programmed to let visitors play the arcade classic *Snake* using a smartphone app.

Under the paving, each jet is connected to a nozzle, an LED light and a pump with variable speed control. "It's very reactive," says David Bracey (*left*), director of The Fountain Workshop, the London-based engineering firm behind the project. "We can make the fountains go from nothing to full height in a few hundred milliseconds." The jets and LED colours are controlled through a central system. "Play time" – the period the app is playable at Granary Square – is set between 5pm and 9pm.

Snake will run until the end of the summer, then the next game will begin. "One of them involves knocking down other fountains that are in the way," says Bracey, 49. "We've thought about experimenting with the phone's accelerometer – you could use it to control the fountains. When you tip your device, the fountains move." The real challenge? Keeping your phone dry.

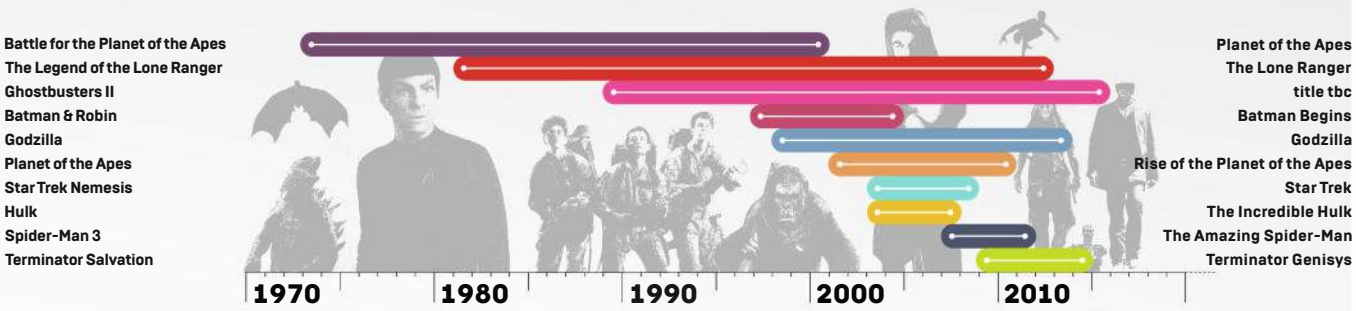
Sophia Epstein

kingscross.co.uk/granarysquirt

PHOTOGRAPHY: JAY BROOKS

ENOUGH REBOOTS!

It's only eight years since the last Fantastic 4 film, 2007's *Rise of the Silver Surfer*. But just eight years later we have a reboot – Josh Trank's *Fantastic 4*, out August 6, which aims to reinvigorate Fox's flagging franchise. Is it just us, or is the gap between films and their remakes getting shorter? WIRED does the research. Stephen Kelly





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Hyeonseo Lee
North Korean defector
Hyeonseo escaped North Korea in 1997. Now living in South Korea, she is an activist for refugees fleeing the regime.



Stephane Kurgan
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The new Flyboard is 35 per cent lighter and can rotate on its axis to improve spins

Chairman of the boards

A JET-SKI CHAMPION WANTED TO FLY LIKE IRON MAN – AND BUILT A GLOBAL SPORT

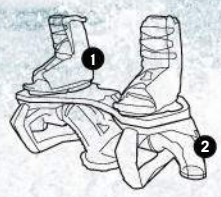
Franky Zapata can make you fly. A former world jet-ski champion, Zapata was frustrated by being tethered to the waves. So he invented the Flyboard – a jetpack/hoverboard hybrid that lets its wearer soar up to 15m in the air using high-powered water jets. "My inspiration came from *Iron Man*," says Marseille-based Zapata, 36. "I was a jet-ski pilot for many years, but I always dreamed to fly as a superhero – and thanks to my experience in hydro-propulsion I made it possible."

Zapata hand-built a Flyboard prototype in 2011 from carbon fibre and welded aluminium tubes. You strap yourself to the Flyboard, which is connected to a 260bhp jet-ski engine that forces water through the tubes at high pressure.

Zapata's initial demonstration racked up more than seven million views on YouTube. Since then, Flyboarding has built a global following, with an annual world championship hosted in Dubai. Last summer, Zapata debuted its follow-up, the Hoverboard: a snowboard-like design which can hit up to 25kph whilst soaring and flipping up to 5m above the water.

This autumn, Zapata Racing will unveil two new creations: a redesigned Flyboard (*pictured*) and a back-mounted Jetpack. But the future, Zapata says, is on land. "We're working on machines from science fiction," he says. One such project is the Airboard: a redesigned Flyboard using high-pressure air jets. "We're well advanced on it," he says, and has tested a working prototype. For now, however, Zapata is focused on letting people experience flight on water. "It's a fantastic feeling," he says. "It makes people dream."

OF-W *zapata-racing.com*



1. The Flyboard's shoes sit atop a pivot system on bearings
2. Water shoots through a supply pipe attached to the deck

PHOTOGRAPHY: FRANCOIS RIGAUD; JIRO SCHNEIDER. ILLUSTRATION: MEGAPONT

INVASION REPELLED!

In Chris Columbus's sci-fi comedy *Pixels*, classic video game characters from Pac-Man to Q*bert invade Earth in an 8-bit apocalypse. But what could be done should such a catastrophe occur? WIRED consulted the experts.
Alex Godfrey **Pixels** ***is out on August 12***



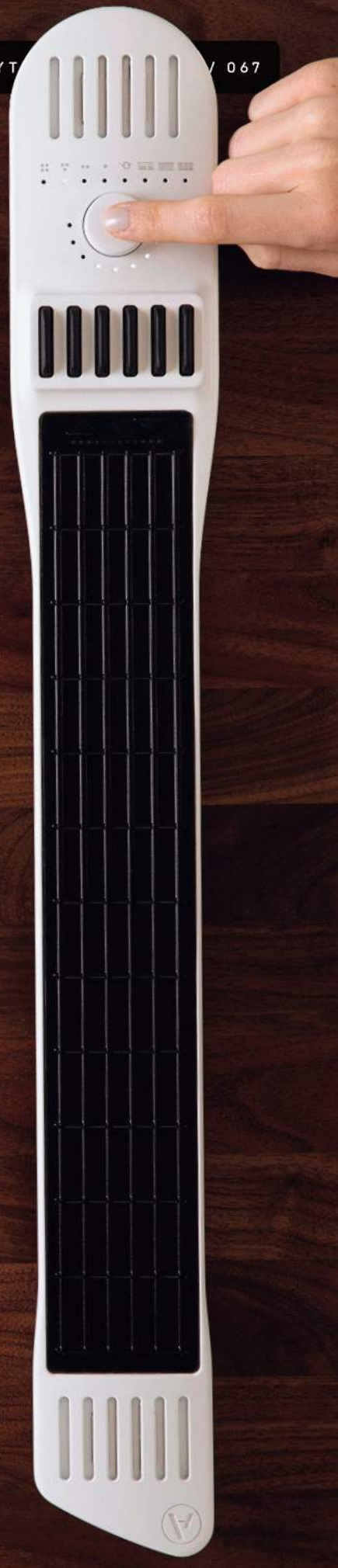
SPACE INVADERS
Richie Knucklez, world *Space Invaders* champion
"I'd bust a cap in each invader row by row with a shotgun. But if you kill the last invader they send a new wave, so I'd drop a drag net on him from a helicopter."



DONKEY KONG
Vincent Lemay, world number-two-ranked *Donkey Kong* player
"I'd use his hairy body against him by dipping my hammer in the oil can. Once the hammer is covered with oil, I'd light it with a fireball and watch him burn."



PAC-MAN
Daniel Borrego, world *Pac-Man* champion
"I'd ask scientists to open a portal to the *Ms Pac-Man* world and leave a trail of sweets towards the portal. He'd fall in love, settle down and become a contented family man."



This is the Artiphon INSTRUMENT 1: a whole band in a single device. Lay it flat and it's a digital piano or a drum machine. Strum it and it becomes a guitar or banjo. Add in your smartphone to act as a bow, and it becomes a violin or – held vertically – a cello. "We're not just doing this to create a new instrument," says its Austin-based creator Mike Butera, 31. "This is a new category of musical device – the multi-instrument."

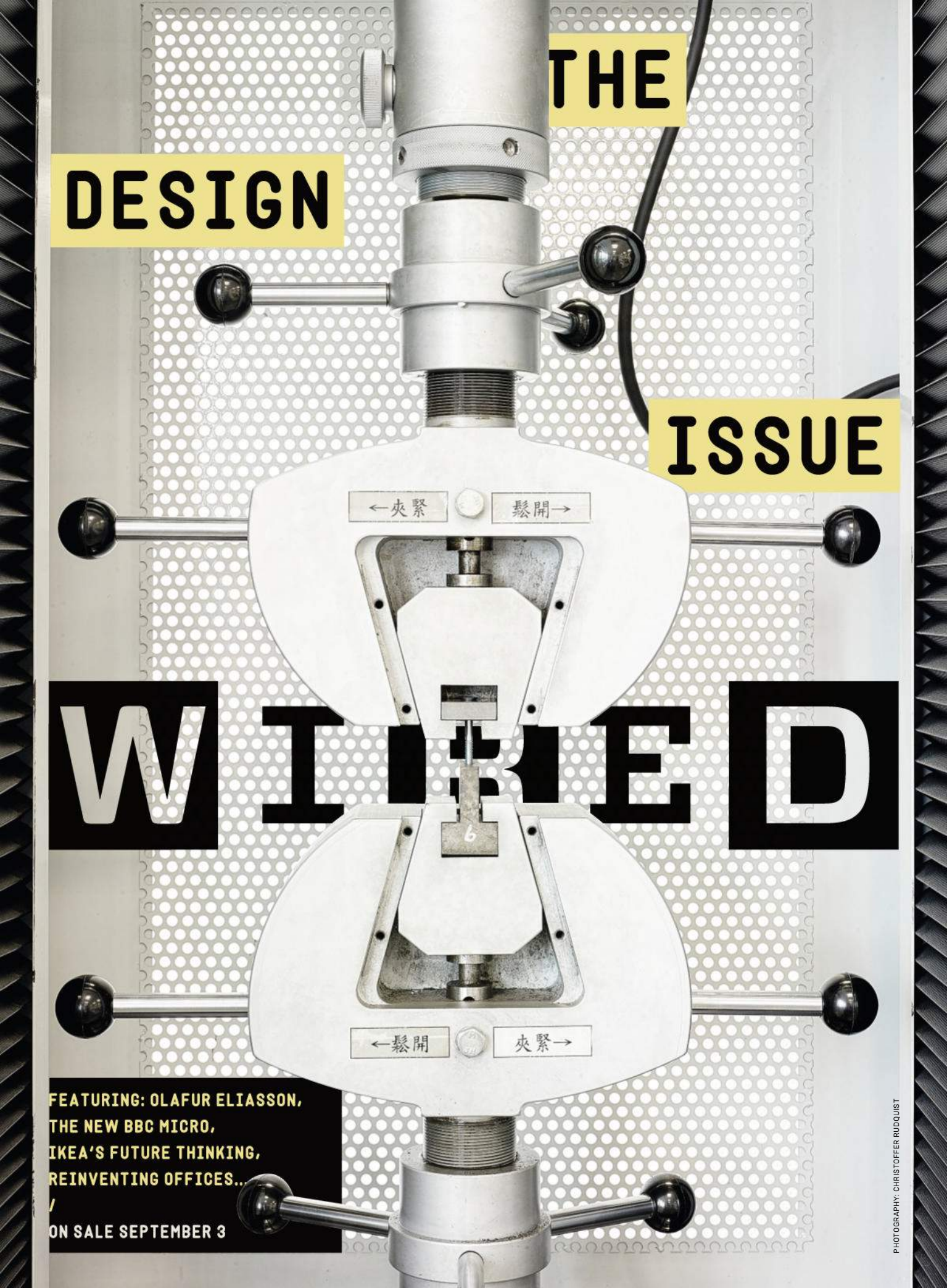
A lifelong violin player with a PhD in sound studies, Butera came up with the idea for a universal musical instrument back in 2011 after becoming frustrated with digital music-creation tools. "The power was available in apps, but the interfaces were lacking," he says. He founded Artiphon with friend Jacob Gordon, and four years and six prototypes down the line created the INSTRUMENT 1. The MIDI device features 12 touch-sensitive pads – which make up the keys or frets – crossed with six "strings". "You can slide them or apply vibrato, and they're pressure sensitive," says Butera. Then there's the bridge, six-string like nubs that can be pressed, plucked or strummed. "We did a tremendous amount of modelling of how strings behave," he says. (Artiphon has applied to patent the system.) The INSTRUMENT 1 also has a speaker and can connect to a smartphone or PC to change the sound produced.

Drums
+
Keys
+
Guitar
+
Bass
+
Strings

In April 2015, Artiphon raised $1.3 million (£829,000) on Kickstarter from its $75,000 goal, and Butera says the first backers will receive their INSTRUMENT 1s in January 2016, before a wider release later next year. "What we're carrying over is the history of musical instruments," says Gordon. "You can pick this up and play a guitar chord – but then you can explore violin, or drums. It's about breaking out of the forms you're used to." **OF-W** ***artiphon.com***

INTRODUCING THE BAND

ROADIES REJOICE! THE INSTRUMENT 1 IS THE MUSICAL KIT YOU CAN STUFF INTO A BACKPACK


THE
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PHOTOGRAPHY: CHRISTOFFER RUDQUIST

KANYE'S STAGE SETTER

WHETHER WORKING WITH U2 OR DESIGNING THE SET FOR CUMBERBATCH'S HAMLET, DESIGNER ES DEVLIN HARNESSES TECH TO CREATE A SPECTACLE

When Es Devlin speaks about stage design, she could be talking about an ancient science: the distance between audience expectations and reality are "calibrated"; her long-term collaborator Kanye West applies a kind of "medicine" to the proceedings; and a successful show works like a chemical reaction.

Over the past 20 years, Devlin, 43, has been challenging how audiences experience opera, pop music, theatre and, most recently, fashion. Her workplaces range from Olympic stadiums – she designed the London 2012 closing ceremony and is working on the opening ceremony for Rio 2016 – to found spaces, and claims to live her life by the *Hamlet* quotation: "I could be bounded in a nutshell and count myself a king of infinite space." Fitting, seeing as the Londoner will bring her own vision of the Shakespeare classic to the Barbican Centre this autumn, starring Benedict Cumberbatch. From the opening night of U2's new iNNOCENCE + eXPERIENCE tour in Vancouver, coming to the UK in September, Devlin talks to WIRED about new technology and its role in the future of live music. ***esdevlin.com*** **Emily Vincent**



Es Devlin with a design inspired by her set for the Royal Opera House ballet *Connectome*

WIRED: You've been working on the new U2 show for two years. Where do your ideas come from?
Es Devlin: On the last show of the 360° stadium tour [in 2011] Bono stood, looked at the giant space, and said: "Well next time, we'll just go out with a single light bulb." So that's how our new show starts, as a reaction against the architectural hugeness and light of the last adventure.

Has technology changed stage design during your 20-year career?
When the system's working the right way round, the ideas drive the technology. With U2's tour, we wanted a screen that would divide the audience in two, and the band could perform inside and be seen through >

PHOTOGRAPHY: DAVID ELLIS

video projections. We wanted it to be more lateral and transparent than others we had seen. For it to happen, we had to develop new technology. But the idea came very simply – from the lyrics. It's not that we had a desire to innovate technologically, it's more that there was something we wanted to say.

For *The Nether* at the Royal Court Theatre [in London], we gave an ancient piece of technology a new dimension: a handheld counterweight system with a d3 video-playback system. It's the nitty-gritty of how you deliver your idea – that's when the innovation happens.

Does it still all start with a sketch?
It does. I try to think with a pencil in my hand so I can capture the train of thought. I have reams of sketches for every project I've been working on – 20 years of them. There are thousands – too many to put in a book. I might start Instagramming the sketches as I go. We documented the U2 process carefully and it's quite interesting to look back at the iterations because, actually, what you see on stage tonight is going to be remarkably similar to a drawing we sketched in September 2013, which we actually departed from for 18 months and ended up coming back to.

You jump from designing for stadiums to tiny theatres above a pub. Do you treat each space differently?
You can go to the theatre and dutifully watch something where lots of money and time have been spent but nothing happens. Or there are other nights when you go and all there is on the stage is two actors and one strip light and it can go off. You get that feeling of the hairs going up on the back of your neck. The essence of what I try to do is to understand the alchemy of those moments when audiences communally feel something, whether it's 80,000 people or 200. So scale can be misleading because, fundamentally, the response of being moved by watching something together is potent, regardless of big or small. That's the ticket.

How do you manage to design across fashion, pop, theatre and opera?
The more fields that I work in, the more that I enjoy blending them: extra-ordinary chemical fusions happen between people who look at things differently. I try to have the eyes of an outsider in each genre I've entered into, even theatre, where I started. It allows you to look at each challenge in an unexpected way.

What's your vision of the future for live music?
There's still plenty of room for new ideas with artists on touring shows. It would be interesting to do some more residencies. Kanye gained a lot when we did a residency in Atlantic City. I'd be intrigued to see if the whole paradigm of live music had to follow that of a touring arena show: if there were a way of installing artists in found spaces, you could engage with architecture that's already there and be free from the brutality of touring. You could achieve far more visually and atmospherically.

What are you hoping to achieve with the Cumberbatch *Hamlet*?
Hamlet is really hard to design because Shakespeare wrote for a theatre that was conjuring space with words, and that has to move quickly like a film. What a Shakespeare production cannot bear is any kind of slowing down. You cannot wait for a scene change, it's got to keep coming at you. And there are hundreds of little scenes in it. So what you really have to make is an environment that can be fluid, and avoid it just looking like the Globe Theatre. That's the challenge.

THE STAGE IS A WORLD: FOUR OF DEVLIN'S SETS

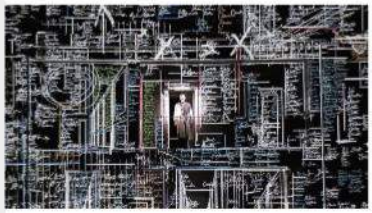


U2's iNNOCENCE + eXPERIENCE world tour features three stages: one shaped like a letter i; another like a letter e; and a catwalk linking them (*shown*). Mesh screens either side of the walkway allow for hologram-like video projections

For **Kanye West and Jay Z's Watch the Throne tour**, Devlin had the pair perform in moving projection-mapped cubes for 57 gigs performed worldwide



Devlin designed a huge rotating house set with projection-mapped interiors for the **Royal Opera House's production of *Don Giovanni***



For **Miley Cyrus's 2014 Bangerz world tour**, Devlin incorporated a giant "doge" meme and a tongue slide, based on the singer's own



Combat evolved

UNIFIED WEAPONS MASTER GIVES GLADIATORS AN ARMOUR-CLAD UPGRADE

Australian startup Chiron Global wants to bring back gladiatorial combat – without the bloodshed. Its new sport, Unified Weapons Master, combines weapons-based martial arts with modern sensor-lined protective armour. The aim? To emulate the success of the mixed martial-arts Ultimate Fighting Championships.

"Of the 303 martial arts around the world, about 96 of them are weapons-based. These arts are fading into obscurity, because there's no forum where these athletes can compete safely," says co-founder and CEO David Pysden, who, along with Justin Forsell, first came up with the idea in 2009. "We contacted every force-measurement company we could find, and they all said, 'It can't be done, you're crazy'," says Pysden. Undeterred, they built a rough prototype using a motorcycle helmet and managed to raise some initial seed funding.

The team consulted with martial artists and armour experts – including a designer who built suits for the *Lord of the Rings* films – to develop the Lorica armour (*right*). "We studied designs from the Roman army through to the 15th century and up to modern-day motocross and ballistics gear," says Pysden.

The Lorica's plates contain a network of sensors that measure the location and force of each impact; the data is then fed into a medical database. "We're collecting data on fracture profiling, soft-tissue damage and concussive force," says Pysden. "That forms the basis for our scoring system." Wearing the armour, fighters will use their choice of non-edged weapons from an array of combat styles ("We don't intend to use real samurai swords, for obvious reasons"), with successful blows determining the winner. Chiron will host closed test events in Australia and New Zealand this autumn, before launching Unified Weapons Master globally in 2016.

So how does it feel to wear? "You definitely still know you've been hit – this is for world-class athletes. But it's better than the alternative." **Oliver Franklin-Wallis** *uwm.tv*



The 25kg Lorica prototype uses plastics, foams and carbon fibre – the finished suit will weigh 17kg

PHOTOGRAPHY: ANNA JAMIESON

Build with bug-proof bamboo

SUSTAINABLE ARCHITECTURE HAS A NEW TAKE ON AN OLD MATERIAL

It's as strong as steel, has the load-bearing capacity of concrete and can grow up to a metre a day, but bamboo has traditionally suffered from one fatal weakness: termites. Bali-based Ibuku Bamboo Architecture and Design uses a boron salt solution to render the wood inedible to insects – and now it is building an entire village from it. "Bamboo is plentiful across Bali and throughout the tropical regions of the world," explains Ibuku's creative director Elora Hardy. "But most things built out of bamboo in the past have been eaten to dust. Now a bamboo structure can last a lifetime."

Hardy's Green Village follows on from the bamboo Green School (founded by her father John Hardy in 2008), and contains eight homes with two more in progress. Ibuku has also recently completed Sharma Springs, a 750m^2 family home (*main image*), a yoga pavilion and a riverside spa, and is constructing a second educational campus.

"To make use of the unique properties of the material, we have had to establish new ways of building and engineering," explains Hardy. "Everything from primary structural connections down to window frames have to be reconsidered." Even the design process is different – rather than relying on computer-aided 3D design, the architects begin by building intricate 1:50 scale models from tiny bamboo sticks.

Although such bamboo construction is geographically limited by reliance on local expertise and the tropical climate, Ibuku is developing a prefab bamboo home that will be created in Bali then assembled elsewhere. "Ultimately, there will be bamboo buildings in more extreme climates of Europe and America as well," says Hardy. "But we will need to pair the bamboo with insulation materials – and give the building-code departments a chance to catch up." **KN** *ibuku.com*

PHOTOGRAPHY: RIO HELMI; JORDAN HOLLENDER. ILLUSTRATION: GIACOMO GAMBINERI



Each of the homes in the village is a unique design – right down to its bamboo furniture







- Pebble Time
- Shenmue III
- Reaper: Miniature Bones 2
- The Veronica Mars movie
- Dwarven Forges Caverns

CHARTED

FASTEST KICKSTARTER FUNDING

Shenmue III set a new record for video games on Kickstarter in June, hitting $1 million in just 102 minutes. But how does it stack up to the competition?



Once upon an app...

DAVE ISAY'S STORYCORPS IS ARCHIVING THE WORLD'S NARRATIVES

When Dave Isay was 14, he made a recording of an interview with his grandmother. Years on, after she died, he searched high and low for the tape, to no avail. Now 49, Isay still goes looking for the tape – but his loss inspired StoryCorps, an organisation that Isay says seeks "to provide people of all backgrounds and beliefs with the opportunity to record, share and preserve the stories of all of our lives".

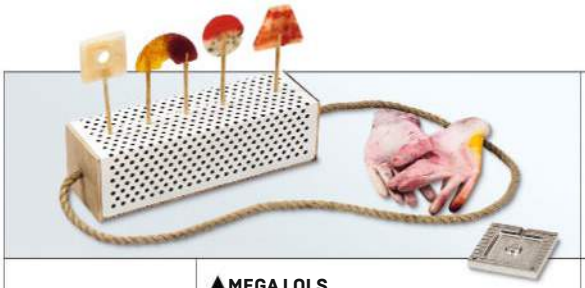
Since 2003 it has collected more than 65,000 conversations in its recording studios (called StoryBooths) in Atlanta, Chicago and San Francisco. As well as equipment, StoryCorps provides a "facilitator" to oversee the process. The best dialogues are featured on storycorps.org and US National Public Radio. Examples include a mother interviewing her son's killer, and a conversation between two daughters and their Alzheimer's-suffering father.

Archived at the US Library of Congress, it is, according to Isay, "the largest single collection of voices ever gathered". However, those voices have tended to be American. Isay's new idea: a smartphone app to enable a more global outlook.

Funded by the $1m (£600,000) 2015 TED prize, it allows recording, processing and uploading of interviews from across the world. Now in beta, it has been downloaded more than 165,000 times, taking StoryCorps not only to new countries – including the UK – but also to new places emotionally. "It's so intimate because people are recording in their bedrooms," Isay says. He hopes that in the future, automated transcription software – or the crowd – will help to make the massive cache of audio it produces more searchable. "It's going to become a valuable historical document."

***Above*: Dave Isay, founder of StoryCorps**

Charlie Burton
storycorps.org



▲MEGA LOLS
Seasonally appropriate item alert: Tessa Geuze's Something Sweet kit is designed to help you make lollipops from foraged and all-natural ingredients. Honey and roasted-almond flavour? Yes, please. *thetomorrowcollective.se*

▶CITY OF LIGHTS
From projection-mapped urban landscapes to green street lights, Davina Jackson's *SuperLux* profiles some of the most innovative artists experimenting with the latest in lighting technology. *Published on Aug 24 thamesandhudson.com*





▲STRANGE FRUIT
Beach House's new album *Depression Cherry* features less drumming and dreamier atmospheres than the duo's previous work. Physical versions will come wrapped in cherry-like crimson velvet. *Released Aug 28 beachhouse baltimore.com*



◀KUBRICK REVISITED
Piers Bizony's *The Making of Stanley Kubrick's "2001: A Space Odyssey"* opens the pod bay door on the legendary film-maker's creative process. Now on full release after a painfully limited 2014 run. *taschen.com*

Playlist

▼BIOPIC WITH ATTITUDE
Produced and soundtracked by NWA founder members Dr Dre and Ice Cube, *Straight Outta Compton* follows the rise – and fall – of the gangsta rap pioneers. (Alas, the story of Beats Electronics will have to wait for the sequel.) *Out Aug 28*



▼SNOWDEN'S IN THE FRAME
We all know how Edward Snowden exposed the NSA surveillance scandal – so here's another take on the story. Ted Rall's *Snowden* gives the whistleblower the comic-book hero treatment. It's a revelation. *Out on Aug 18. rall.com*



▶CATCH IT WHILE YOU CAN
The *Disappearing Acts* exhibition at the Lofoten International Art Festival focuses on the decline of human agency. More than 20 artists contribute, including Elizabeth Price and Katja Novitskova (*right*). *From Aug 28 liaf.no*



PHOTOGRAPHY: STANLEY KUBRICK ARCHIVES/ TASCHEN; URA; CAPITAL PICTURES

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Events, new products and promotions to live the WIRED life

Compiled by Cleo McGee







1 2
3 4





1/Paul Smith Essential fragrance

The new Essential scent from Paul Smith is for the contemporary gentleman. Combining notes of orange flower, lavender, cedarwood, patchouli and a hint of musk, Essential is perfect for the man who wants to subtly show off. Available from August 20, 2015 exclusively at Boots.
£19.50
boots.com

2/Saint Luke summer travel bags

New brand Saint Luke has launched their travel bag in three colours and sizes. The St Barts Short Haul (*above*) features a detachable inner bag – ideal for the traveller with a taste for flair, as well as practicality. The line is produced in partnership with the Waves for Water charity organisation.
From £125
saintluke.co

3/Bavaria Premium Dutch beer

Dutch-brewed since 1719, Bavaria Premium beer relies on the same local spring water and recipe as it has for generations. At five per cent, this tasty beer is delightful to drink at a festival or on a hot day. The finish is clean and crisp, thanks to malt from the Bavaria malt house.
Available in off-licences and supermarkets

4/Hunter Field Balmoral Side-Adjustable Boots

The iconic brand delivers yet another sterling boot built for walking, wading and wandering through festivals. The textured rubber delivers an aged feel, and the rubber sole is rounded around the boot for a better grip in mud. Practical, hard-wearing and comfortable.
£150
hunterboots.com

WIRED INSIDER'S PICK OF UPCOMING EVENTS

WIRED 2015

Our flagship two-day event returns to Tobacco Dock with more than 50 Main Stage speakers, including the WIRED 2015 Innovation Fellows. The Test Lab area will showcase some of the most exciting new tech, while the delegate list is full of fascinating people.
October 15-16, 2015
wired.co.uk/15

WIRED2015: NEXT GENERATION

A one-day event designed to inspire young people aged 12-18 years old, combining interesting and insightful speakers with hands-on interactive activities. The event takes place on a Saturday – group tickets and school bookings are welcome.
October 17, 2015
wired.co.uk/nextgen

WIRED RETAIL

In its second year, WIRED Retail returns – bigger and better, with another ground-breaking agenda. Taking place at the St Pancras London Renaissance Hotel, this luxurious setting will play host to the most disruptive event in the sector.
November 19, 2015
wired.co.uk/retail

INNOVATE 2015

An event focused on innovation for growth-stage and large companies alike. The agenda includes sessions on how to scale, supply-chain collaboration and the perfect pitch. The networking is excellent, with one-to-one time with investors, buyers and founders.
November 9-10, 2015
events.ukti.gov.uk

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PHOTOGRAPHY: SUN LEE

How to...

Cast using LEGO

Ben Uyeda, founder of Boston-based DIY site Homemade Modern, wants to make sustainable design easy for everyone, with help from concrete.

"Concrete is cheap and readily available," he explains. All sorts of containers can be repurposed for moulds – Uyeda hit on a simple way to build custom castings: LEGO. "To make anything with perfect right angles is usually very difficult for beginners. But that's the beauty of LEGO," he explains. "With it, anyone can make a perfect, repeatable square." Here's how to use it to build a set of textured concrete stacking tables. *homemade-modern.com*

Kathryn Nave

ILLUSTRATION: POKED STUDIO

BUILD YOUR MOULD

1 Take a piece of melamine or laminate board and lay out your perimeter for the tables with a row of bricks to separate the larger from the smaller. Use one bead of hot glue on the base layer to fix each one. Build it 22 bricks high. "When you reach 18 layers, the weight of the concrete starts to push the brick outwards," Uyeda says, "so you need to add cross braces across the top."

MIX THE CONCRETE

2 "When you buy concrete mix, it often comes with a gravel filler, because it's meant to be used for things like driveways," Uyeda says. "You need to filter it out or find a counter-top mix which won't contain gravel." Spoon the concrete into the form until it's about 5cm high, then use a stick to push it into the corners and vibrate to remove bubbles. Repeat every 5cm, then smooth off at the top.

REMOVE THE MOULD

3 Leave the concrete to cure for at least 20 hours, then flip the mould over, pull off the baseplate and remove the bricks from the top down. "The only part that might be difficult is that one layer separating the two tables," Uyeda says. "If you have a hard time getting it out, you can let it sit for a week or two – the concrete will shrink as it dehydrates and you can remove the pieces more easily."

REUSE YOUR LEGO

4 It would hardly be sustainable design if you had to sacrifice thousands of LEGO blocks every time – fortunately the concrete cleans off easily. "Scrape off the concrete from the outside of the forms when it's still wet. Then, once you've disassembled them, place the bricks in a mesh laundry bag and put them in the washing machine on cold with a cup of vinegar. Hot water will warp the LEGO."

How to...

MAKE YOUR OFFICE A BETTER PLACE TO WORK

As the adage goes, find a job you love and you won't have to work a day in your life. Laszlo Bock, Google's senior vice-president of people operations, goes one better – improve the workplace you're in so that going to work is an enjoyable experience. His book *Work Rules!* outlines how he and his team turned Google into one of the happiest places to work. "Because of our profit margins, people think only Google can do this, but it's really not true," he says. Any business, big or small, local or international, can make these changes. Here's his advice. Sophia Epstein



HAVE A MISSION

American grocery chain Wegmans, a family business, connects its staff with a mission to provide for the community. If a company is not mission-driven then "find what's meaningful in the work you do and draw a connection to your impact," says Bock. "Meaning sustains people far more than anything else."

GIVE FREEDOM

When the productivity of two Nike plants in Mexico was monitored, the plant that gave workers control over their schedules and goals produced almost double the number of shirts per day than the other. "Give people more freedom than you're comfortable giving them," says Bock.

PAY PEOPLE THEIR WORTH

It is common to pay within a narrow range, so top employees often make 20 to 30 per cent more than the average staff member, when their performance is 100 per cent or more better. "But it's essential to have a wide variation, based on performance," explains Bock. "Otherwise your best people leave."

MAKE CLEAR GOALS

Of all studies done on how to improve performance, all techniques have been inconclusive, except one: goal-setting. "The act of setting goals and making them visible causes people to drive towards those goals," says Bock. And be specific without micromanaging; you want to make sure that the goals are clear.

BE TRANSPARENT

Put everything out in the open, from goals to sensitive information. "Knowing what's going on helps people make better decisions," says Bock. This is especially true in terms of goals. Whereas most companies spend excessively on consultant-style planning processes, Google sets quarterly goals that are visible to everyone.

GIVE HONEST FEEDBACK

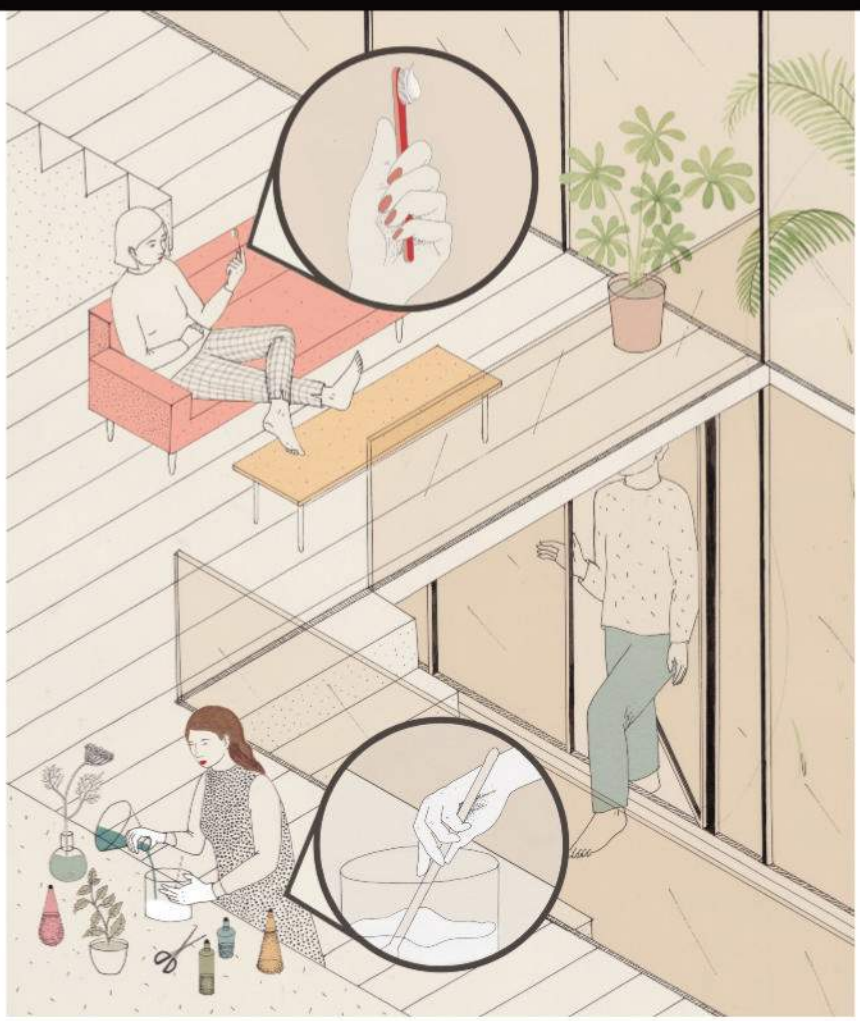
Rather than investing in training courses, tell people what they are doing wrong as they are doing it. "It's really hard for people to do," says Bock, "but constantly nudging, coaching and supporting people in real time to get better is more effective than sending them to management classes."

BOOST REGULAR INTERACTION

It's well known that Google offices have free food, but Bock says it's not aimed at getting people to stay at work longer. "We want people to have a reason to bump into each other," he says. "Because it's from those small, chance conversations that you get really interesting products and ideas."

HIRE PROPERLY

Everyone is biased, favouring candidates similar to themselves – same *alma mater* or favourite team – and that compromises interviews. Bock suggests having everyone who interviews a candidate write down their impression and assign a score, then get a different group of people to make the decision.



How to...

Create a toothpaste

Making toothpaste is an intricate process – but it can be done at home. "We have different formulas for what we're trying to achieve with each toothpaste," says Justin Brown, technical director of GlaxoSmith-Kline's Maidenhead site, where they make Aquafresh and Sensodyne toothpastes. Ingredients are altered to cater to sensitive teeth or to enhance whitening. "This is a standard family oral health formula," Brown says. Here's how to make some. SE

What you'll need: Purified water (23g), glycerine (10g), sorbitol (10g), titanium dioxide (0.5g), saccharine (0.5g), 1,000ppm sodium fluoride, 15g abrasive silica (15g), thickening silica (10g), polyethylene glycol (2g), powdered gum (sodium carboxy-methyl cellulose or xantham gum, 1g), flavouring (spearmint or peppermint, 1.5g), detergent (such as sodium lauryl sulphate, 1.5g). Most of these are available via Amazon, but some (fluoride and silicas) come from chemical companies.



Blend it

Blitz the water, glycerine, sorbitol, titanium dioxide and saccharine in a blender. You can add more saccharine if you want. The sorbitol is a different type of sweetener; it also gives the paste its shine. The titanium dioxide is for whitening. Then add fluoride, but make sure you are wearing gloves, goggles and a face mask – this is for the teeth, not the eyes.



Introduce silica

Now add the two different types of silica, and mix. The first is an abrasive, derived from sand; this polishes your teeth. The second is for thickening; it binds everything to give it a toothpastey consistency. "We use about 13 silicas across our products," says Brown. Specific types are used depending on the brands. "For our Pronamel range we use a less abrasive one."



Shake it up

To make the gum slurry, in a separate container add the polyethylene glycol to the powdered gum, and shake it up. "If you put the gum powder straight into the mixer with the liquid you'd just create a lump," says Brown, "as it will interact on immediate contact with water." If you first combine it in a slurry, it will mix into the batch far more effectively.



Add flavourings

Add the gum slurry around the edge of the blender and mix it in as quickly as you can. Now add your flavourings. At GSK they have pre-blended flavours, but you can use peppermint or spearmint oil. In the US they prefer their toothpastes sweeter, adding flavours like cinnamon, whereas in Europe, plant-based flavours such as fennel are more common.



Drop in detergent

The detergent goes in last. This is what gets the toothpaste foaming when you use it and it carries the fluoride around the teeth and gum line. "We have a vacuum system at GSK that we use for de-aeration," says Brown. Pumping out the air bubbles makes the toothpaste shinier, but you can just whack this straight on to your toothbrush.

ILLUSTRATION: BETH WALROND; HARRIET LEE-MERRION

How to...

Build an arcade

If you grew up in the 80s, there's a good chance you still miss classic stand-up arcade games. You probably don't, however, miss having to put an endless supply of coins into these machines to be able to play *Galaga*, *Pac-Man* or any number of others. The good news is that with today's advanced computer hardware, you can fairly easily build your own arcade at home. Jeremy Cook

WHAT YOU WILL NEED
You'll want a purpose-built encoder for arcade-style controls – a joystick and buttons with microswitches will attach to this encoder via wires and spade connectors, sometimes included with the controls. You'll also need a computer, a monitor, USB cable, software and, finally, wood or sheet MDF around 2cm thick, and wood screws or glue for the control box. An option is to cover the box with Perspex. This will allow the stick to be mounted flat with the cabinet and printed graphics can be displayed underneath. Or you can simply retrofit an old arcade cabinet.

1. CREATE YOUR ENCLOSURE
If you can't find an old cabinet, building a box out of wood is fairly straightforward. For good spacing, cut two 2cm-thick pieces of plywood 60cm by 25cm. Cut two pieces 8cm wide and 25cm long, and two more pieces 8cm wide and 56cm long. These four 8cm-wide pieces will form the vertical walls of your box, sitting on top of the 60cm by 25cm base piece. Drill an access hole 2cm in diameter for the USB port into one of these vertical pieces, then attach the vertical pieces to the base with screws or wood glue, forming an open box. Put the access hole close to where your computer will be when in use.





2. READY PLAYER 1 AND 2
Centre the stick for player one on the left side of your control panel, leaving space for the microswitches, then use a router to cut out space for the assembly. Set the stick assembly into the cavity and attach with wood screws. For a more finished look, set up the router for a shorter cut, and recess the area where the stick assembly is screwed into the top of the wood, allowing it to sit flush. Mark the centre for each button you will be using, leaving about 4cm of space in each direction. Drill buttonholes 28.5mm in diameter, and attach buttons. Do the same for player two. The assembly may be finished with urethane or other wood coating. A Perspex cover can also be used on top. Remove sticks and buttons when finishing.



3. WIRE UP AND ATTACH
The controller microswitches attached to your joystick and control buttons will have one connecting post labelled "N.O." for normally open and one labelled "C" for common. Connect the common posts to the ground (generally "GND") of the encoder using a spade connector and wire. Several or all of these wires can be connected together before connecting to the encoder, as electrically they all go to the same place. Connect each microswitch to the button you'd like to control on the encoder. Connect the USB cable that you'll be using, and feed it to the outside world via the drilled hole. Plug the USB cable into your computer, and screw the top in once you've tested your control setup.



4. SOURCE YOUR SOFTWARE
Multiple Arcade Machine Emulator (MAME, mamedev.org/roms) is a good place to start for sourcing popular vintage games. You can also find original arcade-game information and disk data there. As its mission statement says: "MAME attempts to reproduce that game as faithfully as possible on a more modern general-purpose computer." Another great source of stand-up code is at archive.org/details/internetarcade

How to...

TAKE LUNAR PHOTOS

Want to take a Moon shot? Amateur astrophotographer Matt Quinn shows you how, using a zoom lens and his preferred night camera settings. JC

Prepare your kit
You'll need a DSLR camera and a 200mm or longer-focus zoom lens. Quinn uses the *SkyView* iOS and Android app for planning the position of celestial bodies, and cleardarksky.com to predict cloud cover. A tripod can be helpful, but for bright shots, holding your camera is OK.

Set up and shoot
Set your camera to capture RAW files to enable greater editing options. Use a tripod and digitally zoom in using your camera's display in live-preview mode. Enable manual focusing and, still zoomed in, focus on the Moon. Start with f/11 aperture, ISO 100, shutter 1/20th to 1/50th of a second.

Process and share
Quinn uses Adobe Lightroom. His post-processing goes: enable lens correction; adjust exposure to achieve the desired brightness; increase sharpness; increase noise reduction; slightly desaturate the image; and adjust split tones and saturation to enhance colours.



How to...

MAKE POWER GEL

Matt Frazier, author and founder of No Meat Athlete, explains how to make your own energy gels at home, to save money and help increase energy levels in a nutritious way. According to Frazier, making gels at home is much cheaper than buying them, and very likely much healthier.

"Things such as protein isolates and refined sugars are not healthy long-term. I'd think twice before eating 300 calories of them a day to support your activity," he says, explaining one reason to avoid manufactured energy gels, and to make your own. Rachel Walker



INGREDIENTS FOR A 150ML YIELD

1 tablespoon chia seeds, ground
60ml water
4 fresh Medjool dates, stones removed
3 tablespoons lemon juice
1 teaspoon sea salt
1 teaspoon blackstrap molasses

1. Aim for natural ingredients

"The closer your ingredients are to real foods in their whole state, the better," Frazier says. "Dates, maple syrup, lemon juice, coconut oil and soaked chia seeds all gel nicely in water and don't really need to be cooked." Making energy gels is a lot more precise than adding a liberal shake of salt. "A quarter of a teaspoon of sea salt equals about 500mg of sodium, and that's about how much you need to replace each hour," Frazier says. "I think it's best to get your salt where your tongue actually has to taste it, because if you're taking it in capsules you're missing out on feedback."

2. Don't rattle through energy gels like sweeties

Energy gels aren't designed for an afternoon jog or a few lengths of breaststroke. Frazier suggests that you should consider turning to a sachet only during a workout which lasts more than 45 minutes. "It's around then that glycogen stores start to deplete," Frazier explains. If the situation gets extreme, it can result in what is known as a "bonk", which is where levels drop so low that the brain starts shutting down muscles to preserve enough glycogen for its own operation. It's in circumstances like this that gels can keep you going as a quick and convenient way of replacing lost glycogen.

3. Match the gel to the workout

One problem for athletes in endurance events is that they can't take in calories as quickly as they're burning them, meaning that there's more need to turn to fast-burning carbohydrates, such as glucose, rather than slow-burning carbohydrates, such as oats.

Dates are a great source of glucose, and one of Frazier's favourite ingredients. As well as glucose, they also contain a lot of fibre, which comes with its own problems. "Over the course of an ultramarathon, the fibre in dates is going to accumulate, and require more restroom stops than a gel which uses less fibre-rich ingredients."

4. Show confidence in the kitchen

Frazier insists a homemade gel shouldn't be a compromise on a bought variety, with plastic gel flasks making them just as easy to carry and consume. "Hammer makes a nice, soft gel pack that mimics a commercial gel package – but a plastic sandwich bag with the corner removed works just fine, too."

Caffeine is another ingredient which Frazier avoids putting in gels. It is often added to manufactured versions, and some athletes spike theirs with ground tea or coffee. "There seems to be a correlation between caffeine intake and sudden deaths at marathon finish lines," he says. "For me, the risk isn't worth it."

5. Let it thicken

In a small bowl, stir the ground chia seeds into the water and then set them aside to let a thick gel form, which should be after about five minutes.

Meanwhile, combine all of the remaining ingredients in a food processor or high-speed blender. Be sure to run the motor for a good few seconds and ensure everything is properly mixed. The sticky dates may take a few goes to pulp totally.

When the chia gel has thickened sufficiently, add it to the other ingredients in the processor or blender, then process them until you obtain a smooth, gel-like consistency.



ILLUSTRATION: IKER AYESTARÁN; ALBANE SIMON; ANTTI KALEVI


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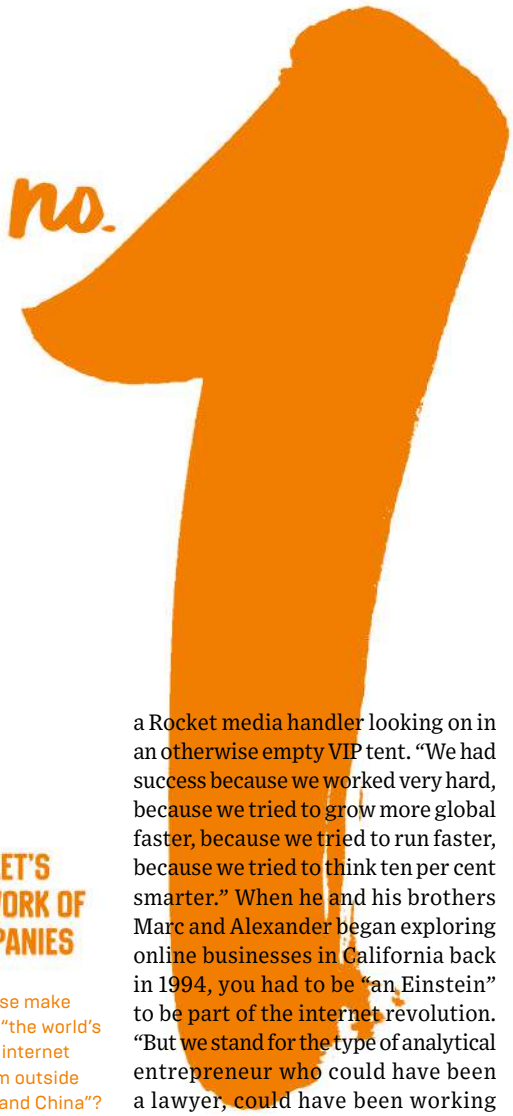
THE WIRED 100



PHOTOGRAPHY: BEN FRASER. TYPOGRAPHY: REBECCA SWARBRICK

By Stephen Armstrong, Duncan Baizley, Liat Clark, Mike Dent, Sophia Epstein, Oliver Franklin-Wallis, João Medeiros, David Rowan, Michael Rundle, James Temperton, Madhumita Venkataramanan, Gian Volpicelli, Simon Ward and Greg Williams

WIRED SURVEYED OUR EXTENSIVE NETWORK TO IDENTIFY THE 100 MOST INFLUENTIAL PEOPLE IN OUR WORLD ACROSS EUROPE. TOP OF THE LIST: ROCKET INTERNET'S OLIVER SAMWER



OLIVER SAMWER

CEO, ROCKET INTERNET
BERLIN

Oliver Samwer is determinedly telling WIRED why the 33,000 employees in Rocket Internet's 30 companies across 110 countries are but a pixel on a spreadsheet of his ultimate ambitions. "I hope in ten years when we achieve 250,000 employees that I'm going to say the goal is one million, ja?" the 42-year-old CEO of Berlin's Rocket Internet startup machine says in a machine-gun-fire response when your correspondent manages to corner him in Berlin. "You plant seeds. You already know you have, say, 3,500 people in Africa. Will you have in ten years 10,000? No way. There will be maybe 40,000 people."

Samwer does not make time for journalists – his response when WIRED requested an interview was curt: "As you know we focus all of our time on building great companies. Unfortunately I am too much working currently [sic] and need to focus." When we persuaded his team that, as the individual nominated by our network as the single most influential European in WIRED's annual list, he should at least accede to a photograph, he reluctantly granted a (repeatedly rescheduled) nine-minute cover shoot. So the odds are low, when WIRED arrives at the Noah conference in Berlin in mid-June, that Samwer, scheduled to give a late-afternoon keynote, will be available to answer questions about his extraordinary, hyper-scaling, systematised, controversy-generating company-building empire. But then a strange thing happens. A speculative text message leads to a phone call and then a two-minute warning that Samwer is after all available to meet WIRED. And he's ready to clarify a few popular misconceptions about his business.

"Our company is built on very simplistic virtues," Samwer begins, a Rocket media handler looking on in an otherwise empty VIP tent. "We had success because we worked very hard, because we tried to grow more global faster, because we tried to run faster, because we tried to think ten per cent smarter." When he and his brothers Marc and Alexander began exploring online businesses in California back in 1994, you had to be "an Einstein" to be part of the internet revolution. "But we stand for the type of analytical entrepreneur who could have been a lawyer, could have been working for a big company if he hadn't started an internet company. Maybe [we should demolish] the myth of internet building – it's also something that relatively normal people can achieve with relative success."

The sons of two Cologne lawyers, the Samwer brothers returned from their Silicon Valley sojourn ready to bring West Coast business models to Europe much faster than their originators. In 1999 they launched a German eBay-like auction business called Alando, which they famously sold to eBay for $50 million (£30m) within 100 days of its going live. They launched a Facebook-ish social network called StudiVZ in 2005, which Holtzbrinck Ventures bought two years later for $85 million. Soon they were gaining a reputation for cloning Pinterest (as Pinspire), YouTube (MyVideo), Twitter (Frazr), Airbnb (Wimdu), Groupon (CityDeal) and Birchbox (Glossybox). By the time this magazine covered their parent business, Rocket Internet, as "the clone factory" in 2012, Oliver Samwer had gained a reputation as a ruthless, if sometimes insensitively brash, CEO: his image had not been

PORTRAIT PHOTOGRAPHY:
OLAF BLECKER

ROCKET'S NETWORK OF COMPANIES

Will these make Rocket "the world's largest internet platform outside the US and China"?

"CONCEPTS"

Bonativo
nestpick
EatFirst
SHOPWINGS
SpaceWays

Continued >



burnished by an email he had sent some lieutenants the previous October headed "when is it time for blitzkrieg". "I will die to win and I expect the same from you," he told staff building an international furniture business. "The time for the blitzkrieg must be chosen wisely, so each country tells me with blood when it is time. I am ready – anytime! I do not accept surprises. I want this plan confirmed by all three of you: you must sign it with your blood."

That, though, was before Rocket became respectable: when it announced its intention in September 2014 to float on the Frankfurt Stock Exchange, Samwer sent a more measured email to all staff explaining his mission to build "one of the world's greatest internet companies". "For Rocket, being global is the big prize," he wrote. "Innovation never stops... we must win. To lead in our industries we have to innovate every day in providing the best services for our customers... Our strength is not in any single company or country. Our unique power is being the platform that brings it all together, and makes all the individual businesses possible. And the power of this platform is just getting started."

The IPO on October 2, 2014, raised €1.6 billion (£1.1bn), and made the Samwer brothers billionaires; now the business is finalising a move to a new 22,000m² HQ building in Berlin's Kreuzberg district overlooking Checkpoint Charlie, from where it will be the "platform" that links companies such as HelloFresh and Foodpanda in food, Dafiti and Lamoda in fashion, Lazada and Linio in e-commerce, and Westwing and Home24 in home and living.

Rocket's website declares its mission as "to become the world's largest internet platform outside the United States and China" – yet there was never any grand plan, nor any particular vision, Samwer says. "We didn't have that vision. This entire word 'vision' always sounds very far away. When I hear, 'What's your vision, what's your misison, what's your strategy?' – I think for us basically we would like to be very successful entrepreneurs in the internet space and have a very big impact on lots of people and markets and countries. With Jeff Bezos, Jack Ma, I think they never expected to be that big either." As he told WIRED three years ago: "We are builders of companies, we are not innovators."

Continued from previous page

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"EMERGING STARS"

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ZALORA

HOW TO LAUNCH A GLOBAL BUSINESS IN 143 DAYS

Rocket turned the cleaning business Helping into an international brand within a year. (Source: Rocket Internet's 2015 annual report.)



So he's not particularly bothered by the accusations of cloning others' original ideas. "Even Edison said [success was] 99 per cent perspiration, one per cent inspiration," he says now. "Are you really sure that of all the supermarkets in the UK, they all invented the same? I've never read a story that Tesco is the clone of Asda. Everyone has the chance to pick up ideas – and most people don't pick up. It's the difference between waking up – which is easy – and getting up, which is difficult. Your children have no problems to wake up. It's harder to make your children get up."

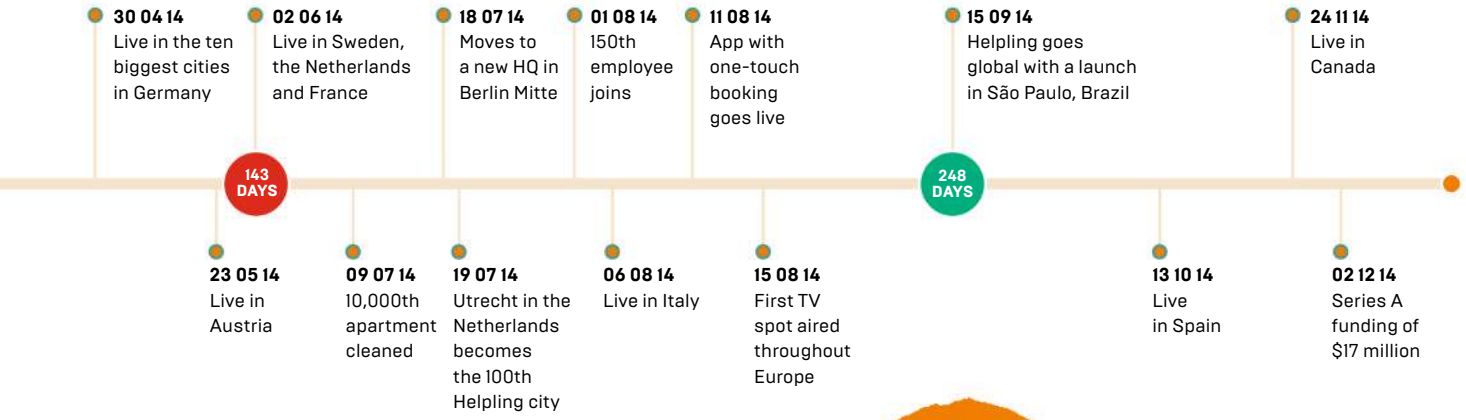
Oliver Samwer speaks quickly and firmly, and offers few opportunities for interruptions. "I would have an easier life if it was all easy?" he continues. "It's damned difficult. Would I love to be the very first ever in the world with an idea? Yes, maybe. Do I lose sleep over it? No. I like what I'm doing. We try to build successful companies that are sustainable, that are market leaders, that provide great service to customers. Maybe one day people will write, 'He didn't invent many companies, but he invented one,' and maybe the business model of Rocket will be one day be declared pioneering, an original idea."

In aiming to be "the home screen of the world", Rocket's original idea is to identify, then build, then scale businesses in e-commerce, marketplaces, finance-tech and travel more quickly and aggressively than anyone else. It divides the businesses it launches (or invests in) into "proven winners" – such as fashion retailer Lamoda and home-interiors business Westwing; "emerging stars" – payment gateway Paymill and home-cleaning firm Helpling; and "concepts" – laundry service ZipJet and carpool platform Tripda. It has "Regional Internet Groups" in Africa, Asia Pacific, Latin America and the Middle East to take a new business quickly into any territory where Berlin sees the numbers working.



ROCKET GIVES YOU ACCESS TO A NETWORK of experts, help in setting and scaling up the business, and access to capital," says Stefan Smalla, co-founder of interiors-commerce business Westwing in his Munich office. "That makes them great investors. It's not this romantic game building e-commerce – it's super expensive, and you need a boatload of capital to get it going." In four years, Rocket has helped Westwing scale to 15 countries from Brazil to Kazakhstan, with 1,600 employees and, as of 2014, €183m in revenue, growing at 66 per cent year on year. Part of the benefit is the centralisation of best practice: "We were looking at rolling out HR software, so we contacted Rocket, and got access to a few benchmarks of good products," Smalla says. "There are email lists such as CTO @ Rocket, product @ Rocket – experts who run stuff across the Rocket portfolio, who can help."

Very often, Rocket will develop a business model internally and then



go on to recruit its founders, typically management consultants such as Paul Philipp Hermann, formerly of the Boston Consulting Group and now co-founder of real-estate-listings business Lamudi. "I had the advantage of [launching with] a proven business model, of having a lot of help with fundraising, and lots of contacts," Hermann says. "We launched in late 2013 and are currently in 33 countries – last January we were launching a new country every two weeks. They take a lot of the risks out – and provide an environment where you can thrive and learn. We have regular calls with Oli – we go through our numbers, our KPIs, our planned strategy – and we meet four times a year in the office to go through things in more detail. You do realise it's not 100 per cent your company – but then again, if I had launched alone, I'd be in a ten-person startup, scared of running out of cash tomorrow. Rocket gives you an unfair advantage."

One criticism often made of the Samwers is that businesses are structured so as to minimise the founders' upside, thereby hindering the growth of an ecosystem where wealthy founders re-invest. Samwer naturally disputes this. "Nobody created as many millionaires outside the US and China as us. Maybe we didn't create multibillionaires yet, but let's look at how many multibillionaires there are anyway in non-US and non-China tech. Microsoft was once a millionaire factory. We're not a factory yet, but we've filled several school classes, and there are multi-millionaires and also multi-hundred millionaires there."

'HE REALLY, REALLY WANTS TO SUCCEED. I'VE NEVER SEEN SOMEONE MORE PASSIONATE. HE HAS 12-HOUR TELEPHONE SESSIONS. WHO DOES THAT?'

Increasingly, prospective founders are responding to the benefits of being inside the machine. "In Germany you really need it because the culture is so antagonistic to startups that a factory approach makes such a difference," according to Christian Grobe, who went from McKinsey to co-founding peer-to-peer lending business Zencap. "A lot of our McKinsey friends don't think about going to big companies like Mercedes now – they want to launch a startup in Berlin with Rocket. The downside is that you're expected to deliver your numbers from day one. There's no trying-out period."

Samwer is blunt, too, about his mistakes. "I invested in Facebook at $15bn and sold it at $15.5 because I was scared," he tells Marco Rodzynek on stage at Noah. "I missed the chance to invest in Delivery Hero at $10m; the list is very long." He also pulled out of Turkey after losing money in a series of businesses. "I don't regret it. You learn. There's no transformation if you don't try. In the same year we entered 27 markets; yes, Turkey didn't work, but 26 worked. I'm so focused on what's next I can't start crying at the past.

"The most important thing is that you chose the right business model. Then it's all about being number one in this business. You'll have a period when you'll have substantial significant losses as you build enough of a critical distance from number two, three, four. Being number one and giving everything to become that is very important. It's speed, but also the detail, the focus on the operations, the loyalty of the customers. It comes down to the normal virtues – hard work, thinking a little faster, smarter, going more international, and being a little braver and luckier."

And his founders know he won't give them any slack. "Oli's passionate, no bullshit, straight to the point," says Christian Grobe. Paul Philipp Hermann agrees: "I've never seen someone more passionate about what he's doing. He really, really wants to succeed in whatever he does. He schedules 12-hour phone sessions when he has companies on the call for 20 minutes one after the other. Who does that?"

"He's driven, loyal, aggressive, but he honours people who do good," says Paymill's Mark Henkel. "In Europe, in my eyes, Oliver Samwer is the internet: I guess that drives you. He's also someone who fears failing. I don't think what drives him is money. He wants to prove that this company is a real company."

At Noah, Samwer likens himself simply to a baker. "I bake a cake out of three things: ideas, people and capital. I do that every day, and there's always a shortage of one."

So what are his remaining ambitions? "We would like to be involved in many, many of the winners in Europe, Latin America, Russia, South Asia, India, Australia, the Middle East and Africa," he says without pause. "I'm now 42; I've got quite a few years still to go. When I look at [Rupert] Murdoch, when I look at [SoftBank's] Masa Son in Japan, who has a 300-year business plan – I'll be in this business for my whole lifetime. That means still many years to come. I want to sit here in five, ten, 25 years – and hopefully we'll be a lot bigger."

David Rowan is editor of WIRED. *He wrote about DeepMind in 07.15*

◇ △ ▽

2 JONATHAN IVE
CHIEF DESIGN OFFICER, APPLE, CALIFORNIA/UK
Apple's emphasis on the design and feel of its products puts Ive's role on a par with CEO Tim Cook's. The 48-year-old is considered the world's most high-profile designer of hardware and software. That doesn't stop him quietly returning to the UK, most recently for Goodwood's cars.

□

3 MARGRETHE VESTAGER
EU COMMISSIONER FOR COMPETITION, BRUSSELS
In April 2015, Vestager, 47, filed a complaint against Google for anti-competitive behaviour. It was the result of a five-year investigation initiated by Vestager's predecessor, Joaquín Almunia, after Microsoft and other companies first made antitrust allegations. Can she tame the giant?

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4 MARTIN SORRELL
CEO, WPP, LONDON
Sorrell's salary became news in 2014 when it was revealed the 70-year-old's compensation was £43 million – the highest amount of any FTSE 100 company CEO by far. Since then, WPP has bolstered its position as the largest advertising group in the world by continuing to make acquistions. And Sorrell does have 179,000 staff.

◇ ≡

5 NICOLA MENDELSOHN
FACEBOOK VICE PRESIDENT FOR EMEA, LONDON
Mobile is the main priority for Mendelsohn, 44. Facebook now has more than 100 million users in Africa alone, 80 per cent accessing the social network on mobile devices. Its internet.org project, which in the past year was launched in Ghana, Kenya, Tanzania and Zambia, is driving much of that growth.

⬠

6 JO BERTRAM
GENERAL MANAGER UK, IRELAND & NORDICS, UBER, LONDON
Bertram, 32, is behind Uber's successful expansion to London, a city that Travis Kalanick, Uber's CEO, described as the "Champions League of transportation": the taxi firm provides over a million rides a month there. She now has to tackle allegations of tax avoidance.

◇ ○

7 XAVIER NIEL
FOUNDER, FREE/42, PARIS
Niel's influence in France is second to none: the 47-year-old is the founder of one of the country's leading ISP and mobile operators, Free, and co-owner of *Le Monde*. He's launched tech college 42, which aims to produce 60 graduates a year. The mission continues: in 2016, he'll unveil 1000 START-UPS, the largest ever digital-business incubator.

▽

8 BJARKE INGELS AND THOMAS HEATHERWICK
DESIGNERS, LONDON AND COPENHAGEN
Heatherwick's work with Denmark's Ingels, 40, on Google's new US and UK HQs is exciting the Valley's power brokers. Even scaled back from its original plans, their proposed US Googleplex will comprise 55,277m² of flexible, translucent canopies.

⬠

9 DANIEL EK
FOUNDER, SPOTIFY, STOCKHOLM
Ek has revamped Spotify (again) over the past year. Now the music-streaming platform hosts podcasts and videos from renowned media partners including Vice and MTV. And the new Spotify app adjusts the beat of your playlist to your running. But can the 32-year-old survive a new assault from Apple?

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10 MATT BRITTIN
GOOGLE PRESIDENT OF EMEA BUSINESS AND OPERATIONS, LONDON
Former Olympic rower Brittin, 46, joined Google as head of direct sales in the UK in 2007. In February, he was promoted to VP responsible for its EMEA business and operations. He has already announced an investment of $25 million to teach digital skills to a million people by 2016.

× ‖ ▽

11 JULIEN CODORNIOU
DIRECTOR OF GLOBAL PLATFORM PARTNERSHIPS, FACEBOOK, LONDON
Codorniou, 38, oversees the apps in the social network, a role that has significant influence on their success. His attention has been on developers outside Silicon Valley, such as the Beijing-based caricature app *MomentCam*, which won Facebook's first FbStart app competition in March 2015.

× ⫽

12 PETER VAN DER DOES
CEO, ADYEN, AMSTERDAM
Van der Does, 45, is the co-founder, CEO and president of Adyen, which he launched in 2006. It handles 187 currencies for 3,500 firms across the world, including Facebook, Dropbox, Airbnb, Netflix, Spotify and Groupon. At the end of 2014, Van der Does raised $250 million, which values the company at $1.5 billion. (*See page 90*)

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13 YURI MILNER
FOUNDER, MAIL.RU; INVESTOR, MOSCOW/CALIFORNIA
The 53-year-old Russian VC travels 200 days a year to meet the founders of the companies he invests in, a portfolio that includes WhatsApp, Facebook, Twitter and Alibaba. In 2015, his fund DST Global was involved in a $400m investment in India ride-sharing startup Ola Cabs.

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\+ Investment
× Web
○ Telecoms
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□ Politics
≈ Gaming
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⫽ Retail
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▽ Design
‖ Events
≡ Other

no. 14

'BY WORKING ACROSS BORDERS AND USING THE SKILLS OF OUR BRIGHTEST IN BUSINESS, I'M HAPPY TO SAY THAT WE'RE STARTING TO GIVE CHILDREN THE FUTURE THEY DESERVE'

JOANNA SHIELDS

△ ◇
14 SIMON SEGARS
CEO, ARM, CAMBRIDGE
ARM processors power almost every smartphone – but CEO Segars, 47, wants to take on malnutrition and disease. He has backed projects in STEM education, and is working with UNICEF to bring the benefits of wearable tech to children across the globe. But it's the £16.6bn company's consumer tech that gives him his influence.

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15 GOOGLE VENTURES EUROPE
INVESTOR, LONDON
In February 2015, Google Ventures' European arm made its first investment – leading a $60 million round in Kobalt, the UK firm that ensures songwriters get money from streaming. The European VC team has $125m to invest, so its partners – including Tom Hulme and Avid Larizadeh – get their calls returned.

VC EUROPE

The number of investments made by the top six funds in 2014. (For sources, see the Colophon on page 134)

1 HIGH-TECH GRUENDERFONDS
63

2 BUSINESS GROWTH FUND
40

3 TECHSTARS
38

4 BPIFRANCE
30

5 SEEDCAMP
30

6 INDEX VENTURES
22

≡
16 JEREMY FARRAR
DIRECTOR, WELLCOME TRUST, LONDON
Under 53-year-old Farrar, an infectious-diseases expert, the trust will spend more than £800m advancing medical research in 2015, putting it behind only the Bill & Melinda Gates Foundation. The trust is a founding partner of the Francis Crick Institute for biomedical research, about to open in St Pancras.

‖ ≈
17 RICCARDO ZACCONI
FOUNDER AND CEO, KING DIGITAL ENTERTAINMENT, LONDON
Over the last 12 months, 48-year-old Zacconi has steered *Candy Crush* makers King through a tepid IPO and back into investors' hearts. Though first-quarter results were not as strong as a year earlier, the $604 million profit was still a three per cent increase on the previous three months.

₪
18 PADDY COSGRAVE
CEO, WEB SUMMIT, DUBLIN
In November 2014, Dublin's Web Summit, which Cosgrave, 31, co-founded in 2010, registered more than 22,000 attendees. In 2015, Cosgrave further expanded it with the launch of sister events in Hong Kong and Las Vegas and an event about finance in Belfast in June 2015. His speakers have included Bono and Eva Longoria.

+
19 INDEX VENTURES
VENTURE CAPITAL, LONDON
Index has made investments in some of the biggest names in tech, including BlaBlaCar and Etsy, and is looking towards a mobile-first world with a new $400m smartphone-focused fund. In 2013, only two Silicon Valley competitors had an equal or better performance on billion-dollar exits.

◇ //
20 BRENT HOBERMAN
CO-FOUNDER, FOUNDERS FORUM, LONDON
Hoberman's Founders Forum is a key European networking gathering. Hoberman, 46, was awarded a CBE last year and helped get tech entrepreneurs behind the Conservative party. In April he launched the F Factor, a competition offering 14- to 25-year-olds the chance to win £10,000 for a business idea.

× □
21 GIOVANNI BUTTARELLI
EUROPEAN UNION DATA PROTECTION SUPERVISOR, BRUSSELS
Watch out, tech giants: the 58-year-old Italian judge was appointed to lead the EU's data-protection organisation in December last year – just as the EU began to redraft its rules. He has stated his commitment to innovation, but also said that "big data requires big data protection".

≈
22 ILKKA PAANANEN
CO-FOUNDER AND CEO, SUPERCELL, HELSINKI
Mobile gaming is booming and 37-year-old Paananen's company, now 73 per cent owned by Softbank, is leading the way with its tablet-based products. In 2014, the company generated $1.7 billion in revenue with three blockbuster games: *Clash of Clans*, *Hay Day* and *Boom Beach*.

+
23 ACCEL PARTNERS
VENTURE CAPITAL, LONDON
The company's recent $10 million fund with Shenzhen-based UAV maker DJI underlines Accel's reputation for strategic investment in emerging markets. Renowned for its early backing of Facebook, it led the B round of French ridesharing startup BlaBlaCar, which is now valued at $1 billion.

× □
24 JOANNA SHIELDS
MINISTER FOR INTERNET SAFETY AND SECURITY, LONDON
After two and a half years as the head of Tech City and David Cameron's digital adviser, Baroness Shields, 53, had returned to the private sector. However, post-election, her friend the Prime Minister has promoted her to a role as Parliamentary Under Secretary of State.

◇ + ×
25 ARKADY VOLOZH
CO-FOUNDER, YANDEX, MOSCOW
In Russia you don't Google, you Yandex. The search engine is responsible for 57 per cent of all Russian search-engine traffic, leaving Google in second place on 34 per cent. Volozh, 51, who founded the company in 1997 and remains its largest individual shareholder, has a net worth of over $1.7bn.

◇ × □
26 GÜNTHER OETTINGER
EU COMMISSIONER FOR DIGITAL ECONOMY AND SOCIETY, BRUSSELS
The EU is taking the fight to the world's biggest internet firms – and Oettinger is its warrior. Less than six months after taking office, 61-year-old Oettinger announced plans to create a "digital single market", a strategy covering everything from online retail to broadband.

£43 MILLION

The highest salary of a FTSE 100 CEO – earned by Martin Sorrell in 2014

// ⬠
27 JESPER BUCH
FOUNDER, JUST EAT, MARBELLA
In April 2014, the food-delivery startup debuted on the London Stock Exchange at a valuation of £1.47 billion. Buch, the platform's 40-year-old Danish founder, is an active angel investor – in 2014, he was involved in seven series A fundings, two series B and a series C. He is a World Economic Forum Young Global Leader.



'WE HAVE ALWAYS INCLUDED RISK ASSESSMENT IN OUR PRODUCT BUT, AS WE EXPAND OUR DATA SET ACROSS ALL MERCHANTS, WE CAN SAY WITH CERTAINTY IF A TRANSACTION IS FRAUDULENT'

no. 12

PIETER VAN DER DOES

CO-FOUNDER AND CEO, ADYEN
AMSTERDAM

"SOMEONE FORWARDED ME A TWEET FROM a big guy in Silicon Valley saying: 'Today I spoke to four companies who claim to be Adyen's largest customer – wow, those guys are nailing it'," Pieter Van der Does, Adyen's co-founder, president and CEO, laughs. "That summarises it pretty well, actually..."

The Dutch online-payments company's rise has been rapid. Launched in 2006, Adyen now handles 187 different currencies serving 3,500 businesses across the world, including Facebook, Dropbox, Airbnb, Netflix, Spotify and Groupon. At the end of 2014, Van der Does raised $250 million – which values the company at $1.5 billion – to fund a move to physical retail.

"For a merchant it's horrible to have one system for online and another for point of sale," he explains. "Historically, point of sale was a hard-coded machine linked to your bank, but it's moving to something very comparable to the internet. So you don't need to sign up for 30 different connections at 30 different terminals. Now you can have one terminal to Adyen."

Clothing stores Superdry and Moss Bros, as well as hotel chain CitizenM, have signed up and several other fashion retailers are on the way. As a result, Van der Does' vision goes beyond multiple forms of payment to risk and identity management.

"We have always included risk assessment in our product but, as we expand our data set across all merchants, we can say with certainty if a transaction is fraudulent," he says. "Have we seen this person? Have we seen this email address? Have we seen this card? We don't do it on a single transaction – we look at the full relationship. An Israeli card in the US [or] shopping online Europe – is that a fraud alert? There are many Israeli developers working in New York and sooner or later they'll buy something in Europe. I've been to many presentations about big data and they all boil down to: if you have small children and you go to a supermarket, they tell you to get diapers. We're going to prove there's more subtle solutions for big data."

It's a level of ambition Van der Does, 45, has nursed from the start of his career, when he quit the executive-training programme at Dutch bank ING because banking didn't feel entrepreneurial. Prior to Adyen he was CCO at Bibit, the payment service provider acquired by the Royal Bank of Scotland in 2004. He left two years later.

"The skilled IT people were saying, 'RBS is centralising. They are not so happy about us and we are not so happy about them – so we're thinking about leaving. Are you guys up for doing something?' We saw the opportunity to get this team together and started Adyen – which means," he laughs, "all over again."

Written by Stephen Armstrong, who wrote about superbugs in 11.14

187
–
The number of currencies used by Adyen's 3,500 business customers

EUROPE'S BIGGEST INVESTORS

These five firms made the most tech deals in 2014 in Europe, measured by the total sales they made. (See the Colophon on page 134 for sources)

1 INDEX VENTURES
£547 million

2 ACCEL PARTNERS
£260 million

3 BALDERTON CAPITAL
£181 million

4 BUSINESS GROWTH FUND
£165 million

5 WELLINGTON PARTNERS
£156 million

28 NATALIE MASSENET
CHAIRMAN, YOOX NET-A-PORTER GROUP, LONDON

The Richemont Group's sale of Net-A-Porter to Federico Marchetti's Yoox Group means that, while Massenet is chairman to Marchetti's CEO, the 50-year-old founder of the company is now part of the world's largest online luxury-goods business, valued at €3.12bn. In May 2015, Net-A-Porter launched *The Net Set* app.

29 SHERRY COUTU
ANGEL INVESTOR, CAMBRIDGE

The Canadian expat, 51, is on the advisory board of LinkedIn, a non-exec at the London Stock Exchange and Cambridge University, and has backed Zoopla, LoveFilm and YPlan. She runs Silicon Valley Comes to the UK and Founders4Schools, which gets entrepreneurs speaking in classrooms.

30 STEFFI CZERNY
CO-FOUNDER, DLD, MUNICH

The 61-year-old former journalist and founder of Europe's most influential tech conference, Burda's DLD, is securing a foothold in the US – the second DLD NYC took place in May 2015, joining the DLDsummer conference, DLD Tel Aviv Festival, DLD Moscow and DLDcities in Burda's portfolio.

31 ERIK ENGSTROM
CEO, REED ELSEVIER, LONDON AND AMSTERDAM

Engstrom, a 52-year-old Swede, is CEO of Reed Elsevier, the Anglo-Dutch multinational publisher and information provider operating in the science, tech and medical sectors. Under Engstrom, it has transformed from a trad print-publication and events company to a digital information business.

32 MIKI KUUSI
SLUSH, HELSINKI

As CEO, Kuusi spent 2011 to 2014 leading Slush's growth from a local, 150-person conference to a global event, attracting 14,000 delegates from 79 countries. Kuusi stepped down in 2014 to launch his own startup, the fledgling food-payments app Wolt, with $500,000 seed funding led by Lifeline Ventures. (*See page 102*)

33 SEAN PARK
FOUNDER AND CHIEF INVESTMENT OFFICER, ANTHEMIS, GENEVA

Park's investment firm focuses on startups disrupting financial services through technology. Companies invested in include Betfair, Zoopla and Simple. Park, 46, launched the Anthemis Fellowship programme in 2015, whereby three fellows will be placed across portfolio companies.

34 PATRICK AND JOHN COLLISON
FOUNDERS, STRIPE, CALIFORNIA/LIMERICK

Patrick, 26, and John, 24, usurped Amazon when Kickstarter ditched the retail giant for their Stripe payments system in 2015. Backed by Elon Musk and Peter Thiel, the company has soared to a reported $5 billion valuation. When you press "Buy" on social media, you're probably using it.

35 BALDERTON CAPITAL
VENTURE CAPITAL, LONDON

The London-based investors – already one of Europe's biggest tech venture firms, with around $2.3 billion of assets under management – is looking towards Europe from its new base in Kings Cross, with a round of hiring for an office in Paris. It has been part of rounds in 3D Hubs and Lyst and backed Kobalt early on.

36 FEDERICO MARCHETTI
FOUNDER, YOOX, MILAN

The 46-year-old CEO of luxury e-commerce platform Yoox pulled off an all-share deal takeover of his largest rival Net-A-Porter in April – creating the world's largest online luxury retailer, valued at €3.12bn. The company was founded on his negotiating with high-end fashion brands to sell at discount prices.

- Tech
- Investment
- Web
- Telecoms
- Social
- Politics
- Gaming
- Computing
- Retail
- Apps
- Design
- Events
- Other

37 JAMES DYSON
FOUNDER, DYSON, MALMESBURY

Having reinvented the vacuum cleaner and the hand dryer, billionaire Dyson, 68, now wants to reinvent the engineering college. His £12 million Dyson School of Design Engineering will launch within Imperial College in October. Meanwhile Dyson UK is investing £1.5 billion in research.

no. 38

38 DEMIS HASSABIS
CO-FOUNDER, DEEPMIND, LONDON

The former chess champion, 40, made waves in February 2015 when *Nature* revealed that his artificial-intelligence algorithm had learned to play 49 Atari video games, often more skilfully than humans. Google bought DeepMind in 2014 for £400 million, but Hassabis –now Google's vice president of engineering – remains at the core of the London business, describing it as an "Apollo mission for AI".

'COMPETITIVE ADVANTAGE DOESN'T GO TO THE NATIONS THAT FOCUS ON CREATING COMPANIES, IT GOES TO NATIONS THAT FOCUS ON SCALING COMPANIES'

SHERRY COUTU

39 OLIVER SCHUSSER
VICE-PRESIDENT, ITUNES INTERNATIONAL, LONDON
Music sales on iTunes declined significantly in 2014 (hence the firm's investment in Apple Music) yet the platform generated $10.2 billion in net sales in 2014, up from $9.3 billion, and still dominates the global market. Schusser is responsible for all iTunes business outside the US, including fast-growing Asia.

40 EBEN UPTON
FOUNDER, RASPBERRY PI FOUNDATION, CAMBRIDGE
When Upton, 37, launched his credit-card-sized Raspberry Pi computer in 2012, he hoped to teach kids programming skills and dreamed of selling 10,000. By February 2015, the company had sold five million units. Recent school curriculum changes have placed the Pi at the forefront of ICT in British schools.

41 JØRGEN VIG KNUDSTORP
CEO, LEGO, BILLUND
In the decade since Knudstorp, 46, joined LEGO, he has pulled it from a company on the brink of bankruptcy to one with revenues of £2.7bn. The former McKinsey consultant launched a programme to hire LEGO fans as designers. *The LEGO Movie* and *Minecraft* competitor *LEGO Worlds* paid off hugely.

42 HRH DUKE OF YORK
CONVENOR, PITCH@PALACE, LONDON
Even as his PR team was denying historical allegations about his personal life, the duke, 55, was reinventing himself as a startup supporter. His three Pitch@Palace events have brought hundreds of top-grade investors to St James's Palace to hear pitches from startups from across the UK.

43 RISTO SIILASMAA
CHAIRMAN, NOKIA, HELSINKI
When Nokia sold its mobile division to Microsoft in April 2014, Risto Siilasmaa saw an opportunity: the 49-year-old chairman of Nokia's board is currently overseeing a €15.6 billion (£11.2 billion) deal to buy French rival Alcatel-Lucent, showing doubters that Nokia is still, despite everything, a major player.

44 BRUNO GIUSSANI
EUROPEAN DIRECTOR, TED; LE FORUM DES 100, GENEVA
As European director of TED, Giussani, 51, has one of the most impressive contacts books in the world of ideas. He has curated and hosted the TED University programme and the TEDGlobal conference, and is the man to impress if you want your 18 minutes of fame.

45 KRISTO KÄÄRMANN AND TAAVET HINRIKUS
FOUNDERS, TRANSFERWISE, LONDON
Estonians Käärmann, 35, and Hinrikus, 34, started the peer-to-peer money-transfer startup TransferWise in 2011. It claims to have saved users £135 million in fees and is a powerful symbol of how fintech startups disrupt banking. The $1bn company has 300 employees.

46 KAJ HED
CHAIRMAN, ROVIO, HELSINKI
The father of Rovio's ex-CEO Mikael Hed – who left the company at about the time that the profits began to fall – Kaj owns almost 70 per cent of its equity. Kaj, 60, continues to be an active investor in Nordic startups via his new venture fund MOOR Capital, which launched back in May 2013.

£2.7BN

The worldwide revenue, including from movies and games, of LEGO in 2014

47 SEBASTIAN SIEMIATKOWSKI
CO-FOUNDER, KLARNA, STOCKHOLM
The online-payments provider is one of a rising number of European startups valued at over $1 billion. Siemiatkowski, 33, expanded Klarna into the UK and the US in 2014. In 2015, he plans to expand from payments into payment systems for news articles and public transport.

48 LINO GUZZELLA
PRESIDENT, ETH UNIVERSITY, ZURICH
In January, thermotronics professor Lino Guzzella, 57, took office as president of ETH Zurich – the top university in mainland Europe, with 21 Nobel Laureates associated with it. The university, which has an endowment of 1.5 billion CHF (£1 billion), has spun out 16 startups since the start of 2014.

49 FRÉDÉRIC MAZZELLA
BLABLACAR, PARIS
BlaBlaCar has a community of 20 million users, making it the world leader in long-distance ride sharing. Last year, it raised $100 million in a funding round led by Index Ventures. Over 12 months, it has launched in several markets: Turkey, India, Hungary, Romania, Croatia and Serbia, and in Mexico after acquiring competitor Rides. (*See page 98*)

50 MARTHA LANE FOX
ADVOCATE PEER, LONDON
The former Lastminute.com exec has been on a roll since she sold up for £577m in 2005: becoming Open University chancellor, giving this year's Richard Dimbleby Lecture, chairing Go ON UK, and being on the boards of Marks & Spencer and Channel 4. Plus, she is waking up the House of Lords. (*See page 94*)

51 ALEX HOYE
FOUNDER, RUNWAY EAST/ICE/FACTION SKIS, LONDON
Serial entrepreneur Hoye, 46, brings people together. In 2009 he co-founded ICE, a network of startup entrepreneurs. In 2014, he established Runway East, a co-working community of startups in London's Old Street. It houses more than 100 tenants, from IndieGoGo to Grabble.

52 HANS ULRICH OBRIST
CO-DIRECTOR, SERPENTINE GALLERY, LONDON
The Swiss art curator tries to get five hours' sleep a night, but often fails. His relentless travelling ensures the Serpentine Gallery is always at the head of conceptual creativity. The web hasn't killed art, 47-year-old Obrist argues, but rather increased interest in it.

MARTHA LANE FOX

INTERNET ADVOCATE AND CROSSBENCH PEER
LONDON

'ONLY ONE LARGE TECHNOLOGY COMPANY IS RUN BY A WOMAN, WHICH IS ABSOLUTELY UNBELIEVABLE TO ME'

no.

£577 MILLION

The sale price that Lastminute.com achieved in 2005

MARTHA LANE FOX ISN'T USED TO accepting defeat. "I'm a real optimist, I think the potential for change is the most exciting thing," she says on a warm summer afternoon in London. When her startup Lastminute.com – co-founded in 1998 when she was 25 – lost 90 per cent of its value within a year of being floated on the London Stock Exchange, she and co-founder Brent Hoberman managed to keep it buoyant and sell in 2005 for £577 million, not long after she turned 32. A year before the sale she had suffered a serious car crash in Morocco, which resulted in her undergoing 28 operations, and a lifelong need for a walking cane.

Since returning to public life, Lane Fox, 42, has been Britain's "digital commissioner"; in her role, she campaigned for more of the UK population to go online – Lane Fox says that ten million people have never used the web. She helped set up the Government Digital Service, which brought government transactions with citizens on to a single digital platform – Gov.uk. She is also on the boards of Marks & Spencer, Channel 4 and Makielab and she co-founded the karaoke chain Lucky Voice, which turns ten this year. "I never imagined Lucky Voice would be anything more than a slight vanity project, but it's really exciting to see that it's grown to eight venues around the world," she says.

In March 2014, she was appointed chancellor of the Open University; the year before she was made a life peer in the House of Lords (Baroness Lane-Fox of Soho), sitting as a cross-bencher. "Earlier this year, I delivered the BBC's Dimbleby Lecture, where I posited the idea that the UK could be brilliant and world-leading at internet infrastructure, digital skills and government services – but we need a completely new civic organisation to help us do that," she says. "I am now working on what it might look like."

The first point on her agenda: addressing the major problems with the internet in the west. Her big concerns are the lack of women in large tech companies ("Only one large technology company is run by a woman, which is absolutely unbelievable to me," she says) and the ethical issues creeping up around online privacy. "We know from Snowden and the public domain that we are one of the most surveilled countries on the planet and we've walked right into that," she says. "I think as a society we'll look back and think, 'Whoops, we gave up our privacy in quite a dramatic way.'" The public body she proposes – which she calls Dot Everyone – would be a civil organisation staffed by researchers and ethicists who would unpick the ethical questions about privacy and the under-representation of women in tech, and then take a global lead on how to address them, she says.

Aside from public advocacy, Lane Fox's passion is a new entrant into the political landscape – the Women's Equality Party. "As a crossbench peer, I have to be careful, but this is fascinating – a non-partisan force with some really radical ideas such as equal pay for women and ending violence against women," she says. "I'm supporting them carefully from the sidelines as I'm a non-political peer. I just have to find the right relationship with that party as it develops."

And what about returning to her roots as an entrepreneur? "I have one business that I'm dying to do, but it's quite a difficult, grubby, unpleasant business. It's dealing in a bit of the world that's really quite hardcore, but I know it's a good idea," she says. "You'd think starting a massive new public institution, a new political party and continuing with my business interests might be enough. But you never know."

Written by Madhumita Venkataramanan, WIRED's *associate editor. She wrote about BrainGate in 05.15*



53 JOSÉ NEVES
FOUNDER AND CEO, FARFETCH, LONDON
After working in retail for 15 years, Neves, 41, launched fashion retailer Farfetch, an e-commerce platform that represents more than 300 brands, in 2008. In March 2015 he raised £56 million in an E round of funding that valued the company at $1bn. [Condé Nast, which publishes *WIRED*, has invested in Farfetch.]

54 KLAUS HOMMELS
FOUNDER, LAKESTAR, ZURICH
With Facebook, Airbnb and Spotify in his portfolio, Hommels is one of the most discerning investors. In the past year, the 48-year-old has focused on the German on-demand economy, with investments in Marley Spoon (the new venture of the former CEO of Delivery Hero, Fabian Siegel) and cleaning service Helpling.

55 WELLINGTON PARTNERS
VENTURE CAPITAL, LONDON AND MUNICH
Wellington Partners is a pan-European venture capital firm with deep reach into the US and Asia. With more than £572m under management – with an emphasis on life sciences – the team's portfolio includes Hailo, Spotify and Dropbox. Recent investments include Mapillary and YOU-app.

56 LIAM CASEY
FOUNDER AND CEO, PCH INTERNATIONAL, CORK/SHENZHEN/US
Liam Casey's PCH International employs more than 25,000 staff in Asia to make hardware for everyone from startups to Philippe Starck and Apple. Casey, 49, plans to open up access to his production resources and create what he calls a "Netflix for high-end design".

57 STEFAN VON HOLTZBRINCK
CHAIRMAN, HOLTZBRINCK PUBLISHING GROUP, STUTTGART
The 52-year-old's plan to move the family firm away from its newspaper business included a merger between Holtzbrinck Publishing Group's Macmillan Science and Education division and Springer Science & Business Media.

58 MIKE BUTCHER
EDITOR-AT-LARGE, TECHCRUNCH, LONDON
He continues to be ubiquitous on the conference circuit, and startups travel far to compete for £30,000 and a TechCrunch write-up at the site's London event, Disrupt. The startup workspace he co-founded, TechHub, launched its eighth location, in Madrid, in June.

59 ZAHA HADID
ARCHITECT, LONDON
In the decade since Hadid, 64, became the first woman to receive the Pritzker Architecture Prize, she has brought her project total close to 1,000, including the World Cup stadium in Qatar and a new parliament for her place of birth, Baghdad. Hadid's fluid designs helped her firm be named International Practice of the Year by *Architects' Journal*.

60 RICHARD CHEN
INVESTOR, ROVING
Chen, ubiquitous at European tech events, is a partner of Ceyuan Ventures, an early-stage VC fund in Beijing, founded in 2004, as well as MD of Yifei Investment Holdings. His expertise is in cross-border tech and media investments. He has invested in startups such as onefinestay, Sofar Sounds, FishBrain and Seedcamp.

61 JON FREDRIK BAKSAAS
CEO, TELENOR, FORNEBU
Nortel might just be the biggest teleco you've never heard of. Led by Baksaas, 60, the company (majority-owned by the Norwegian government) is investing heavily in developing countries such as Thailand and Pakistan. It amassed 26 million new customers in Q1 of 2015. Revenues in 2014 were £8.8bn.

62 HERMANN HAUSER
CO-FOUNDER AND DIRECTOR, AMADEUS CAPITAL, CAMBRIDGE
A pioneer of home computing in the UK, Hauser was awarded an honorary knighthood in March 2015. Now the 66-year-old is taking entrepreneurship back to his native Austria: his Alpbach Summer School for Entrepreneurs aims to teach PhDs how to commercialise their ideas.

'THE ACCELERATOR IS OUR GYM: IT CHALLENGES US, IT HURTS US, IT FORCES US TO THINK DIFFERENT'

LIAM CASEY

WHERE OUR TOP 100 ARE BASED

UK 43
France 8
Germany 7
US 7
Sweden 5
Switzerland 5
Belgium 4
Finland 4
Ireland 3
Russia 3
Denmark 2
Netherlands 2
Austria 1
China 1
Israel 1
Italy 1
Norway 1
Spain 1
Turkey 1
Vatican City 1

◇ Tech
\+ Investment
× Web
○ Telecoms
⫴ Social
□ Politics
≈ Gaming
△ Computing
⫽ Retail
⬠ Apps
▽ Design
▥ Events
≣ Other

63 MARC SIMONCINI
FOUNDER, JAÏNA CAPITAL PARIS
In 2015, Simoncini, 52, was ranked the third most active business angel in France in a survey by crowdfunding platform GoFundMe. He has made 23 investments since 2009 amounting to €12 million. After selling his online-dating company Meetic, he launched a film production company, Reborn.

64 MATHIAS DÖPFNER
CEO, AXEL SPRINGER, BERLIN
The CEO of Germany's largest multimedia publisher doesn't mind a scrap. In 2014, Döpfner, 52, sent an open letter to Eric Schmidt criticising Google's dominance of search. Recent investments in Blendle, a site that lets users pay for articles, and *Business Insider* underline his ambition.

65 ROBIN WAUTERS
FOUNDER, TECH.EU, BRUSSELS
Wauters, 34, is a seasoned European tech journalist and founder of Tech.eu - launched with seed funding from angel investors including Dave McClure's 500 Startups. It offers data-based analysis, insights and research into the European tech industry. Since May, he's been advising the Belgian government.

66 ALAN MAMEDI
CO-FOUNDER, TRUECALLER, STOCKHOLM
Mamedi is the 31-year-old CEO and co-founder of Truecaller, a phonebook app that identifies callers via a crowdsourced database. The platform has over 100 million users and is installed on Nokia/Microsoft, Alcatel, Lenovo and LG phones. An agreement with Cyanogen means it'll be integrated into Android OS.

67 JEAN-BAPTISTE RUDELLE
CO-FOUNDER AND CEO, CRITEO, PARIS
Founded in 2005, Criteo continues to make big money from personally targeted online advertising. The company, a standout French tech success, recently posted profits of €77.6m (£56.2m). Rudelle, 45, says the success was down to selling ads based on results, not eyeballs.

68 AXELLE LEMAIRE
MINISTER FOR DIGITAL AFFAIRS, PARIS
Lemaire, 40, was appointed French minister for digital affairs in April 2014. Since then she has been fighting to have net neutrality included in French law. She has also started a €15m initiative to promote French entrepreneurs abroad, creating hubs for French tech in Boston and San Francisco.

69 YARON GALAI
CO-FOUNDER AND CEO, OUTBRAIN, TEL AVIV AND NEW YORK
The native-advertising entrepreneur, 44, sold three businesses before launching content-recommendation service Outbrain in 2006. With 25 per cent of the market share – way ahead of Yahoo! and AOL's competing services – the plan is for a $1 billion IPO this year.

70 VU BUI
COO, MOJANG, STOCKHOLM
The former documentary film-maker, 38, is producing the upcoming live-action *Minecraft* movie while heading up the game's growing focus on real-world interventions. He's in our list in place of Notch who, since Microsoft's buyout of *Minecraft*, has been focusing on enjoying Beverly Hills life.

71 CHRIS MORTON
FOUNDER AND CEO, LYST, LONDON
The British entrepreneur raised $40m in a series C round for his e-commerce platform in April 2015 and plans to use the investment to take the company worldwide. The revenue of his Hoxton-based company has tripled year-on-year for the past three years – in April 2015 sales reached £98 million.

no. 08

72 CÉDRIC HUTCHINGS
CEO, WITHINGS, PARIS
A pioneer of connected health, Hutchings, 39, is behind Withings' activity-tracking wearable Activité as well as its cheaper, more colourful younger brother, the Activité Pop. The Pop was announced at CES in January and claims an eight-month battery life, a feature the French entrepreneur says defines a "true wearable" – disqualifying smartwatches from the category. The company is a European leader in connected devices.

73 GERFRIED STOCKER
ARTISTIC DIRECTOR, ARS ELECTRONICA, LINZ
As artistic director of the Ars Electronica Center, 51-year-old Gerfried Stocker curates the future, working with innovators and "conceptioneers" to reimagine what happens when art and tech interact. The Center's Spaxels installation stole the show at Eurovision with only 30 seconds of airtime.

£8.8BN
Worldwide revenue in 2014 of Telenor, the Norwegian telco you may not have heard of

74 OLA AHLVARSSON
FOUNDER, SIME, STOCKHOLM
Although Stockholm's punchiest serial entrepreneur - Ahlvarsson, 45, is a former world kickboxing champion - has a wide portfolio, including his consultancy, Result, Star Stable Entertainment and workspace hub Epicenter, it's his well-attended SIME conferences that give him global clout.

75 FABRICE GRINDA
INVESTOR, ROVING
A serial entrepreneur and super angel, France's Grinda, 41, has invested in stellar companies such as Alibaba, Delivery Hero and Uber, and is active from Bucharest and Paris to New York. He has made over 170 investments since 2009; exits amount to more than $300m. This year, his AngelList syndicate financed the apps *Home6l* and *Recarga*.

76 ALICE ZAGURY
FOUNDER, THEFAMILY, PARIS
In March, French paper *Le Parisien* named Zagury, 30, the most influential "entrepreneuse" in Paris. The CEO and co-founder of accelerator TheFamily supports 270 startups and opened an office in London in May. Facebook announced it will offer mobile services associated with one TheFamily startup.



no.44

FRÉDÉRIC MAZZELLA

CEO AND CO-FOUNDER, BLABLACAR
PARIS

IN 2011, FRÉDÉRIC MAZZELLA, CEO OF a French ridesharing startup called CoVoiturage, had a dilemma. The company had recently expanded to other countries in Europe – and in each country it had a different name. Mazzella had to come up with an unified brand. "One of our most popular features on our service was the 'blabla'," Mazzella, 39, says. "When an user registered, she would have to choose whether she was 'bla', 'blabla' or 'blablabla', depending on how talkative she was when sharing a ride. That became our name."

BlaBlaCar currently has a community of 20 million users, making it the world leader in long-distance ridesharing. "Our role is to match passengers looking for a ride with drivers who have empty seats to share costs for a common journey," Mazzella says. "Our drivers don't make any profit, which makes us totally different from companies like Uber." Last year, BlaBlaCar raised $100 million (£65 million) in a seed round led by Index Ventures with previous investors such as Accel Partners and ISAI. "With the previous investment round, our investors wanted us to prove that we were able to expand beyond France," says Mazzella, age 39. "We did that by expanding to Italy, Poland, Germany. Now the ambition is to be global and getting more usage per service by enhancing our mobile real-time experience."

Given BlaBlaCar's extraordinary growth, one of Mazzella's main concerns is to preserve the trust that users have in the service. Recently, BlaBlaCar conducted an online survey of its users, asking them to rate how much they trust someone on the scale of one to five. "A stranger in the street had an average rating of 2.2, friends 3.8 and family, 4.7," Mazzella says. "BlaBlaCar profiles had on average 4.2. We want to build a trusted network for rideshare using information that is declared, rated, engaged, activity-based, moderated and social."

29
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The number of nationalities of the 300 BlaBlaCar staff in its 19 offices around the world

Over the past year or so, BlaBlaCar launched in several new markets: Turkey in July 2014, India in January, Hungary, Romania, Croatia and Serbia in March (upon acquiring AutoHop), and Mexico in April (after acquiring local firm Rides). "Our acquisitions are what we call acqui-hires," Mazzella says. "The goal is to hire talented people in those countries." BlaBlaCar now has a team of 300 people spread over 19 offices around the world, from Moscow to Mexico City, comprising a total of 29 nationalities.

"Three years ago we had to change our internal-communications language to English," Mazzella says. "We're doubling our number of staff every year. When we were 60, we gathered everybody in the same amphitheatre and crowdsourced our values. Our heads of deparment have now developed MOOC courses explaining to new hires what they do. Our biggest challenge as we grow is to keep our culture intact."

Written by João Medeiros, who wrote about McLaren in 08.15

'DURING THE PREVIOUS INVESTMENT ROUND, OUR INVESTORS WANTED US TO PROVE THAT WE WERE ABLE TO EXPAND BEYOND FRANCE'

+

77 ARNIE SRISKANDARAJAH
FOUNDER, THE COLLECTIVE ELEVATOR, LONDON
As the EU Commission's inaugural entrepreneur-in-residence, Sriskandarajah, 28, advised Brussels on startups. Now managing director of incubator-cum-workspace The Collective Elevator, he picks promising startups aimed at 25-to-35-year-olds.

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78 CARA DELEVINGNE
MODEL/ACTRESS, LONDON
Of all *Instagram*'s European users, only Cristiano Ronaldo has more followers. The 22-year-old has amassed over 13.2 million followers. A single shot will often break 600,000 likes – few in fashion wield as much brand power as her. Next, she's looking towards Hollywood with a role in DC Comics' hotly anticipated *Suicide Squad*.

8.5 MILLION

The number of *Vine* followers accrued so far by NY-based Jérôme Jarre

◇ × △

79 LUDOVIC LE MOAN
FOUNDER AND CEO, SIGFOX, TOULOUSE
As CEO of Sigfox, a wireless network used for machine-to-machine communication and the internet of things, Le Moan, 52, raised $115 million in February in what was at the time the biggest funding round in French history. The cash will be used to build a network in Europe, Asia and the Americas.

+ ≈

80 KRISTIAN SEGERSTRALE
COO, SUPER EVIL MEGACORP, CALIFORNIA/FINLAND
Since selling his game-dev company, Playfish, to EA for $300m in 2009, he, 38, has focused on bringing multiplayer online battle arena games to tablets. Now COO at developer Super Evil Megacorp, he oversaw the release of the company's inaugural game, *Vainglory*.

+ × //

81 OSKAR HARTMANN
FOUNDER AND PRESIDENT, KUPIVIP GROUP; INVESTOR, MOSCOW
Through Hartmann Holdings – his family-owned investment vehicle – the 32-year-old launched ShoppingLive, Sapato.ru, FastLane, SIMILE Ventures, CarPrice and Zaodno. His fashion site KupiVIP dominates the local market – in April it purchased Sapato.ru, the Zappos clone.

□

82 PAUL TIGHE
SECRETARY OF THE PONTIFICAL COUNCIL FOR SOCIAL COMMUNICATIONS, VATICAN CITY
Tighe, a 57-year-old Irishman who's a step or two away from being the online voice of God, manages the Pope's app and Twitter account. In April 2015, Pope Francis appointed him to streamline and modernise the Vatican's comms policy.

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83 JÉRÔME JARRE
VINE AND SNAPCHAT STAR, NEW YORK/FRANCE
French-born but NY-based Jarre, 25, has more than 8.5 million followers on *Vine* – and over a million more on *Snapchat*. His charming, six-second comedy videos have been played over a billion times, bringing him a reported six-figure salary and high-profile partnerships, including with Paramount.

no.

68

'BAYES WILL PROBABLY TURN OUT TO BE TO THE INFORMATION AGE WHAT EINSTEIN WAS TO PHYSICS'

MIKE LYNCH

≡

84 IVAN DUNLEAVY
CHIEF EXECUTIVE, PINEWOOD GROUP, BUCKINGHAMSHIRE
Dunleavy, 54, has been chief executive of Pinewood Group since 2000. *Spectre*, James Bond's 24th iteration, and Lucasfilm's new galactic adventure were both filmed on the lot near Iver, but the group also has studios in Canada, the US, Germany, the Dominican Republic and Malaysia.

||

85 ZOE SUGG
YOUTUBE STAR, BRIGHTON
The 25-year-old Brightonian – better known as Zoella – is the queen of YouTube. She has 8.3m subscribers to her fashion and beauty channel. Her popularity has earned her commercial tie-ins including a make-up range, and her 2014 novel *Girl Online* – the first of a two-book deal – was reportedly the fastest-selling British debut book ever.

× ||

86 DOMINIC SMALES
FOUNDER, GLEAM FUTURES, LONDON/LA
Smales, 42, is manager to YouTube's superstars. From Zoella to boyfriend Alfie "Pointlessblog" Deyes (3.7m subscribers) he's helping British social-media stars build businesses to match their audiences: from best-selling books (Sugg, Deyes) to make-up (sisters Samantha and Nicola Chapman, Tanya Burr).

◇ △

87 BEN MEDLOCK AND JON REYNOLDS
CO-FOUNDERS, SWIFTKEY, LONDON
The predictive-typing app is now on over 200m smartphones. In May 2015, it moved towards monetising its user base by offering personalised keyboard themes. SwiftKey has expanded into the Asian market – Hindi is available on Android, and there are plans for Japanese too.

⁂ ≡

88 GERD LEONHARD
CEO, THE FUTURES AGENCY, BASEL
There are hundreds of consultancies that help corporates understand the challenges of a fast-moving world, but few have a client list like Leonhard's. From Google to the European Commission, the 54-year-old futurist has the ear of some of the world's most significant decision makers.

◇ Tech
\+ Investment
× Web
○ Telecoms
|| Social
□ Politics
≈ Gaming
△ Computing
// Retail
⬠ Apps
▽ Design
⁂ Events
≡ Other

EUROPEAN DIGITAL ECONOMY

The five highest-value digital economies in Europe

UK
£218 billion
(8.3% GDP)

GERMANY
£98bn
(3.0% GDP)

FRANCE
£66bn
(2.9% GDP)

ITALY
£52bn
(2.1% GDP)

RUSSIA
£47bn
(1.9% GDP)

89 EILEEN BURBIDGE
CO-FOUNDER, PASSION CAPITAL, LONDON
The 44-year-old Burbidge has invested in more than 40 companies, including DueDil, GoCardless and EyeEm, through the VC firm she co-founded. She's interested in cybersecurity, investing privately in secure-messaging app *Wickr*, and advises London's first cybersecurity accelerator, CyLon.

90 RUSS SHAW
FOUNDER, TECH LONDON ADVOCATES, LONDON
Shaw, 52, has been pushing for increased broadband speeds, modernised transport infrastructure and more office space for the capital. In February, he hosted the first Tech London Advocates event in New York and urged the UK tech sector to remain politically neutral before the general election.

91 SINA AFRA
ENTREPRENEUR, ISTANBUL
In May 2014, the 47-year-old Turkish entrepreneur exited his flash-sales site Markafoni. The former European director of M&A for eBay is an angel investor and eco-entrepreneur – in May his design studio Atölye Labs launched low-carbon brand UNDO Laces. He's a connector in Istanbul's tech scene.

92 FUNDING CIRCLE TEAM
P2P MONEY-LENDING SERVICE, LONDON
In April, Samir Desai's startup closed a £150 million funding round, reflecting its remarkable success in the overcrowded peer-to-peer lending market. Funding Circle now has access to over 38,000 investors, who lent £100m to small businesses in Q1 2015 alone. The company hopes to hit $1bn in loans this year.

93 YOSSI VARDI
CO-CHAIRMAN, DLD, TEL AVIV
Regarded as the godfather of the Israeli tech scene, Vardi, 73, has founded and invested in tech companies ranging from software to energy production over his 40-plus years in the field. In addition to all this, Vardi is also a regular on the tech circuit, and serves as co-chair of the DLD (Digital-Life-Design) conference.

94 JIMMY WALES
CO-FOUNDER, WIKIPEDIA, LONDON
The founder and "benevolent dictator" of the web's sixth most popular site has been speaking out against government surveillance and the tech sector's gender gap. As an adopted Londoner, Wales, 48, is also involved with Shoreditch's ventures such as People's Operator, a telco that invests in charities.

95 ANDY MCLOUGHLIN
CO-FOUNDER, HUDDLE, CALIFORNIA/LONDON
McLoughlin and partner Alastair Mitchell launched their cloud-based co-working software in 2006. By December 2014, with McLoughlin, 36, as executive VP, Huddle was used by 80 per cent of the Fortune 500, and its value was around £1bn. In March he left to work at Silicon Valley VC firm SoftTech.

96 NIKLAS ÖSTBERG
CEO, DELIVERY HERO, BERLIN
The online food ordering startup operates in 34 markets, with 200,000 restaurants delivering ten million orders a month. In September, the company raised $350m, bringing total investment to more than $1bn since Ostberg, 35, founded it in 2011. Its current valuation is $3 billion. His next step? An IPO.

97 NIGEL ECCLES
CEO, FANDUEL, EDINBURGH/NEW YORK
Since co-founding FanDuel in 2009 out of Hubdub, a news-prediction startup, Eccles, 40, has seen his fantasy American-football platform expand to host over 30,000 leagues and to secure exclusive rights from the NBA for basketball. In July, a $275 million funding round valued it at more than $1 billion.

98 MIKE LYNCH
FOUNDER, INVOKE CAPITAL, LONDON
Mike Lynch's Autonomy was acquired by HP for $11.7bn, before allegations of cooked books (strongly denied) flew and he was sued for $5.1bn. In 2013, he re-emerged with Invoke Capital and invested £12m in cybersecurity startup Darktrace, which combines expertise from Cambridge University, GCHQ, MI5 and the NSA.

99 JAMES BRIDLE
ARTIST/WRITER, LONDON
As both a tech writer and artist, 34-year-old Bridle is politically charged and has an influential following. He's one of the first artists to understand the internet and make politically charged works about it. His *Instagram* project, *Dronestagram*, plots aerial photographs of unreported drone-strike locations.

100 ALEXANDER LLUNG AND ERIC WAHLFORSS
CEO AND CTO, SOUNDCLOUD, BERLIN
SoundCloud faces tough challenges, from copyright claims to the Apple juggernaut. But what gives its founders influence is their 175m monthly users and their visibility as Berlin's iconic social network. Can they persuade enough fans to pay a fee to put the $123m-funded firm in profit?

no. 27

MIKI KUUSI

CEO AND CO-FOUNDER, SLUSH/WOLT
HELSINKI

"WHEN I STARTED UNIVERSITY, THE top three career choices for a young graduate were to work for McKinsey, work for Nokia or work as an investment banker in London," Miki Kuusi says ruefully. "In the early 2000s, an entrepreneur was looked down on – an entrepreneur was a car mechanic who couldn't get a job because he was such a bad mechanic that he had to start his own company."

Kuusi, 25, didn't quite change that single-handedly, but the Helsinki startup scene would look very different without him. Noticing the number of talented tech students at the city's Aalto University, he became president of the student-led non-profit Entrepreneurship Society, which morphed into the Startup Sauna accelerator programme when he graduated in 2011. Soon afterwards he co-founded Slush, a bi-annual conference. The combination of these elements means that Kuusi has a hand in almost every aspect of Helsinki's startup scene, connecting first-time and serial entrepreneurs, investors, Silicon Valley mentors and the wider international scene.

"All the best startup scenes have community at their core," he says. "The CEO of one company can call the CEO of another company to ask for help. So we facilitated that with Startup Sauna. But the biggest issue for startup companies in Europe in general is that everyone's doing something inside of their own country's borders. They're not thinking big enough. So we launched Slush."

As CEO, he spent 2011 to 2014 leading Slush's growth from a local, 150-person conference to a global event, attracting 14,000 delegates from 79 countries. Although the next Slush is scheduled for November 2015, Miki Kuusi is no longer in charge. In 2014 he stepped down to launch his own startup, the fledgling food-payments app *Wolt*, with $500,000 (£320,000) in seed funding led by Lifeline Ventures. A pilot programme in Helsinki led to a Nordic and German roll-out in spring 2015.

'I MEAN, I HATE TAKING CREDIT; IT'S ALWAYS VERY MUCH A GROUP EFFORT. WE HAVE A SAYING: IT'S ALWAYS UP TO THE ENTREPRENEUR'

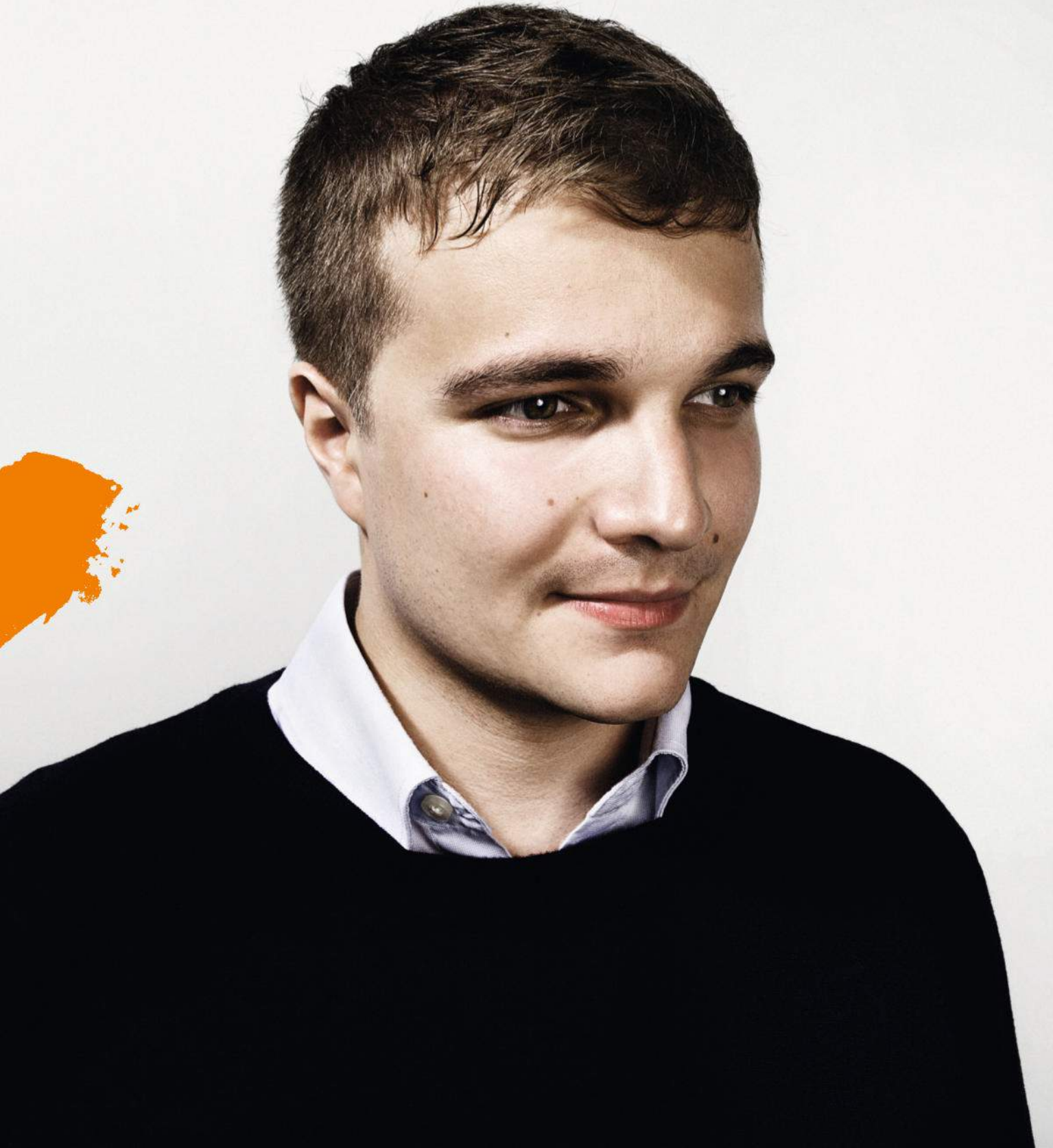
"I could have stayed with Slush, but at heart I'm not an event organiser," he says. "I wanted to do something more. Helsinki has a great gaming scene so I'm combining gaming, seamless mobile payments and the restaurant experience."

Wolt's users, Kuusi explains, can open the app, order a meal at a nearby restaurant, get a waiting time and arrive to eat just as the meal is served. As the meal is paid for at the time they order, there's no need to wait for the bill – they can simply leave.

"Mobile commerce has only really affected the takeaway side of catering so far," Kuusi explains. "But people eat out sometimes two or three times a day. It saves time for not only customers but also restaurants to receive orders that are already paid for. There's no risk that the person won't show up or won't be able to pay."

That's not to say Kuusi has abandoned the city's startup community. With Slush now run as a charity by the Slush Foundation, he can still remain involved, albeit less hands-on. "I've spent a lot of time being a part of building a better tech ecosystem. I love where the event is being taken now; I still sit on the board and I'm very actively involved," he says. "I mean, I hate taking credit; it's always very much a group effort. We have a saying: it's always up to the entrepreneur." W

Written by Stephen Armstrong, a regular WIRED *contributor*




NELLY CLOSE
Coca-Cola



Date 09/15 Time Case GHOST TOWN

Tag for
- ☐ DNA SEROLOGY
- ☒ DRUGS
- ☐ FINGERPRINTS
- ☒ FIREARMS
- ☐ POSSESSIONS
- ☐ QUESTIONED DOCUMENTS
- ☐ TOXICOLOGY
- ☒ TRACE EVIDENCE
- ☐ OTHER

Location / Description / Incident: In Gravesend, Kent, a small community is ripped apart by violent protests every few weeks. Luckily the police are always nearby - it's a fake streetscape where they train in riot control

Remarks/Details: Photography: Edgar Martins. By Gian Volpicelli

105

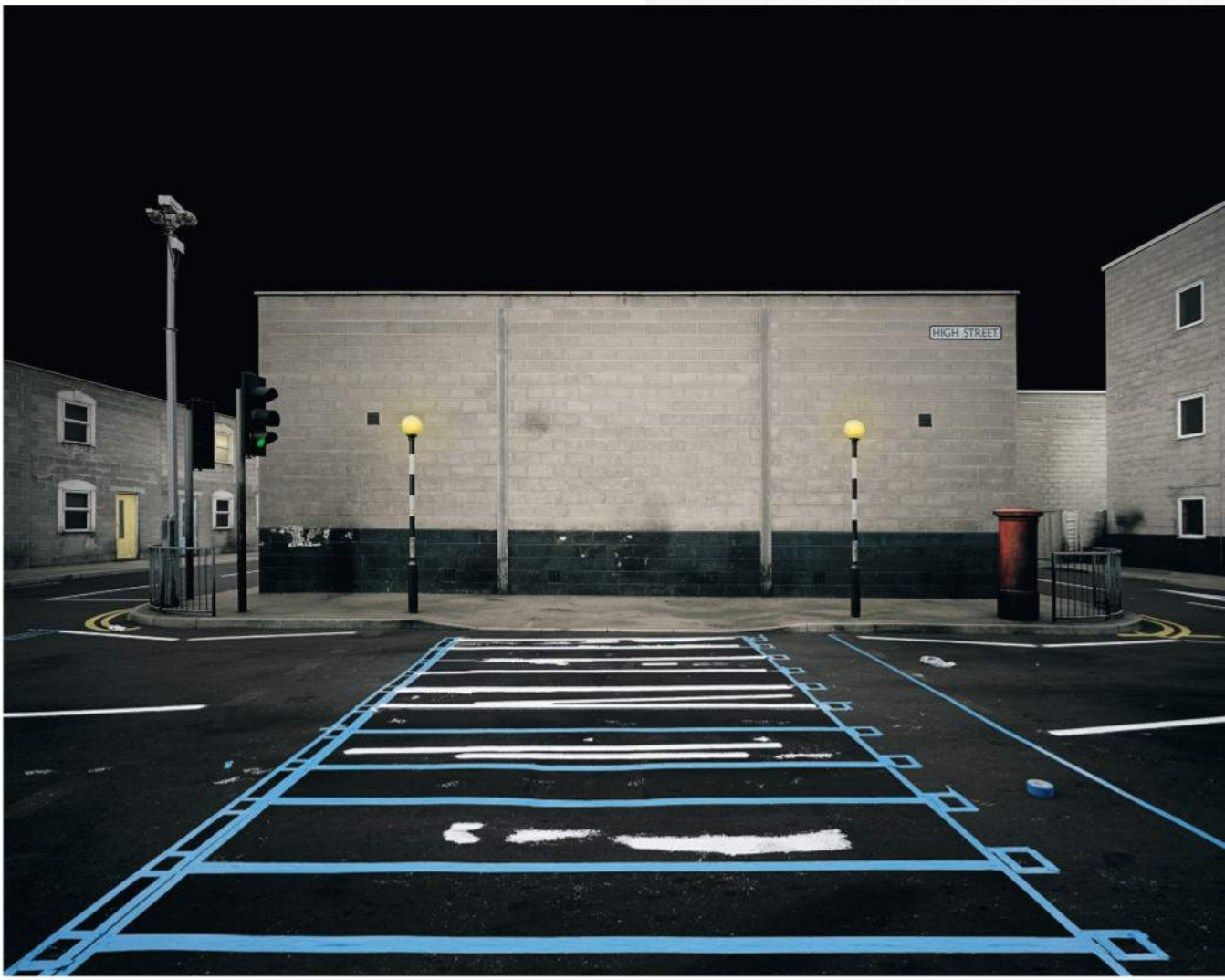

National Bank

It looks like a typical small English town, complete with a high street bank, a post office and a takeaway pizza restaurant. But nobody lives here, and the place is constantly devastated by riots and violence. Welcome to the Metropolitan Police Service Specialist Training Centre in Gravesend, Kent – a replica of a UK community where police officers train to deal with public disorder and firearm use.

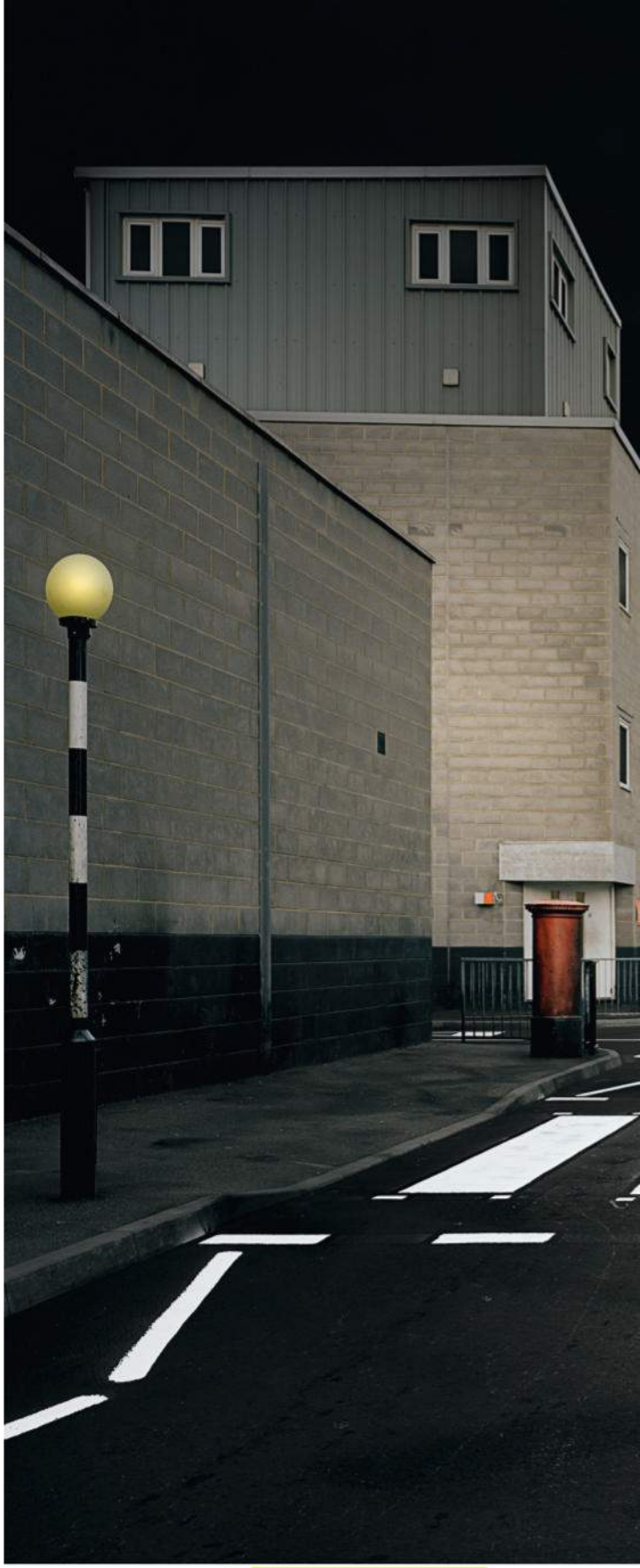
The Met comes here to rehearse crisis scenarios: police officers in riot gear learn to manage angry mobs by confronting in-character colleagues who pelt them with bricks and petrol bombs. Charred marks on the walls of the buildings testify to the authenticity of the high-octane drills that groups of senior officers undergo every five weeks. "It could be the industrial part of any British city," says Edgar Martins, who photographed the eerie riot town. "But sometimes it just looks a bit like a grown-ups' playground."

RESTORING ORDER

The 38-hectare centre was built in 2003 by Cubic Range Design Solutions, a private defence contractor that specialises in the design and construction of training facilities. "The various roads and façades are used to create a simulated public disorder scenario, where officers can be trained to deal with a variety of public-order situations in a safe environment," says Met spokesperson Steve Sherwood. The bricks-and-mortar reproduction town may be the facility's most eye-catching part, but Gravesend also boasts virtual training technologies, such as an indoor 3D simulator for firearms training, as well as a live shooting range. Up to 300 officers can be housed on the site.







BUILT ENVIRONMENT

The centre's structures vary in their degree of detail: some buildings are more developed, with rooms and doors; others are empty façades. But in general, the team that devised the centre created an environment that reflects the range of possible settings in which the Met might operate. This includes a pub, a nightclub, a sports stadium – even a Tube station with train. There's also a mocked-up aircraft, to simulate hijacking scenarios. Chris Evans, Cubic's regional director, explains that the training facilities' designers sometimes look to Hollywood to achieve greater realism. "There have been instances where we have worked with personnel from the cinema industry," he says.



CROWD CONTROL

The streetscape is used to train medical specialists and police who may be called to oversee peaceful protests. There are stables for ten horses so that mounted units can be trained to disperse crowds. Drills can be lengthy, explains James Rawlings, a photojournalist who witnessed a training session last year. "The public-order scenarios last for as long as it takes," he says. "It could be 15 minutes, it could be two hours."



THIS IS MICA

It's used in your electronic devices,
your car paint and your cosmetics

By **Matteo Fagotto**
Photography: **Matilde Gattoni**


And it's typically dug illegally, by hand,
by landless Indian labourers
and their children, caught in a culture
of debt and corruption
How comfortable are you with that?





There's an eerie atmosphere as the car takes the last turn towards the rebel-infested forest. The traffic, which was heavy until just a few minutes ago, has disappeared. Now there's only an empty road that meanders around the hills in Koderma in western India, some 320km from the border with Bangladesh.

HUMANS

and animals seem to be absent here; the forest is completely silent, as if the trees were lifeless. Then comes the first clue we are on the right track.

Suddenly – shining under the baking Sun – dozens of piles of a glittery, flaky mineral appear at the side of the road. The source of these stacks of this naturally occurring substance lies a little further inside the forest: hidden in the woods, small groups of miners are busy working in what look like giant rat-holes, pounding at cave walls with rudimentary tools and sorting the debris with their bare hands. Their wicker baskets are already full of the reddish, translucent sheet mineral they're searching for. At the end of today, the few pounds they've earned will just be enough to provide for their families, but the material they have mined will end up in products found in every western home.

The districts of Koderma and Giridih, in the impoverished state of Jharkhand, are home to the world's largest deposits of sheet mica, a glittery silicate that has become an essential component in thousands of products we use daily. The mineral's stability when exposed to electricity and extreme temperatures means that mica is used as an insulator in countless everyday electronic and electrical products – including radio and TV sets, fans, microwaves, toasters, kettles and rice cookers – as well as in heating systems. Thanks to its glitter, mica is also employed in pigments – from car paint to cosmetic products such as mascara, foundation and face lotions – as well as food colouring. It also finds use as a filler in cement, plastic and rubber products such as tyres. It's in technology including breathing equipment, X-ray machines, navigation compasses, atomic microscopes and missile, laser and radar systems. In the modern, technological world, mica is used pretty much everywhere.

Depending on its quality, mica's price on the world market can range from $1,000 to $2,000 (£650 to £1,300) per kilogram. India produces 60 per cent of the world's mica, most of it from Jharkhand. But since 1980, when the Indian Forest Conservation Act was passed to limit deforestation, the industry has gone underground due to restrictions on mining in threatened areas. Today, it involves an estimated 20,000 landless and illiterate small-scale miners who are at the mercy of an unscrupulous array of agents, middlemen and exporters. Activists claim the consequences include crippling debt and environmental destruction.

Dhab is a village of mud-and-straw dwellings that house roughly 2,000 people. Here, deep in the forest, mica is so abundant





it can be found in every back garden. On a hot, pre-monsoon morning, 22-year-old Gita Devi is busy working in a small hole she has opened just beside her house. Her fingers move quickly in the freshly dug soil, expertly picking out the glittery chunks. This shy young woman, whose yellow-and-green sari is already covered by a layer of dust, smiles at the dark red sheets she has just collected – a sign the deposit she found contains high-quality mica.

"I started doing this job ten years ago, together with the rest of my family," she explains hastily, her eyes fixed on the ore. Devi can collect up to 20 kilos of mica per day at a rate of ten rupees (less than ten pence) per kilo. The £2 she earns in a day spent digging under the unforgiving Sun will just about be enough to buy her children some food.

The recent history of Koderma is inseparable from that of mica. Although rich in natural resources, the region is one of the poorest in India and home to a five-decade-long, low-intensity Maoist rebellion. As the only viable economic activity in the area, mica mining has become a way of life in Dhab. Mining started in the 19th century under British rule and today's villagers are descendants of the bonded miners who were brought here from other parts of India. After independence in 1947, most remained as salaried workers during mica's golden period: from the 50s until the early 90s, around 24,000 people were legally employed in more than 700 licensed mines. But regulation of the industry and the collapse of the Soviet Union – until 1991 the main importer of Indian mica – means only two legal mines are still operating in the area.

With no land deeds and no farming knowledge, thousands were faced with either emigrating or starving. When a renewed demand for mica fuelled by the Chinese economic boom hit the region few years ago, the industry sprang back to life. But periodic police round-ups and the threat of imprisonment for illegal mining has made villagers wary of outsiders.

Sarita Devi, a 25-year-old from Dhab, was just 12 when she started mining with her mother. Today, her right leg is held together by a metal rod after an accident almost killed her in February 2015. "I was digging. The walls of the mine were so soft that they collapsed upon me. I fainted immediately," she says, her black, vivid eyes staring at the barren ground beside her family house. "It happens frequently, but we generally manage to escape in time. That day, I didn't."

It took Devi's parents 30 minutes to extract her from the debris and reach the hospital, where she underwent emergency surgery. The mother of four is still traumatised by the accident. Although she has started walking again, she cannot bend or crouch and is now forced to stay at home, looking after her sons and elder relatives. Once she has recovered, she knows her only option will be to return to mining. "I really don't want to go back there, but what can I do?" she asks. The eldest of two brotherless sisters, Devi has to take care of her aging parents and find a way to repay the almost £1,000 loan she took for the hospital bill. Her family earns less than 70p per day.

Previous pages: Doda Cola mine, deep in the forest near Domchanch
Above: Gita Devi, near her home in Koderma
Below: workers dig tunnels near Domchanch



Some of the illegal mines in Koderma are commercial-scale enterprises with heavy machinery and hundreds of labourers, but most mica extraction is carried out by small-scale, freelance miners. As they work in makeshift underground holes, miners are often exposed to collapses and landslides – which can be fatal. "Whenever I venture inside those holes, I don't know if I will come back alive," explains 35-year-old Mantu Turi, who has been mining since he was ten. "The only thing I know is that if I don't go, my family will not eat."

The, miners WIRED meets don't even know what mica is used for, let alone its price on the international market. The subsistence-level payment of ten rupees per kilo does not allow miners to save money to endure the rainy season, when mines are filled with water and inaccessible. So villagers have to take advances from the same agents they sell their mica to – sometimes at monthly interest rates of 15 per cent. Loans are then repaid by reducing their payments when the mines reopen. It's a poverty cycle that worsens when there are medical bills. "Miners are de facto bonded labourers, because they cannot clear their debts," explains 39-year-old Vhinod Kumar Yadav, a local youth leader. "Some sons are still working to repay loans taken by their fathers."

Once collected, the mica is bought by freelance agents and transported to Domchanch, a nearby small town where the unprocessed ore is sold to middlemen, before being cut, refined and sorted. The town's main road is lined with workshops hosting scores of skilled men carefully cutting and cleaving the transparent mica sheets with knives and scissors, sorting and separating the different qualities of mica. Nothing is wasted. "The lowest quality mica stays in India," explains an old cutter who has been in the business for decades. "The best quality goes to America – but most of it will be sold to China."

Contrary to the diffidence encountered in the forest, in Domchanch illegal trade is so widespread that practitioners don't even try to

MICA AND ITS USES IN TECH AND BEYOND

Mica has a huge range of applications, thanks to its resistance to heat, dielectric properties, its smoothness when ground – and its sparkle. In India, Mica has been mined for a century, but it is only in recent years that the industry has experienced a massive up-tick in demand from consumers in the west and, in particular, China. Cosmetic uses include adding a metallic sheen to make-up such as eyeshadow (the same effect is also employed in car paint), and as an abrasive in toothpaste. In electronics, it is used as an insulator, and manufacturers add it to plastics to increase tolerance to heat.



Below: a mica worker splits a chunk of ore. Mica forms in sheets of varying quality

conceal it. Sudesh and Vivek Modi are two friendly dealers aged 29 and 30 respectively, dressed smartly in brand new shirts and jeans – a marked contrast to the miners. Although their business is officially licensed and above board, the brothers openly admit that the mica they trade is "100 per cent illegal. But if the police come, I can manage," Sudesh explains. Dealers such as the Modis are free to operate with this sense of impunity because local politicians are unwilling to act against the trade for fear of losing votes. "The authorities mostly harass small miners, but they leave us alone. There are very powerful people involved in this business, how can they stop them?" says Vivek, while walking around the storehouse. Hundreds of sacks of mica are lined up, ready to be transported to Kolkata, where it will be exported, mainly to China.

According to the Indian Bureau of Mines, India legally produced 1,255 tonnes of mica in 2012 to 2013. Yet the quantity exported was 127,629 tonnes – that's more than 100 times higher than the officially sanctioned figure, a clear indication of the magnitude of illegal mining. Although exporters are supposed to provide a mining licence in order to prove that the mica they bought comes from legitimate sources, "When they buy mica from us, they just ask for the bill," explains 62-year-old Suresh Jain, another middleman living in Jhumri Telaiya. He claims that most of the Chinese companies don't ask for any certificate of origin for the mined material. European countries and the US do, but Jain is adamant it's just paperwork: "This is business, they need the material," he says. "If we say, 'Mica is illegal and child labour is involved', what they will get?" Maoist rebels are not alien to the trade either, reportedly taking a cut of the profits from many businessmen working in areas under their control.



Below: Sudesh and Vivek Modi, who resell illegally mined mica in Domchanch

INA

2014 report, DanWatch – an independent research organisation with a focus on conflict, human rights, the environment and corruption – contacted 16 international cosmetic companies behind 20 global make-up brands. Twelve of them did not, or were not able to, disclose whether the mica used in their products originated in India. But instead of asking for greater transparency in the international supply chain for mica, the majority of stakeholders interviewed for DanWatch's project blamed the Indian government for not legalising the mining, a move which, in theory, would guarantee more rights to the workers and prompt the industry to modernise itself.

"In the past, there were 8,000 dealers operating here. Now there are only 150," says a member of the Jharkhand Department of Mines and Geology, who asked not to be named. "How can the government stop an activity which thousands of families depend on?" This sentiment is shared by Mithilesh Kumar Singh, the Koderma district forest officer charged with protecting the woods threatened by the mining.

"The only way out is legalisation," he explains from his leafy office. "Small-scale mining is more harmful than legal mining because it's widespread, unregulated and not done in a scientific way." According to locals, damage to the forest has already caused a decrease in rainfall, affecting farming and making the area even more dependent on mica. "It is a very bad signal for us, because we don't have an irrigation system and we totally depend on rain," explains Yadav, the Dhab youth leader and one of the few villagers owning farmland. "We are very much worried about the future of this place."

Children are still involved in mining, usually working with their parents. Some stay at home to look after their younger siblings while the rest of the family mines. Lost amid a circle of women dressed in colourful saris, a young girl is busy cleaning a pile of raw material in the opencast mine

Right: a woman walks through the village of Dhab. The mine is just beyond the tree



Above: workers wait to weigh their bags of mica. From here it is sent to Kolkata for export

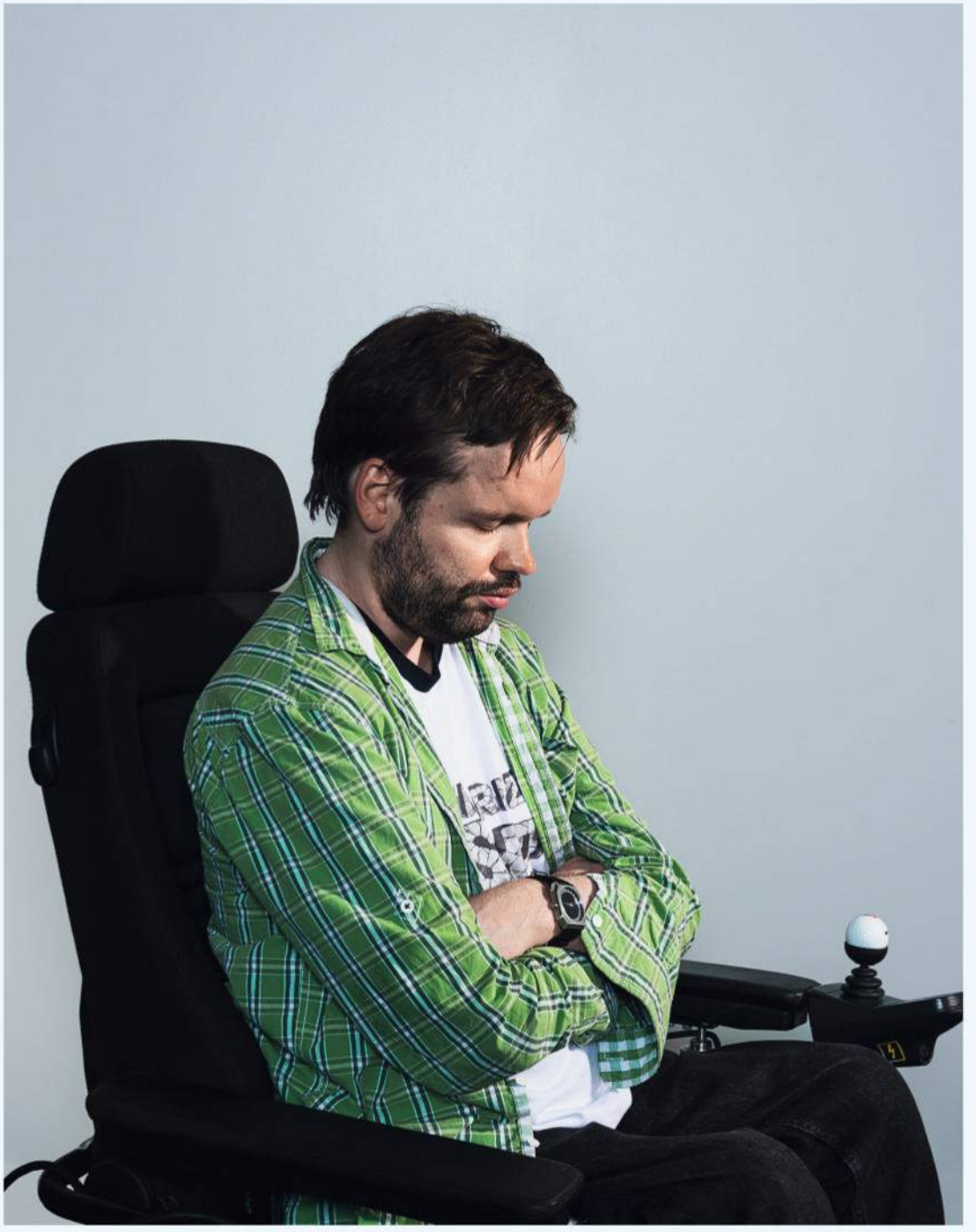
of Doda Cola, in the tropical forest near Domchanch. Fulmati Kumari, aged ten, only started a month ago, and concentrates on collecting small pieces of mica from the dust. Her hands are still not used to the work. Kumari comes everyday from the village of Jampur, working from 9.30am to 4pm. "I don't like this job. It is very tough, but I can earn some money and help my family," she says, admitting that she dropped out of school to help her parents, a decision she regrets but cannot overturn. "I would like to go to school instead of being here, but I can't," she says, before rushing back to the pile.

But the industry may not continue for long. Shallow deposits are running out and the villagers lack the technology to search deeper. Young people are faced with the dilemma of leading a hard and unsatisfying life here or emigrating to work as labourers in Mumbai or Delhi. Sunita Kumari (no relation), a bright, outspoken schoolteacher of 27 who has taught in Dhab for the past 11 years, is trying to offer local children another option. "I can't change the parents' lifestyle, but I can change that of the children if they come to school," she says during a break from lessons. Now, most of the children in Dhab attend lessons and go to the mine only at the weekend or during school holidays.

However, in the more remote forest villages, child labour is still rife. "It pains me a lot that children are still involved in this," says Kumari. Although she cannot offer an immediate alternative to what children could earn if they went to work, she is sure there's no other option for Dhab. "Only education can change the future of this place," she says, looking at the dozens of happy children shouting and playing in the school courtyard. ■



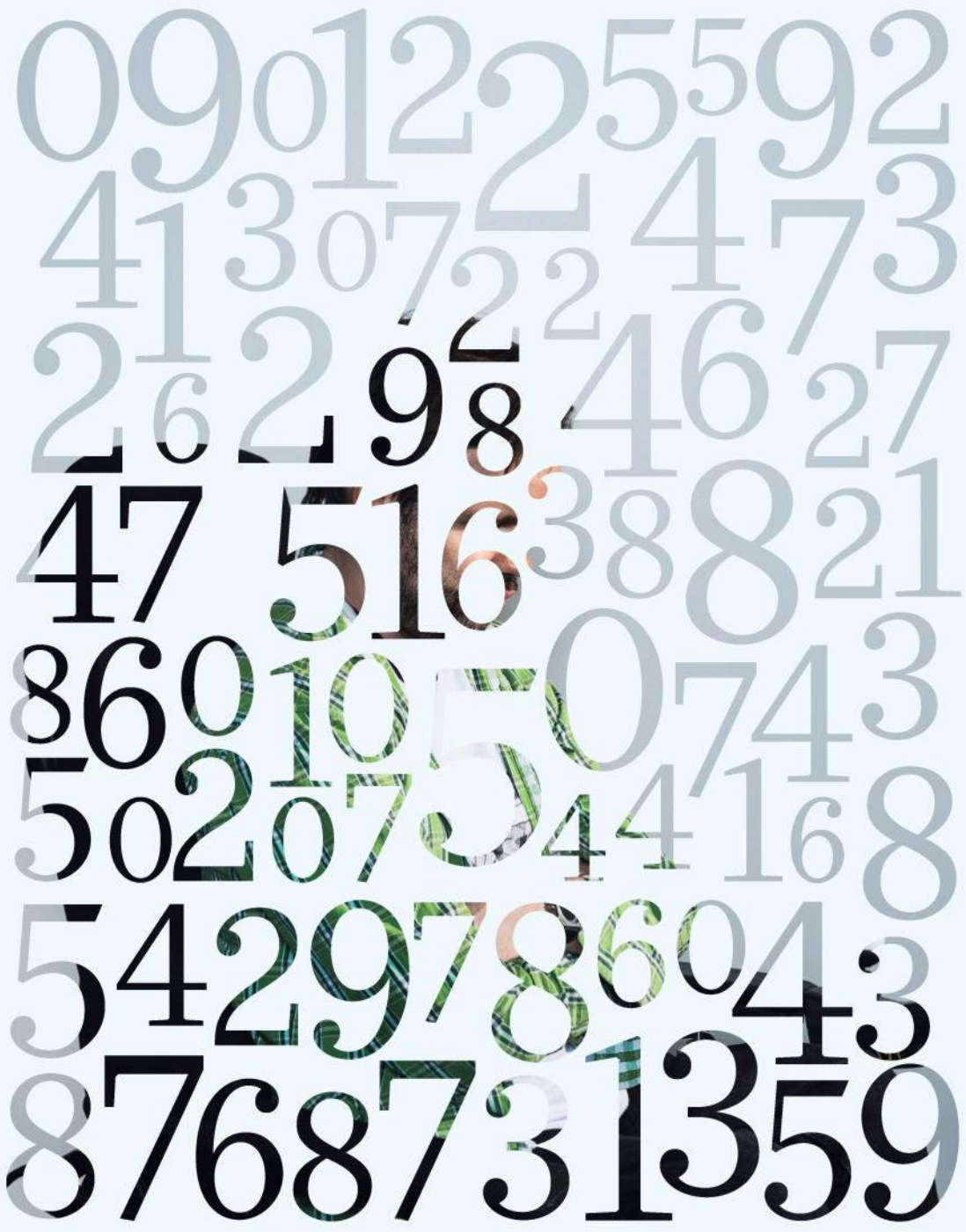
Matteo Fagotto wrote about tin mining in Indonesia in WIRED *03.14*



The Memory Games

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By **João Medeiros**. *Photography:* **Damon Cazares**



Johannes Mallow memorised this 80-digit sequence in 20.01 seconds.

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How science is studying 'mental athletes' to help you remember (practically) anything

In May 2015, during the final match of the group stages of the Extreme Memory Tournament, Johannes Mallow, an engineer from Germany, attempted to break the speed record for memorising 80 digits in the correct order. Mallow, who claims to frequently misplace his keys and forget his appointments, can, for instance, memorise 1,080 binary digits in five minutes, 380 cards in ten minutes and 492 abstract images and words in 15 minutes. He can also memorise 501 digits in five minutes – a world record he established in 2013 when he became world champion in London. To memorise numbers, he has developed a system that allows him to visualise every number from zero to 999 as a predetermined mental image. For instance, 090 corresponds to a pizza, 122 to plums, 559 to a tractor. "It took me half a year to develop a system with meaningful images," Mallow explains. "I memorised it in two weeks, but it was only after around two years that I became really fast at using it."

Inside the large room where the tournament was taking place, there were four tables, each with two laptops facing each other and two large flat-screens on the sides, turned outwards, facing an audience of 20 people. The first day of the competition took the form of a round-robin tournament. Twenty-four mental athletes, divided into six groups, competed against each other in four-minute matches of memorising – one minute to memorise and three to recall – in the categories of images, playing cards, random words, names matched to faces, and numbers. As the athletes memorised, the spectators sat quietly, watching the screens, which displayed the competitor's moves with a ten-second delay.

Mallow, who had already qualified in Group D, now faced Norwegian Ola Kåre Risa, who is seventh in the world rankings. Mallow was wearing his customised sunglasses with handmade cardboard black lens inserts with a small pinhole to block any peripheral visual distractions. Risa, sitting on the other side of the table, had large red earmuffs and a red, white and blue cap with side flaps attached to the visor. At that point, three other matches were taking place. Also for Group D, Marwin Wallonius, from Sweden, faced Enkhmunkh Erdenebatkhaan, a member of a five-strong Mongolian team, all wearing blue polo shirts with sponsor logos and the Mongolian flag. His compatriots, Tuuruul Myagmarsuren and Akjol Syeryekkhaan, competed on the other side of the room, as Filipino Mark Anthony Castaneda played one of the favourites, Boris Konrad, a German neuroscientist with a PhD in the science of superior memory and a penchant for outbursts.

This year's Extreme Memory Tournament (XMT) was hosted at the headquarters of sponsors Dart NeuroScience, a pharmaceutical company developing memory-related therapeutic drugs, on the outskirts of San Diego. Apart from a few isolated studies, psychologists and neuroscientists have taken little interest in studying memory athletes, despite the fact that their memory feats falsify much of our current understanding about the limitations of human memory. For instance, one of the common assumptions about our memory span – our ability to recall a list of digits, letters or words in order, having heard it only once – is that it's fundamentally limited to seven items. "Johannes Mallow once got 364 correct, presented to him at a rate of one per second," says Henry Roediger, a cognitive psychologist who was sitting in the XMT audience and has been working with Dart for the past four years. "A lot of people still seem to think that our memory span can't be trained. Well, these guys have done it."

In 2010, Roediger was approached by Dart with a curious proposition: to find and study people with extraordinary memories. The assumption is that a close scientific scrutiny of these individuals might unravel new neurological or genetic discoveries that can help Dart develop new drugs and therapies. According to the company's estimates, it would need to screen approximately five million people to find 100 with superior memorisation skills; so, as its first project, it ran an online survey with a memory test that was taken by 50,000 people. Roediger also suggested a short cut to find extraordinary memories. They could test mental athletes. "Dart wanted us to find the best memorisers in the world so that it can run genetic tests and potentially find genes behind superior memories," Roediger says. "There are already a few tournaments around, but we thought it would a good idea to bring the athletes here."

Mallow is one of the seven mental athletes who, for the past three years, has travelled to the Memory Lab at Washington University's Department of Psychology in St Louis to be tested by Roediger, as part of his collaboration with Dart. When Mallow wants to memorise a long sequence of objects, he might mentally walk through his flat in Madgeburg, northern Germany, placing the objects he wants to memorise in specific places.

Mallow suffers from facioscapulohumeral muscular dystrophy, a degenerative muscle disease that confined him to a wheelchair in 2011. In his memory journeys, however, he still sees himself walking. He starts with his front door, then he goes left, where his wheelchair sits, then he proceeds to the living room where he finds

PREVIOUS:
Johannes Mallow, Extreme Memory Tournament Champion
RIGHT:
Ola Kåre Risa (in the cap) and Marwin Wallonius go head to head at the Extreme Memory Tournament


SUMMER
DAZE

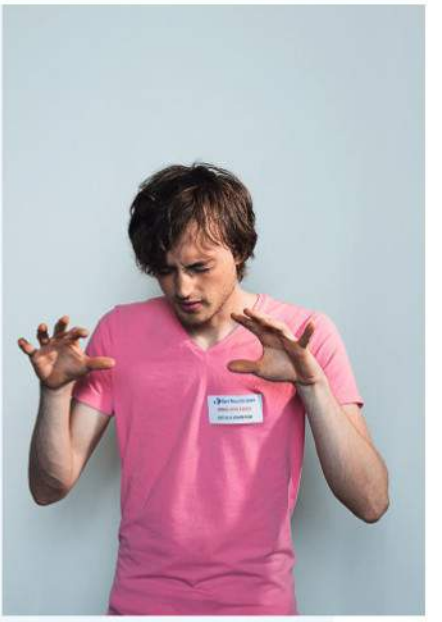
a small cupboard to his left, then to his kitchen, where he places something in his refrigerator, his sink and his window, and another cupboard. He segues to his sofa, then inserts a disc into his DVD player and moves to the balcony. After that, he moves to his lamp, to his TV, and, to its right, a set of candles. Next he goes into his bedroom, where he places objects on a chair, in his bed, on his bedside table, on the heater. There's a window with a potted plant. On his desk, his laptop. His bookshelf. He then goes into another room, where he has another plant, his coffee machine, his stationary bike. Finally, he moves into his bathroom, placing the final objects in the toilet, the shower, the basin and the washing machine.

During a competition, Mallow can only use this journey once, so he has around 15 other "journeys", including one around his mother's flat and one around the campus at the Otto-von-Guericke University Magdeburg, where he is finishing his PhD in MRI tomography. "If I use one journey twice, there's a chance of mixing different images from different memorisations," Mallow says. "They are very hard to erase from the memory. I usually have to wait three to five days to be able to use that location again."

Mallow's final group match was numbers: competitors are presented with a string of 80 digits which they have to memorise. "Just imagine you are at a bar and you meet seven attractive people and you have to memorise their phone numbers," said Nelson Dellis, XMT's creator and founder, and the current US memory record-holder, as he announced the round. Mallow looked at the digits displayed on his computer screen. At his front door, he placed a pizza with plums on it. He turned his wheelchair into a tractor and used a compass to navigate it. He saw the Digedags, protagonists of a popular German comic, bowling inside the cupboard. Inside his refrigerator, an alligator burned. In the sink, a frog climbed on to an anchor. On his windowsill was an oven full of fish fingers. He then saw himself using a hand plane to dry his laundry on the sofa. Between his video games, there was a cup with an igloo inside. On his balcony, a carousel with a drag queen. Shiva drove a car on top of his lamp. His TV showed a whiteboard struck by a gigantic fork. A nappy burned atop his candles while a stranger threw bread. Finally, he saw a tongue licking the chair, then somehow going online to search for an LP. After 20.01 seconds, he stopped the timer and closed his eyes. Then, from memory, he typed an 80-digit sequence on his laptop: 09012255924130772247326298462747651638821860105074300207441685429786043876873135 9. Even before the results were confirmed, Mallow knew he had broken the record.

The first World Memory Championships, officially called the First Memoriad, took place in October 1991, at the Athenaeum Club, a private members' club in Pall Mall, London. The seven contestants, all British, arrived dressed in tuxedos. They had been invited by Raymond Keene, a chess grandmaster, and Tony Buzan, author of a series of brain-training books including *Use Your Head*. Keene and Buzan wanted to establish a mental-sports event that would pit the world's greatest mental athletes against each other in competitions that involved memorising things such as abstract images, binary numbers, random words, even poetry. To find potential competitors Keene and Buzan scoured newspapers for stories related to memory feats. This is how they found Dominic O'Brien.

As a child, O'Brien had been diagnosed with dyslexia, which he suspects is the result of an accident he had when he was eight months old, when his pushchair was dragged by a train at St Leonards Station in East Sussex. The accident left O'Brien with a bump on the left side of his head. His parents didn't tell him about it until he was 16, at which point he had already left school, frustrated with his inability to cope in class. His school reports read: "Tends to dream in the middle of a calculation, which leads him to lose track of the thought." "Terribly slow. Often cannot repeat the question."









ATTENDING THE EXTREME MEMORY TOURNAMENT

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TOP ROW L-R:

Jonas Von Essen, Enhkjin Tumur, Anne Reulke, Ola Kåre Risa

MIDDLE:

Simon Reinhard, Christian Schäfer, Alex Mullen, Nelson Dellis – founder of the XMT

BOTTOM:

Ben Pridmore, Yanjaa Altansuh, Boris Konrad, Johannes Mallow

LEFT:

Henry Roediger, professor of psychology at Washington University. He is studying mental athletes to understand how their brains work






SUMMER
DAZE
FOR
SHORE


Hard Rock
CAFE
LAS VEGAS




MEMORY
2015







O'Brien got his first job working for an oil company. Later, he became involved in silver recovery, setting up a factory that processed 20 tonnes of photographic film a week. In 1987, O'Brien, then 30, watched an episode of TV show *Record Breakers*, featuring mnemonist Creighton Carvello. On the show, Carvello memorised a deck of cards in 179 seconds, viewing each card only once. "I had always been interested in card tricks, and that was the ultimate card trick," O'Brien says. "I didn't know whether he was a genius or if it was a trick." O'Brien went to a library to try to find information on how Carvello had done it. He found nothing, so he decided to work it out for himself.

"I first thought he may have been using his body," O'Brien says. "If the first card was the two of clubs, he'd put his left foot at two o'clock; if the second card was a four, he'd move it to four o'clock. But you'd have to be a contortionist to do that." Mathematical formulas also proved a dead end. O'Brien thought of turning the cards into mental pictures – an object, an animal or a person – and placing them along a pre-planned route. "Making everything a journey was the eureka moment," O'Brien says. "The jack of hearts reminded me of my uncle, the ten of diamonds was the door at Downing Street, and so on. Then all I had to do was to mentally walk through the journey and meet all these characters." Using his journey method, O'Brien started memorising not only cards but sequences of numbers, words, names and faces, telephone numbers, poetry. His first deck took him 25 minutes to memorise, but he soon broke Carvello's three-minute record. In 1990, he memorised 35 decks with only two errors, entering the Guinness Book of World Records for the first time.

When he finally met Carvello at the Memoriad, the first thing O'Brien noticed were his shoes. "There were shiny to military precision," O'Brien says. "I thought, if this guy pays that sort of attention to his shoes, he's going to devastate me with his memory. But he was an oddity. He told me, 'Oh this is a bit of fun, isn't it?' And started giggling. That broke the ice." O'Brien beat Carvello in the final with the very skill that had first inspired him, by memorising a deck of cards in 149 seconds. O'Brien became the first World Memory Champion.



Dominic O'Brien retired from competition in 2002. By then he had won eight world championships and written eight books on memory improvement.

"Up until I wrote my first book, I had kept the journey method very much to myself," O'Brien says. "But then my co-author, who was doing some research, showed me these passages from Cicero and Parmenides that described how orators used cities and villages to plan out their speeches. They would mentally walk through these journeys and talk for hours from memory. It was virtually the same as my method. It was really fascinating to see I wasn't inventing anything new. These people had worked it out for themselves centuries before I did."

That same year, O'Brien, Carvello and six other mnemonists took part in a study at the UCL Institute of Neurology in London, conducted by cognitive neuroscientist Eleanor Maguire. She put her subjects inside an fMRI machine to look at their brain structure and examine what happens during memorisation. She found they predominantly used the hippocampus, a region in the brain where spatial memory is processed – in essence, they were using a learning strategy based on how humans perceive and navigate space. The study also concluded that there was nothing special about their brains. The brains of superior mnemonists were structurally indistinguishable from the brains of the control group.

One of the first scientists to dissect the molecular and genetic details of memorisation was a biologist called Tim Tully. In the 90s, while working at the Cold Spring Harbor Laboratory in Long Island, New York, Tully found that memorisation was triggered by the formation of a protein called cyclic AMP response element-binding protein (CREB). CREB would bind to the DNA of brain cells, activating a set of genes needed to make new proteins that etch permanent connections between the cells that consolidate the memory. The more CREB available to the neuron, the faster the memorisation.

In 1994, Tully created a transgenic fruit fly with the CREB protein gene switched on. Tully ran experiments that conditioned flies to avoid a scented chamber where they would receive an electric shock. Normal flies would learn their lesson – in other words, form a long-term memory that associated the odour to the shock – after doing ten sessions with a 15-minute interval in between. The transgenic fruit fly would only require one session. "It was the first fruit fly with photographic memory," Tully says. "In fact, it was the first genetic manipulation in any animal, in history, that created a supranormal memory. We proved that memory is a biological process that can be improved."

After that breakthrough, Tully decided to search for molecules that would have the same effect on the human brain, without direct genetic manipulation.

"The mechanics of memory formation in humans aren't very different from those of fruit flies," Tully says. "Repetition is required. A normal person can memorise a list of 60 names and faces with sufficient repetition. When you up-regulate the CREB pathway, you reduce the amount of repetition required. We're trying to make small organic molecules that will act on the brain. People can take these orally and they will require less repetition to memorise information."

Finding people with superior memory was crucial to confirm the fruit-fly results, so in 2010 Tully approached Henry Roediger, one of the world's foremost experts in learning and memory. Roediger had spent decades dissecting the intricacies of average human memories. His research extends from the study of hypermnesia to researching the differences between cramming and spaced memorisation. For instance,

Roediger was one of the originators of the Deese-McDermott-Roediger (DRM) paradigm – the discovery that people can form false memories immediately after an event. He is also one of the discoverers of the "testing effect", having showed that trying to recall information from memory re-enforces that same memory more effectively than re-reading that information.

"The key to human memory is recoding: we take information in one form and we recode it in a different form," Roediger says. "Everybody does it, but memory athletes have perfected it. They build these memory journeys and they take in information and put it around it. Is CREB expressed in memory athletes? Sure it is. But we still don't know if that's the main mechanism by which they memorise. The question remains: what are the neurological mechanisms that enable the memory athletes to do what they do?"

Roediger put each of the mental athletes through three days of tests. He conducted not only memory tests, but also tests measuring other aspects of cognition, such as attention. In one exam, Roediger tested the DRM paradigm. He presented a list of 112 words at a rate of two per second, and tested them shortly after. "If you present a list with related words like bed, rest, awake, tired and dream, the probability of falsely recalling a word that's implied but not present in the list, like sleep, is about the same as the probability of recalling words that actually were on the list," Roediger says. "For the memory athletes, the probability of recalling words was seven times higher than the probability of recalling words that were merely implied. One of the athletes recalled all of the words without any mistakes." Roediger also tested their ability to recall words and non-words – words which are pronounceable but meaningless, like flirp, mashua and lencils. The memory athletes recalled 80 per cent of the words in order, and about 20 per cent of the non-words. The control group, composed of Washington University psychology undergraduates, was worse at memorising words than the mental athletes were at memorising non-words.

"The next day, I gave them a surprise test on those same words," Roediger says. "The memory athletes had told us that they could do this immediately but there was no way they would remember them a day later, but their memories were almost intact."

Another test was the Stroop task, a standard test for attentional control which discriminates how well a subject can switch back and forth between tasks while keeping the focus. The Stroop task requires subjects to look at words used to describe colours written in different colours. Answering is nearly instantaneous when the colour and the word match – "red" displayed in red – but slower when there's a mismatch. It's this so-called incongruent trial that most effectively measures focus. Memory athletes were faster at reacting, taking an average of 600 milliseconds, than the control subjects. "The difference between congruent and incongruent trials was halved," says Roediger. "Not only do they have great memories, they have developed a laser-like focus."

The second day of XMT started with the quarter-finals. Mallow faced 18-year-old Johannes Zhou from Germany. Nelson Dellis, the event's organiser, asked the athletes to remove their ear defenders, glasses, visors and anything they were wearing to prevent distraction. The event, Dellis announced, would consist of memorising a deck of cards while listening to an audio montage. Dellis then gave the competitors two minutes to come up with a strategy. "I do CrossFit, so I like to train for the unknown, under stress and exhaustion," Dellis tells WIRED. "I wanted to do a memory tournament similar to CrossFit. If I could, I would dump people into ice baths as they try to memorise something, but I don't want to piss them off."

When he wants to focus, Mallow shuts his eyes and imagines himself back in his flat in Madgeburg. "When I find myself in a situation where I could get anxious, I just imagine sitting at my desk at home," he says. "There's nobody there and it's silent. My heart starts beating slower, I breathe slower. Then I can focus." During memorisation, Dellis played an audio mix, including jumbled-up clips of Katy Perry, Stephen Hawking, Kanye West and Ricky Martin.

Despite the distraction, Mallow perfectly memorised the deck of cards in 37.58 seconds, beating Zhou's 50.87 seconds. Mallow then lost the next two matches, but won match four and five. He defeated Zhou in Match Six, in the category of names and faces. "Names and faces is definitely my weakest," Mallow says. "That's why competitors always choose to play that against me." Mallow memorised 17 names and faces in 59.98 seconds. Zhou got the same number of names right, but took 0.02 seconds longer.

"The knockout stages were very competitive," Mallows says. "I kept losing the first match and had to come from behind in every round. I kept calm but by the end of the day I was knackered."

Last year, in the first Extreme Memory Tournament, Mallow made it to the final, where he was defeated 5-1 by his friend Simon Reinhard. This year, Mallow reached the final again, to face Boris Konrad. Unlike the earlier rounds, the final takes place on the stage of the main lecture room at Dart Neuroscience. The amphitheatre was full. The final was played at the best of nine matches. After match seven of the final, Mallow was ahead by 4-3. Match eight was names and faces, one of Konrad's strengths and Mallow's weakness.

Mental athletes don't use the journey method for names and faces. Mallow, for instance, might try to find a facial characteristic, like a long nose or a birthmark, which he then connects to the name. For instance, in the final, one of the photos showed a man called Damian with a fuzzy beard, which Mallow imagined had somehow been given to him by a demon. Dennis was playing tennis; a woman called Connie wore a cone on her head. "I have fun and put emotions into it," Mallow says. "I saw Walter drawing Walt Disney comics, or Alana as the sister of Alan Harper from *Two and a Half Men*. It makes me smile when I imagine those two punching each other." Mallow got eight names and faces wrong, three fewer than Konrad. When Mallow saw the result, he yelled in celebration, punching the air. "It was my best ever score in names," Mallow says. "Four years ago, I was depressed. My disease was not only affecting my body but my mind. Memory tournaments made me feel confident again. I can't walk, I can't stand, but it doesn't matter." W

João Medeiros is WIRED*'s science editor. He wrote about McLaren Applied Technologies in issue 08.15*

OPPOSITE:
Johannes Mallow and Boris Konrad prepare for their rounds



MOUNT EVEREST, NEPAL At 11:56am local time on April 25, 2015, a 7.8-magnitude earthquake hit the district of Lamjung in central Nepal. This triggered a number of avalanches on Everest, killing at least 19 climbers and trapping many others under snow



THE WORLD IS A DANGEROUS PLACE. AND PEOPLE DO DANGEROUS THINGS. BUT WHEN DISASTER STRIKES (NATURAL OR OTHERWISE) A NEW BREED OF COMPANY WILL GET YOU OUT ALIVE – IF YOU CAN AFFORD IT

SOS, INC.

BY
ABE STREEP

KATHMANDU, NEPAL

On Saturday, April 25, Andy Fraser lay in bed at the Rokpa Guest House, a modest three-storey hotel in Nepal's ancient capital, a city of one million sunk in a valley bordered by the Himalayan range. Fraser, a powerfully built 38-year-old British wilderness paramedic with a shaved head and prominent brow, had arrived a few weeks earlier for a business trip. A lifelong adventurer, he'd cut his teeth in London's ambulance service, taught English at a salmon farm in Chile and spent six months treating snakebites in rural Zambia. Recently, though, things had changed. He had got engaged to another British paramedic, Becky, and with 40 approaching, he'd decided he needed to find what he called "a real job".

He sought out a position with Global Rescue, a private crisis-response firm, and in his first year on the job was dispatched to Nepal for the Himalayan climbing season. Global Rescue, which positions itself as a nimble eject button for those who frequently find themselves in tough spots, has in the past decade established a lucrative client base of large corporations, government organisations, hunters and adventure travellers. The company has offices in New Hampshire, Massachusetts, Pakistan and Thailand, and a staff that might make some countries' armies blush. Its roster of 200-odd employees includes wilderness paramedics and former military personnel, some of them ex–Special Forces and Navy SEALs. The company's Nepal posting is a busy one. Every spring, climbers and trekkers, many of them Global Rescue clients, come to test their mettle in the Himalayas. In 2013 and 2014, the company evacuated 28 clients and repatriated the remains of three more who perished in the mountains.

Fraser's job in Kathmandu was to assist members in need of medical care or evacuation. He called Becky around noon on Skype, as she was waking up in England. The couple said hello, then Fraser's room began to move. "Holy shit," Fraser told his fiancé, "I think there's a fucking earthquake." Then the Wi-Fi connection died. He fell off the bed, pulled on a shirt, hurtled out and started banging on doors, yelling at his neighbours to leave the hotel. The floor lurched, the walls swayed. Staffers and guests ran out of the building and on to the lawn. Fraser was amazed that the Rokpa didn't collapse.

This had been a long time coming. The last major earthquake in Nepal took place on January 15 in 1934, an 8.0 temblor that flattened Kathmandu and killed an estimated 12,000 people. Before that Saturday in April, seismologists had been warning of another Big One for years. Noting Kathmandu's dense population centre and the country's poor infrastructure – Nepal is currently ranked 145th out of 187 on the United Nations' human development report – some observers predicted as many as 100,000 deaths in the event of another 8.0 tremor. At 7.8, the quake that struck on April 25 was smaller than many anticipated, but it went on for two long minutes and was shallow, causing violent shaking on the surface. When it stopped, Fraser heard screaming. He sent a message to Hassan Anderson, a colleague in Global Rescue's Bangkok office, via *Line*, the free communication app, saying, "Big earthquake here."

BANGKOK, THAILAND

When the message arrived, Anderson, a 45-year-old paramedic from Philadelphia who, like Fraser, sports a shaved head, thought he was joking. He'd been a Navy reserve corpsman for nearly a decade and later worked as a paramedic in Afghanistan. His days were now spent in a Bangkok high-rise at Global Rescue's Thailand Operating Center. "Stop farting," he replied. But then news of the disaster broke on TV. Kathmandu's cellular network went down, overloaded by the volume of calls, and *Line* – a communication app popular across Asia – stopped working. Global Rescue's phones lit up. Uber, a corporate client, had three employees in Kathmandu. Another call came from Virginia Commonwealth University in Qatar, which had staff in Nepal. Two Global Rescue analysts began sifting through Twitter feeds from Everest climbers they'd been following. But Wi-Fi was down in Kathmandu, mobile-phone service was sporadic and satellite phones went in and out.

Anderson fielded ten calls, reciting the emergency responder's rote reassurances: be patient; it's a fluid situation; we'll keep you updated. Before bed, one of his bosses, operations supervisor Steve Bright, called. He told him to pack his bag for Kathmandu.

LOS ANGELES

The company's founder and CEO, a former Wall Street executive named Dan Richards, awoke on Saturday morning to many voicemails. Analysts determined that at least 100 clients were in Nepal. Their locations, though, were less clear. Climbers on Everest were spread between Base Camp, at 5,300 metres; Camp 1, at 6,000 metres; and Camp 2, some 600 metres further on. The first reports had emerged of a massive and deadly avalanche of rock and ice at Base Camp. Richards had no idea if his clients were among the deceased. He contacted his associate director for security operations, Scott Hume, who then instructed Drew Pache, a security operations manager for Global Rescue and former US Army Special Forces operative, to leave the New Hampshire office and get on a plane for Kathmandu. Richards was concerned about Fraser – Kathmandu was still rumbling with aftershocks.

In an age when travellers can land in Paris or Jakarta and book a ride with *Uber* before the plane reaches the gate, Global Rescue's existence hardly seems remarkable. Why shouldn't we be able to hire private armies to ensure our safe return home from our travels? Fast convenience has never been so valued, and Global Rescue represents a logical extension in the app era: security guaranteed with the click of a satphone. That's what the company sells, anyway: absolute control in situations that are by definition uncontrollable. The truth is slightly more complicated. The fact that well-heeled travellers can

PHOTOGRAPHY: HARPER/CORBIS (PREVIOUS SPREAD); ADAM FERGUSON

summon Green Berets and wilderness paramedics almost instantaneously can present an ethical conundrum. The places where Global Rescue operates are often short on resources; the company's business model is predicated on delivering goods and services to its clients first. It makes an effort to help locals when possible, but as Richards puts it, "We are not the Red Cross. We don't have the ability to deploy our services to people who haven't paid a membership fee."

A graduate of Dartmouth's Tuck School of Business, Richards founded Global Rescue in 2004 following a successful career as a private-equity adviser at Thomas Weisel Capital Partners. He saw a niche that needed filling. At the time, companies such as International SOS provided risk assessments to big corporations sending employees overseas, while insurance companies allowed customers to file for reimbursement for services such as evacuation or lost luggage. Groups like MedjetAssist, meanwhile, provided evacuation services from international hospitals. But there wasn't a company with the capability to quickly dispatch both helicopters and security personnel to hard-to-

FRASER'S ROOM BEGAN TO MOVE. 'HOLY SHIT,' HE SAID TO HIS FIANCÉ OVER SKYPE, 'I THINK THERE'S A FUCKING EARTHQUAKE.' THEN THE WI-FI DIED



ANDY FRASER A Global Rescue senior specialist, Fraser was on call in Kathmandu when the 7.8 temblor shook the city and threw the country into chaos

reach places – something Richards realised while researching investment opportunities in the crisis-response industry. "When you call the cavalry, you expect the cavalry to show up," he says.

Richards soon hired five paramedics with military experience, negotiated a partnership with the Johns Hopkins Department of Emergency Medicine to provide clients with remote medical consultations, and got in touch with helicopter companies and current and former military personnel around the globe that he could hire on a contract basis. He began to sign up corporate clients that paid hefty annual fees for memberships that included evacuation privileges. The US Department of State, Nasa and Uber soon signed up for similar deals. So did many publishing companies, including National Geographic and Condé Nast, publisher of WIRED. Some writers for *Outside* magazine, myself included, also have memberships. In the past five years, Global Rescue has become the safety net of choice for adventure travellers, many of whom opt for the company's two-tiered membership programme for individuals. Medical coverage costs $329 (£215) per year, while medical plus security runs $655. Most clients won't need the insurance, but for those who do, the cost of their evacuation is covered.

Richards built Global Rescue into a juggernaut. "They changed the industry and made the existing players look at their offerings and make adjustments," one veteran crisis-response official told WIRED. But the CEO also developed a reputation as a competitive and hard-driving boss. In 2011, five high-ranking employees, including two vice presidents, left the company within a month. The VPs, a former US Army Ranger named Tom Bochnowski and a former Navy SEAL named Ted Muhlner, started a competing outfit, Redpoint Resolutions. Based in Silicon Valley, Redpoint packages medical evacuation services alongside travel insurance – you can call them in the event of a lost bag as well as a lost limb. The company took more than one Global Rescue employee and client with it. Bochnowski wouldn't comment directly on Global Rescue, citing a 2011 breach of contract lawsuit between the companies. He did say: "We're able to put the consumer at the centre of our services. It's a bigger vision than what we were able to accomplish in our past jobs."

In 2012, the company opened offices in Islamabad and Pakistan, as well as Bangkok. Members are given one number to call, which is routed to whichever office is open. Running such an operation requires a global network of reliable contractors as well as the ability to quickly establish communication in places that don't have it. Employees in the field use a text-only satellite device called a DeLorme InReach, as well as a satellite-enabled modem system that creates a mini wireless network. Then there's the company's newly developed *GRID* app, which sends real-time security alerts to a client's smartphone – a faster, more accurate version of the US Department of State's travel advisories. For all the tech, though, says Pache, the former Special Forces operative, "it comes down to a guy on the ground exercising good judgment and doing the best he can with what he's got".



LUKLA, NEPAL

In Nepal, that person was Fraser. He spent a harrowing night on the Rokpa's lawn alongside the hotel's other guests while a dozen aftershocks rumbled. In the morning, he sent an SMS message to Bangkok, telling his bosses he was going to fly to Lukla, the small mountain town 130km to the east that serves as the jumping-off point for most major Himalayan climbs and treks. A Swiss doctor named Monika Brodmann Maeder was on the helicopter flight to Lukla with Fraser. When the two arrived, they found an eerily quiet scene. The hospital was damaged, and a few volunteer nurses were trying to set up a makeshift triage ward in the airport. No patients had arrived yet.

They hashed out a diagnostic system: Fraser would give patients a rapid once-over as they were unloaded. Thumbs up meant they went to the nurses; thumbs down sent them to Brodmann Maeder for critical care. Then the helicopters started coming in. Here was a broken back. Here a shattered pelvis. A climber with a head injury got off a helicopter and started walking aimlessly in the direction of its tail rotor. Sometimes a big Mi-17 helicopter would show up. "Every time one turned up, my heart sank," Fraser says, "because I knew there were 20 people in it." By late afternoon he had triaged about 70 patients, most of them Nepalis. No one knows how many of the patients died. He flew back to the capital. It was time to do his real job.

KATHMANDU

When Fraser landed he rendezvoused with Anderson, who had arrived from Bangkok and spent the afternoon negotiating a maelstrom at the airport. Upon arriving, Anderson met Uber's three employees, who were camping on the lawn outside the Hyatt Regency before their flights out. The team looked through their client list. A group of three climbers was on Lhotse, a neighbour of Everest, but they had called in to say they were fine. Another client, Brad Johnson, was high on Makalu with a painful back.

Global Rescue clients seemed to have evaded the carnage. None were among the 18 casualties from the Everest Base Camp avalanche. Nepal's government had commandeered all of the country's private helicopters, meaning that the company couldn't make good on its promise to quickly deliver air evacuations to clients like Johnson, who needed to get off Makalu before his back worsened. The team kept a spreadsheet with four active tabs: situation unknown; safe and accounted for; evacuation in progress; and closed operation. By Monday, April 27, they had moved 49 clients into the latter three tabs. None had required medical treatment. Overall, they felt like they were in good shape. That's when the call came in about the team at Camp 1.

EVEREST BASE CAMP

This Fishtail Air helicopter is one of a limited number capable of flying at high altitudes in the Himalayas. After the earthquake, it made dozens of flights to transport more than 100 climbers to Base Camp.





KATHY MCKNIGHT KNEW THAT A STORM WAS FORECAST THAT MIGHT SOCK THE REGION IN, RENDERING THE HELICOPTERS USELESS

FAIRFAX, VIRGINIA

Kathy McKnight's first thought was: "My God. Not again."

The 52-year-old education researcher was returning from a triathlon training run near her home in Fairfax when her brother-in-law called to tell her there had been an earthquake in Nepal and that there were reports of a massive avalanche at Everest Base Camp. McKnight's husband, Patrick, a 49-year-old psychology research professor at George Mason University, was making his second attempt to reach the top of the world.

The previous year, Patrick, a seasoned mountaineer, arrived in Base Camp just an hour after an avalanche ripped through the Khumbu Icefall, a treacherous 800-metre section of shifting glacier bordered by rock faces between Base Camp and Camp 1. That slide killed 16 Sherpas and ended Everest climbing from the Nepal side in 2014. Now he was back on the mountain with the same guiding company he'd chosen the previous year, Summit Climb, an outfit based in Seattle.

Patrick's brother told Kathy there was no reason to panic just yet. Patrick had a SPOT device, a subscription-based emergency satellite beacon that's tapped into international search-and-rescue networks. He had linked his SPOT to his blog and Facebook and Twitter accounts via the connection app *If This Then That*, and starting at 3:17am US Eastern Time – about an hour after the earthquake hit – he had released a series of three location dispatches placing him at Camp 1, obviously a message to his family. Plus, Kathy knew her husband was a Global Rescue member. But there was no reason to get too comfortable. At 1:27pm Nepal time – 3:42am Eastern – Summit Climb's leader, a 55-year-old guide named Dan Mazur, tweeted, "Aftershock @ 1pm! Horrible here in Camp 1. Avalanches on 3 sides." Half an hour later, he tweeted again about the situation on Everest. This time his message was even less reassuring. It ended with "Please pray for everyone."

CAMP 1, EVEREST

The Summit Climb expedition had left Base Camp and made its way through the Khumbu Icefall earlier that morning. McKnight was climbing with a team of 17. They were feeling strong after making it through the icefall. Still, when they reached Camp 1 – which sits at 6,000 metres – they were struck by the area's precarious glaciology. The team camped just beneath the south-east face of Everest. Sheer walls and immense hanging seracs loomed on both sides.

McKnight settled into his tent alongside a Finnish teammate. All of a sudden the tent started moving up and down and side to side. McKnight experienced a great heaving. The glacier was shifting beneath him. Mazur, the guide, started screaming, "Get your ice axes! It's coming!" He told the team members to lie on their stomachs with their axes planted in the ice. Then the avalanches started: one, two, three. They were aerosol avalanches – wind-driven thin layers of snow. They didn't carry the type of deadly mass of rock and ice that struck Base Camp. Still, the power of the air that funnelled through Camp 1 was wild, a 220kph thing turned fierce by the snow and vapour it carried. McKnight, a sailor who has navigated through hurricanes, had never felt air moving so ferociously. He was covered by 20cm of snow, and as he cleared an airway, he braced for the inevitable crashing serac and slide that he was fairly sure would end his life on Everest.

The slide never came. Immediately following the quake, Mazur decided to relocate to the centre of Camp 1, away from the looming seracs. The centre of Camp 1 is made up of a series of ice ridges; Mazur picked one that was about seven metres by 15 metres. Starting that afternoon, they got hit by one aftershock after another, deep seismic shifts that sounded like great grinding gears of ice. This was about the time Mazur sent his tweets, asking for prayers.

PHOTOGRAPHY: PATRICK MCKNIGHT; ROBERTO SCHMIDT/AFP/GETTY IMAGES



HASSAN ANDERSON Senior specialist Anderson flew from Global Rescue's Thailand Operating Center in Bangkok to Kathmandu in order to assist in the company's response to the April 25 earthquake

McKnight awoke the next morning, Sunday, to sunshine and a steady influx of helicopters. People were lining up to get on the first flights out of Camp 1, and from the ridge above he could see groups of climbers making their way down from Camp 2. When he called Kathy on his satphone, he had no idea about the extent of the devastation in Nepal. Kathy told him that an avalanche had killed people at Base Camp and that the low-lying regions outside Kathmandu were devastated; McKnight began to realise his team's lot. The government would be deploying aircraft far from the Khumbu, and the avalanche had destroyed the fixed ladders and ropes that might have allowed a climbing descent to Base Camp. Still, he told Kathy not to do anything – he figured they had enough food for a few days; he even held out a sliver of hope that the team might complete their ascent.

On Sunday, Camp 1's tiny airstrip became a traffic hub to rival a Heathrow runway. A constant stream of helicopter flights landed that day, shuttling climbers down the mountain. Nepal's high-altitude helicopter operators had all dispatched their aircraft to the Khumbu region. The matter of

'AFTER WATCHING ALL THESE WELL-TO-DO PEOPLE CLAMOURING TO GET ON THESE FLIGHTS, I'M THINKING,"THIS NEPALI MAN NEEDS TO GET OUT OF HERE. AND NO ONE EVEN CARES"'

who boarded the flights was hardly scientific: access to the helicopters was determined by personal relationships between operators and climbing guides. Occasionally, though, force did the trick. A few members of the Summit Climb team were anxious to leave, so Jangbu Sherpa, one of Mazur's trusted staff, pushed them on to a flight.

Kathy McKnight was ready to make contingency plans. She knew that the forecast called for a storm that might sock the region in, rendering helicopters useless. She also knew that her husband and one other person on his team, a Scot named James Grieve, had memberships with Global Rescue. On Monday morning Kathmandu time – Sunday night in Virginia – her husband called again. This time the couple made the decision to call Global Rescue. Some 150 people had been evacuated from Camp 1, but the Summit group hadn't made it on to a helicopter. Kathy called Global Rescue, connecting with Jeff Weinstein, a paramedic in Bangkok who contacted Shree Hari Kuikel, the operations manager at Fishtail Air, one of six helicopter companies Global Rescue regularly works with in Nepal. That night, Weinstein spoke with Patrick via satphone. "He said, 'Don't sweat it, we're there,'" McKnight recalls.

The next day, Fishtail dispatched a helicopter from Lukla to Camp 1. When the pilot arrived, Camp 1 was shrouded in a fast-closing cloud bank. He figured he had a 45-minute weather window to perform the evacuation. McKnight pulled out his Global Rescue card and flashed it to the pilot, who gave him a thumbs-up. Soon McKnight and Grieve were in the air. Over the next hour, the pilot shuttled the remaining members of the Summit Climb team to Base Camp. Mazur made the climbers pair up with Sherpas, who often get left off helicopter medical evacuations because they can't pay. No other option was considered; leaving someone up there could have been akin to manslaughter. They were the last team in camp.

The group spent the night in Base Camp, gathering what was left of their gear. The next day, the Fishtail pilot shuttled them down to Lukla. McKnight and Grieve shared the helicopter with a corpse, a Nepali man who had died in the Base Camp avalanche. There was little room in the helicopter, so the team sat on the cold body. Anderson met them when they landed. They had tickets home within a matter of days.

Disaster zones are collaborative yet competitive places. International search and rescue organisations come first, followed by the big aid operations – USAid, the Office of the United Nations High Commissioner for Refugees, the Red Cross. Their mission is altruistic but not selfless. The groups give aid and also vie for certain resources: access, local knowledge, hotels, helicopters, publicity. The same with the private crisis-response industry. One day, Weinstein ran into a former Global Rescue employee who now works for Redpoint. The two were cordial, but at the time there were a limited number of private helicopters operating in Nepal. Both Redpoint and Global Rescue wanted access to them. The companies acquitted themselves admirably under the conditions, and both evacuated clients and bystanders. Global Rescue flew Summit Climb's Sherpas down from Camp 1 at no cost, while Redpoint sent a trauma surgeon to tend to rural villages. "These companies will help out if they have extra room on the plane," says John Moretti, a former PR manager for Global Rescue. "And if they get some publicity, all the better. But at the end of the day they're private companies. They're not there to do the government's job."

In the days following the quake, Global Rescue's team was divided. Weinstein flew into Nepal to join Anderson in Lukla, where the two tended to the last of the descending clients. Fraser and Pache, meanwhile, remained on call in Kathmandu. One night, during dinner in Kathmandu, I ask if they had thought of heading into the hard-hit mountain villages to help. "We're not equipped, we're not manned, it's beyond our scope," Pache says.

The next morning, I visit Ben Ayers, Nepal country director of the dZi Foundation, a nonprofit group that works on issues such as rural school safety. The day after the earthquake, Ayers helped Fraser triage those patients in Lukla. Ayers has a deep respect for Fraser, but he takes issue with the role groups such as Global Rescue play in Nepal. "There is the issue of those flights going to pick up wigged-out tourists," he says, "instead of going to pick up really fucked-up people in Ghorka" – the epicentre of the quake, where the damage more closely resembled that caused by a tsunami. The fact that Global Rescue was able to commandeer such precious resources, though, came as little surprise. "This is a place where money talks," he says.

Later, I bring this up with Richards. How does he justify Global Rescue's role in commandeering helicopters? "These are difficult issues to deal with," he says. "Especially when you're trying to determine who gets incredibly scarce resources. To try to compare levels of need is a really hard thing to do.

"We always leave these situations wishing we could have done more. When it comes to our clients, though, we feel pretty good about how we've been able to support them."

By Sunday, May 3, most of the climbers and trekkers had left Lukla. Anderson, though, had one more mission before returning to Bangkok: he accompanied a helicopter to pull Johnson, who had a bulging disc, off Makalu. Anderson stayed in town for two more days. While there, he went to the hospital to meet a young doctor he'd met. The doctor was with a patient, a Nepali man who had fallen in the mountains and was suffering from severe seizures. Anderson recognised that the man needed a CT scan and probably surgery. All signs pointed to a brain bleed. But the doctor told Anderson that the man would have to wait. It would cost $3,000 to fly him to Kathmandu for treatment, but the patient didn't have the money. No helicopter companies would fly at a reduced rate.

"After watching all these well-to-do people clamouring to get on these flights," Anderson says later, "I'm thinking, 'He needs to get out of here. And no one even cares.'"

The patient made it to Kathmandu the next day. His family reported back that he'd survived. Whether he'd suffered permanent damage was anyone's guess – neither the doctor nor Anderson knew his name.

Shortly after Nepal, Fraser handed in his resignation to Global Rescue. He told WIRED that he would continue to work for them on a contract basis, and that he was grateful to the company for the opportunity to triage those patients in Lukla. He also said he was planning to return to sub-Saharan Africa, where he and Becky are starting a nonprofit that provides healthcare to the needy at no cost. He couldn't wait to get back. ■

Abe Streep is a contributing editor at Outside *magazine. He lives in Wyoming*

PHOTOGRAPHY: MATT EICH

FORGOTTEN AT WIRED THIS MONTH
Inspired by our "Memory games" feature, we asked the WIRED collective what they've forgotten:
"Deadlines. Well, maybe 'forgot' is the wrong word..."
"My credit-card PIN. I have to sing a song that includes all its numbers."
"That I'm on a diet."

WIRED 100 DATA SOURCES THIS MONTH
imf.org
bcg.com
bcg.de
cbinsights.com

"CELEBRITY" EMAILS THIS MONTH
WIRED was surprised to be messaged by Bitcoin's alleged creator, Satoshi Nakamoto. His request? A free ticket to WIRED Money. Call us suspicious, but would he use Gmail? Still, if he turns up, you'll read about it next issue...

REJECTED HEADLINES THIS MONTH
"Light from shite" – editor: "I really think it speaks to the picture."

LEANING FORWARD THIS MONTH
Dan Burn-Forti criss-crossed Europe to photograph our startup founders. Unsurprisingly, it wasn't always straightforward: "Amsterdam was the first stop on my Euro odyssey. I found this cool, wonky sign just by the CrowdyHouse office, and we all loved it. I'm not sure what the wonkiness is signifying, but Mark and Suzan would agree it was contagious."



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Vogue, GQ, AD, Glamour, GQ Style, Myself, Wired

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Japan
Vogue, GQ, Vogue Girl, Wired, Vogue Wedding

Taiwan
Vogue, GQ

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Vogue, GQ, AD, Glamour, GQ Style, Tatler, Condé Nast Traveller, Allure

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THE WIRED INDEX

1.3%

How much faster tasks are completed after 25mm of rainfall, according to a study led by Harvard University on employees of a mid-size bank in Japan



3.65

Average rating, out of ten, given this year by 39 professional recruiters from Fortune500 companies to applicants, based on a written application, according to data from a study by researchers at the University of Chicago. The rating evaluated intellect, general impression and hiring likelihood

3.2 BILLION

Number of pixels captured by the camera that will be mounted on the Large Synoptic Survey Telescope, a US-funded wide-field telescope being built in Chile. Starting in 2019, it will gather information about dark matter

5.63

The rating when the same application was spoken rather than written

ONE THOUSAND

The approximate number of years archaeologists estimate that a mummified Chinese monk was encased in a statue of Buddha before it was discovered. A recent CT scan by staff at the Meander Medical Centre in the Netherlands confirmed its age and that it was intact



70

The percentage (rounded) of countries where boys are behind girls in education, according to a University of Glasgow study of 1.5m 15-year-olds in 75 countries

7.5%

The rate at which US TV television channel TBS has been speeding up reruns of *Seinfeld* in order to make more time for advertising

52%

Amount of meat found in Finnish manufacturer Kesko's meatballs, recently demoted to "balls" due to regulations. The meat in question was scraps, not considered real meat by Finnish standards

TWO

Number of gold Apple Watches owned by the Siberian husky of Wang Jianlin, the son of China's richest man



76%

Proportion of the studies published on fracking that have some degree of connection to the oil or gas industries, according to research conducted into 137 fracking studies by the Public Accountability Initiative, a New York-based research and education organisation

41%

Proportion of those 137 fracking studies considered to have a "strong" connection to the oil and gas industries, meaning they were funded or authored by the industry in question

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ABOUT THIS GUIDE

In the five years we've been producing our annual guide to Europe's hottest startup cities, our network has helped us to identify the rising stars in Europe's tech scene. We define "hot" as being talked about locally by people who matter: it's about buzz, not valuation or market size. Since 2011, the European ecosystem has grown significantly stronger – we're confident that the class of 2015 will go on to even greater things. ***Greg Williams, supplement editor***

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Above: the Treatwell team in Amsterdam: (*l-r*) Maarten Engelen, Laurens Groenendijk, Martijn Rozendaal, Jan-Willem van Boeckel, Erik Wienk

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From finance to fishing, Sweden's capital is building an ambitious global launch pad

STOCKHOLM



After Silicon Valley, Stockholm is the second-largest producer of "unicorn" startups – those valued at more than a billion dollars. "The region has produced companies such as Mojang, Skype, Spotify and Klarna," says Pär Hedberg, founder of incubator STING and co-working space SUP46. "That's a big change compared to ten years ago when there were no startup icons." According to research by data analytics firm BrightSun, Sweden is the largest outlier in Europe at every stage of investment – the average series A round in Sweden, for instance, is roughly $8 million (£5m). The reason for this innovative ecosystem, says venture capitalist PJ Pärson from Swedish investment firm Northzone Ventures, dates back to the 90s, when the government introduced subsidies for personal computers. "Everyone below the age of about 35 grew up with a PC," he says. "That created a fertile ground for new business ideas."

By Madhumita Venkataramanan

59.3294° N
18.0686° E

Population
915,000

Size
381km²

Global Cities Index ranking 2015
33

Truecaller

Kungsgatan 15,
Stockholm 111 43

Truecaller is a predictive phone book that helps you reach the right person based on your location, time of day and call history. The app has a master list of 1.5bn phone numbers. In December 2014, it announced it had 100m registered users, mostly from emerging markets such as Latin America and India. It has raised $80m in funding from Kleiner Perkins, Atomico and Sequoia. *truecaller.com*

FishBrain →

Regeringsgatan 25, 8th floor,
Stockholm 111 53

Sport fishing is going digital. FishBrain is a specialised social network for anglers that crunches data to advise anglers where to fish. They can check in during a fishing trip and post photos of the bait they are using, what they are fishing for and what they catch. It also collects ambient data on air temperature, humidity, water and wind conditions. In 2014, it introduced an algorithm to forecast when and where to drop a line for nine fish species, based on the 250,000 catches and 50,000 lures users have logged. The startup, which launched an app in 2013 and has $2.6m in funding, now has 650,000 users, of which more than two-thirds are in the US, where it dominates the market. *fishbrain.com*



FishBrain CEO Johan Attby: “Our system can suggest where and when you should fish.”



'Stockholm is one of the best-funded areas in the world. Not just by us locals, but internationally strong players'

- PJ Pärson, Northzone Ventures



Volumental co-founder Caroline Walerud

Sinch

Fabrikörvägen 4, 6tr,
Nacka Strand, Stockholm 131 27

Spun out of VoIP company Rebtel, Sinch is a communications plug-in that can be embedded into any app. Like competitors Twilio and Layer, it allows developers to integrate SMS into the app, and also offers voice calling. It launched its SDK to customers in 105 countries last December and claims four billion minutes of calls were made within six months of launch. *sinch.com*

KnC Miner

Birger Jarlsgatan 33, 5tr,
Stockholm 111 45

KnC Miner uses its powerful data centre in the Arctic Circle to verify and process Bitcoin transactions. Despite receiving lawsuits from dissatisfied customers, the firm raised $15m in a series B round led by Accel Partners, and existing investors Creandum and GP Bullhound. According to the company, it generated revenues of more than $100m in its first 18 months. *kncminer.com*

Acast

Drottninggatan 82,
Stockholm 111 36

Acast brands itself as Spotify for podcasts. Its idea: to insert ads into the most relevant parts of a programme, using a drag-and-drop tool that inserts the ad at a suitable point. Funded with $5m, Acast selects ads based on listener data – where they are located, time of day and so on. Customers include *The Guardian*, Sky Sports, *Nature, The Sun and* Coca-Cola. *acast.com*

Goo Technologies

Linnégatan 89E,
Stockholm 115 23

Backed by Rovio founder Kaj Hed, Goo wants to bring 3D animation to HTML5 and WebGL-based web pages. When it launched in 2011, Goo created instant 3D games for browsers, and has since expanded to ads. It claims to have created the first WebGL-powered online ad, which enables a user to move through a 3D scene and look at an advert from multiple angles. *goocreate.com*

Volumental

Drottning Kristinas väg 53,
Stockholm 114 28

Volumental wants to digitise the human body. Its big idea: low-cost, high-resolution software that allows you to scan body parts using a depth-sensing camera like the Kinect to create precise models that can be uploaded to a 3D printer. The startup raised $2m in 2014 from Rovio's investment firm MOOR and others, and plans to expand into medical fields. *volumental.com*

Instabridge

Regeringsgtan 29,
Stockholm 111 53

Instabridge is a crowd-powered Wi-Fi network. Its app lets you share your hotspot details and gives access to other user hotspots. The company claims 1,000 networks are added each day. It took in $1m in a seed round from Creandum, GP Bullhound and a number of angels, and is growing fast in emerging markets such as Mexico, Argentina, Brazil and India. *instabridge.com*

FLIC

Teknikringen 26,
Stockholm 114 28

FLIC's internet-of-things smart button sticks to any surface and can be programmed as a smart home and smartphone device controller, so you can adjust your lights or thermostat, take pictures, make phone calls or order taxis. One of Sweden's most successful Indiegogo campaigns, it raised $800,000 – eight times its goal. The Bluetooth devices cost around $25 a unit. *flic.io*

Lookback.io

800 El Camino Real, Suite 180,
Mountain View, CA 94040 US

Founded in Stockholm but recently relocated to Silicon Valley, Lookback.io allows UX designers to see through the eyes of their customers by analysing user experiences via high-quality video testimonials captured on mobile devices. Funded with $2.1m by investors including Index Ventures, its customers include Spotify, King.com and Venmo. *lookback.io*



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René Redzepi
World-renowned food designer
Redzepi founded Noma, one of the world's best restaurants. He will lead a session on re-inventing food.



Hyeonseo Lee
North Korean defector
Hyeonseo escaped North Korea in 1997. Now living in South Korea, she is an activist for refugees fleeing the regime.



Stephane Kurgan
Building hit games at King.com
Kurgan's company develops some of the world's most popular games and apps, including *Candy Crush Saga*.



Andras Forgacs
Creating lab-grown meat
Forgacs' company Modern Meadow is producing meat and leather in the lab – without harming animals.

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Dataiku

2 Rue Jean Lantier,
Paris 75001

Founded in February 2013, by CEO Florian Douetteau, Marc Batty, Thomas Cabrol and Clément Stenac, Dataiku's Data Science Studio is a software platform that allows data scientists to run statistical models and build their own predictive algorithms. Among its high-profile clients are local giants Vente-privee.com and BlaBlaCar. In 2014, it made €1 million in profit, and it is experiencing 5.5 per cent user growth week on week. It completed a €3.2 million investment round led by Alven Capital and Serena Capital in January 2015. *dataiku.com*

Drivy

7 Impasse Charles Petit,
Paris 75011

Drivy lets its 600,000 registered users rent their cars to each other. It recently merged with its competitor Buzzcar and is currently active in France and Germany, representing more than 37,000 cars. Drivy recently raised €8.6 million from Via-ID, Index Ventures, Alven Capital and investment bank Bpifrance, following an €8.3 million round in 2014. *drivy.com*

'The French ecosystem is maturing – we are seeing more and more opportunities from repeat entrepreneurs'

– Philippe Botteri, Accel Partners



Top talent and big-hitting investors continue to be seduced by the City of Light's hotbed of startup savvy

PARIS

In June 2014, ride-sharing startup BlaBlaCar raised more than €100 million (£60m) in one of Europe's largest-ever investment rounds. It now has more than 20 million members across the world, but it's not the only Parisian startup to make a global splash: France is the most represented European country in the Deloitte Technology Fast 500 with 86 companies (the UK is second with 67).

Many Parisian startups have already achieved the kind of success that fuels a digital ecosystem: ad-tech company Criteo was valued at £1.7 billion at its 2013 IPO on Nasdaq; marketing tech startup Neolane was acquired by Adobe for £394 million; and restaurant reservation service LaFourchette was bought by TripAdvisor in 2014 for $140 million (£88m). "The Paris ecosystem is getting better and better each year," says Frédéric Mazzella, CEO of BlaBlaCar. "We now have a host of good incubators, investors and tech coverage."



By João Medeiros

←

happn
8 Rue du Sentier,
Paris 75002

Over the past year, dating app *happn* has been heralded by UK media as the new *Tinder*. Launched in February 2014 by Didier Rappaport, the co-founder of Dailymotion, *happn* presents a personalised news feed of potential dates within a 250-metre radius. The app has more than two million active monthly users and has been downloaded four million times. It is available in most European capitals and major US cities; London is its most popular customer base with 310,000 users, followed by Paris with 280,000. In December 2014, it raised $8 million in a series A round. "Our vision is to bring reality into the dating world," says Rappaport. "We want to reconnect dating with the people around you, the people you encounter throughout the day." *happn.com*

tinyclues
15 Rue du Caire,
Paris 75002

Mathematician David Bessis founded tinyclues after noticing that certain mainstream approaches to data-mining were mathematically incorrect. An expert in machine learning and digital marketing, Bessis spent ten years as an algebra researcher at Yale University and at universities in Moscow and Kyoto. His startup has raised $1.9 million from ISAI and Elaia Partners since launching in 2013 and provides web-based software to predict marketing trends to customers such as Fnac and PriceMinister. *tinyclues.com*

48.8567° N
2.3508° E

Population
2.2 million

Size
105.4km²

Global Cities Index ranking 2015
3

Above: Happn CEO Didier Rappaport. Its recent São Paulo launch attracted 150,000 users in its first week



Selectionnist co-founders Tatiana Jama (*left*) and Lara Rouyres

↑

Selectionnist

54 Rue de Ponthieu, Paris 75008

Selectionnist monetises the editorial curation of fashion magazines including *Vogue*, *Elle* and *Glamour* (WIRED is published by Condé Nast International , which also publishes *Vogue* and *Glamour*). It allows readers to select a product from a magazine and, via its app, purchase it on an e-commerce website. It raised $2.1 million in seed funding in March 2014. *selectionnist.com*

OpenClassrooms

7 Cité Paradis, Paris 75010

OpenClassrooms offers more than 1,000 massive open online courses to its three million monthly users. It has partnered with France's top engineering school, the École Polytechnique, and now offers courses such as Decode the Entrepreneur's DNA, taught by Bruno Martinaud, head of technology at the university's Technology Venture Master programme. *openclassroom.com*

La Ruche Qui Dit Oui

208 Rue Saint-Maur, Paris 75010

La Ruche Qui Dit Oui provides a way for farmers to sell their produce online and directly to the public. In 2014 it organised 700 assemblies in France and Belgium, connecting more than 4,000 producers to 100,000 customers. It launched last year in the UK as The Food Assembly and is also established in Belgium, Germany and Spain. *laruchequiditoui.fr*

Capitaine Train

9 Rue Ambroise Thomas, Paris 75009

Founded in 2009 by Jean-Daniel Guyot, Martin Ottenwaelter and Valentine Surrel, Capitaine Train has streamlined rail travel – its 800,000 customers can buy train tickets for 19 European countries via its app. It recently raised €6.3 million in an investment round led by Alven Capital. Former Deutsche Bahn president Daniel Beutler recently joined as COO. *capitainetrain.com*

Lydia

84 Boulevard Raspail, Paris 75006

Lydia's app lets its customers send and receive money for free and pay at stores and e-commerce websites. Processing is cheap – it charges just 1.5 per cent and €0.06 per transaction. The app was downloaded more than 50,000 times in 2014, with 85 per cent of its users in the coveted millennials (18 to 30) bracket. *lydia-app.com*

Algolia

53 Rue de Turbigo, Paris 75003

Y Combinator alumnus Algolia was founded in 2012 by Nicolas Dessaigne and Julien Lemoine. It provides a real-time search API it that claims can retrieve results up to 200 times faster than its competitors, a feat that has attracted customers such as CrunchBase, Genius, Periscope and the Etsy-owned A Little Market. It has more than 600 clients in 50 countries. *algolia.com*

WE'RE ALSO WATCHING: DUBLIN

The Dublin scene is small but buzzing, with a business-friendly climate and big Valley firms. Its next big challenge: retaining its home-grown talent. OF-W

Verifly

Founded by former Hailo CEO Jay Bregman, Verifly has raised £1.4 million to build a global database of civilian drones. *verifly.com*

Trustev

Founded by Pat Phelan and Chris Kennedy, Trustev analyses user behaviour to prevent online credit-card fraud. *trustev.com*

Xpreso

Xpreso aims to eliminate missed deliveries by letting e-commerce sites deliver to individuals, co-ordinated by an app. *xpreso.com*

Restored Hearing

Restored Hearing uses smartphones to help tinnitus sufferers alleviate symptoms. It recently secured $750,000 in funding. *restoredhearing.com*

Intercom

Intercom creates business-to-customer messaging software. In 2014, it raised $23m from a series B funding round. *intercom.io*



The Catalan capital is closing the gap between itself and Europe's powerhouses

BARCELONA

41°23′ N, 2°11′ E

Population
1.6 million

Size
102km²

Global Cities Index ranking 2015
27



Barcelona is playing catchup with Europe's major hubs, says investor Michiel Kotting from Accel Partners, who leads the VC firm's investment in Barcelona. But it's accelerating apace, with more companies growing and attracting talent to the city. As a result, it has experienced big investment rounds, with online voting tool Scytl securing $104 million (£67m) in 2014. "We see more and more companies looking for serious rounds," Kotting says. "With the speed of growth accelerating, companies are raising more money faster." Startupbootcamp has launched an accelerator, and local and national government have invested in others. One obstacle to negotiate, however, is the city's lack of international experience and language skills that will help startups to scale.

By Liat Clark

Mailtrack

Còrsega 301, atico 2, Barcelona 08008

When Nacho González-Barros was seeking new clients for his startup in 2013, he realised he needed an easy way to track Gmail correspondence. So he created MailTrack, a Chrome extension that deploys the same "double-check" principles of WhatsApp to Gmail. In 2014 the company received a seed round of $460,000 from, among others, Big Sur Ventures. *mailtrack.io*

8fit

Mediatic, Roc Boronat 117, Barcelona 08018

In 2013, Pablo Villalba lost 12kg in four months by changing his lifestyle. By 2014, he'd translated what he'd learned into an iOS and Android app that delivers bespoke training schedules and food plans to its 500,000 users. One-on-one coaching is available for $25 per quarter: "The gym is the next industry to be disrupted," claims Villalba. The team raised $2.25 million in May 2015. *8fit.com*

Smadex

Carrer de la Llacuna 162, Barcelona 08018

Smadex creates and distributes rich mobile advertising for advertisers using machine-learning algorithms, charging for each campaign. Because it built its own tools – helped by $1.1m in funding from Cabiedes & Partners, Trovit and others – its costs are kept down. In the past year it has seen revenues multiply 30 times over, to €300,000 per month. *smadex.com*

Geenapp

Torre Telefònica Plaça de Llevant, Barcelona 08019

This mobile app-discovery platform connects publishers and developers with content creators and media agencies who are given tools to share download links on their sites or via social media. For every successful installation, the sharer gets paid. Launched in 2013, Geenapp broke even last year and secured two seed rounds totalling almost $390,000. *geenapp.com*

Lodgify

Gran Via de les Corts Catalanes, 420, Barcelona 08015

Lodgify has helped 3,000 holiday homeowners create mobile-friendly booking platforms, charging a subscription fee based on the size of the client. Although there are plenty of other centralised platforms, co-founder Dennis Klett says many struggle to build their own site to generate direct bookings. It's a competitive but huge market estimated to be worth $85 billion. *lodgify.com*

First V1sion

Plaça d'Ernest Lluch I Martin, 5 Planta 11, Barcelona 08019

While working in sports sponsorship, Jose Ildefonso pitched the idea of integrating a video camera into an athlete's clothing for POV streaming. His agency didn't like it, so he quit and did it himself, launching FirstV1sion in 2014. It has secured a contract with Euroleague Basketball and launched a €1m crowdfunding equity campaign in March. *firstv1sion.com*

Kantox

Torre Mapfre, Planta 10 Marina 16-18, Barcelona 08005

The foreign-exchange platform provides transparency, peer-to-peer trading, alerts to trade at the best time and an API to automate transactions. It has reached $1 billion in transactions and secured 1,000 corporate clients since being founded in 2011. In February 2014, it raised €6.5 million in investment from Partech Ventures, IdInvest and Cabiedes & Partners. *kantox.com*

Wallapop

Carrer de Casp 162, Barcelona 08013

This used-item trading app uses geolocation to sync sellers and buyers, and claims five million monthly active users across Spain, the US, the UK, France and Mexico. It has received a reported $40 million in investment to aid further expansion from Insight Venture Partners, Caixa Capital Risc, Accel Partners and Bonsai. *wallapop.com*

Tiendeo

Edificio Palau de Mar, Plaza Pau Vila, 1, Barcelona 08039

Retail marketing app *Tiendeo* brings offline content such as leaflets and catalogues online, and has been downloaded four million times across 31 countries since its 2011 launch. The startup has secured €1.1 million from Cabiedes & Partners and a series of angels, claims more than 17 million users per month and has launched in Japan and New Zealand. *tiendeo.com*

Marfeel

Rambla Catalunya 35, Pral 2, Barcelona 08007

Marfeel's technology began as a way for publishers to optimise desktop content for mobile, but pivoted to optimise ad space following a cash injection of €1.6m from Wayra, Nauta Capital and others in 2013. "Our traffic and revenues have since exploded," says co-founder Juan Margenat. Plans are afoot to double staff numbers to 64 and open an office in New York. *marfeel.com*

SPOT ILLUSTRATION: CHRISTIAN DELLAVEDOVA

Pictet's view on Europe's big challenge for the future



Capitalism has emerged from the financial crisis and is ready for the next stage in its development, which will be driven by innovation. But Europe has a problem: its startups struggle to gain financing and scale up compared with their US counterparts. Unless this changes, the US will produce the next radical innovation boom, successful European firms will continue to migrate to the US, and Europe will be condemned to slow growth.

A new innovation shock beckons

Radical innovation shocks deliver a long-lasting boost to economic growth. In the 90s, new computing and communications technologies propelled US real GDP growth to 3.5 per cent, well above the country's 2.5 per cent long-term equilibrium growth rate. The sluggish growth in the developed world in recent years could be largely down to the absence of significant innovations.

Genuine technological revolutions take time to deliver tangible and sustainable benefits to economic growth. But there are flickers of such an innovation shock. Pictet has identified seven sectors that could be the sources of the next wave of transformative innovation: the internet (the Internet of Things); IT/information and data processing (Big Data); automation (advanced robotics); transport (driverless vehicles); energy (shale gas); life sciences (genomics); and smart materials (nanotechnologies).

Europe's innovation problem

The US seems likely to lead the way. Across our seven sectors, US firms account for three-quarters of top ten firms by market capitalisation, while European companies comprise just 15 per cent. In Silicon Valley, a range of new technologies are coming together, backed by ample financing, to create a wave of innovation solutions.

Innovation is stirring in Europe as well, but overall the region considerably lags the US. The World Economic Forum's Global Competitiveness Index 2014-15 includes a sub-category that assesses a country's capacity for innovation: the US is fourth of 144 countries. Finland is first, and there are four other Europeans in the top ten: Switzerland (2nd), Germany (5th), Sweden (6th) and the Netherlands (8th). Most European countries do less well: the UK is 12th, France 19th, Italy 35th, Spain 37th.

As a result, European tech companies often move to the US to kick-start their development. Examples include software firm Zendesk, which was founded in Copenhagen but moved to San Francisco a few years later, and cloud-computing company Huddle, which started in London but has shifted many operations to the US.

For a second year Pictet sponsors this editorially independent WIRED guide to Europe's hottest startups.

THE PICTET STORY

Founded in Geneva in 1805, Pictet is one of Europe's leading independent wealth and asset managers, with over £380bn in assets under management and custody (as of March 2015). The group is owned and managed by eight partners with principles of ownership and succession that have remained unchanged since its foundation.



PHOTOGRAPHY: CHARLIE SURBEY

Above: Christophe Donay, head of asset allocation and macro-research, Pictet Wealth Management, at the private bank's Geneva headquarters

Access to financing is a key issue

One problem that faces innovative European startups is fragmentation, in terms of languages, media, culture and regulations. This makes it harder to scale than for their US counterparts. Successful innovation also requires a culture of risk-taking and a readiness to tolerate failure, which is stronger in the US than in Europe. US bankruptcy laws favour innovation, as they make it easier for entrepreneurs to bounce back from failed ventures – having gained invaluable experience for their next startup.

Another key challenge is financing. Innovation and sustained growth require supportive lenders – more readily available in the US. The issue is partly cyclical. After the credit crunch, when bank lending all but dried up, the US credit cycle received a boost from quantitative easing. Europe was slower to clean up its banks and stimulate lending growth. European bank lending has now at least stopped contracting, but is still barely growing.

However, there are also deeper differences between the US and Europe. Venture capital is much more well developed in the US than Europe, and investors – often with experience in the tech sector – have flocked to Silicon Valley. European firms raised $2.9bn (£1.8bn) from venture-capital funds in the first quarter of 2015. That was up by 41 per cent quarter-on-quarter, a sign that financing in Europe is cyclically improving, but remains far behind the $15.7bn raised by US companies in that period. In terms of equity financing, there is still no European equivalent to the tech-focused NASDAQ stock exchange, which had a market capitalisation of $6.8 trillion at the end of 2014.

Europe needs to use its brainpower

Unless Europe solves its innovation problem, it will continue to lose its most promising firms to the US. In the absence of any major innovation push, its growth prospects are gloomy. Europe's share of global GDP may well halve from 22 per cent to 11 per cent in less than 20 years, with China doubling to 22 per cent and the US at 25 per cent.

European policy-makers still have the chance to reverse this trend, by breaking down the barriers that face startups and developing policies to stimulate innovation, including making it easier for firms to gain financing. Europe is certainly not short of brains – countries such as France have very strong mathematical and engineering expertise. The problem has been that inventions (new ideas) are not transformed into innovations (marketable products or solutions) because the enabling environment is lacking.

There are encouraging signs that this could change. The new European Commission has placed fostering innovation high on its agenda, and promised €24bn ($27bn/£17bn) in financing for innovative firms in 2014-21. However, Europe's track record on such reforms is not promising, and it is likely that the innovation gap with the US will persist. ***perspectives.pictet.com***

Europe's most laid-back city is focused on innovating around creativity and services

AMSTERDAM



The flexible and outward-looking nature of Amsterdam has infected its startup scene – and its worldly aspect means the city is gradually becoming an accelerator for the rest of the globe.

"Because we're small, we have to think global from day one," explains Don Ritzen, managing director of local accelerator Rockstart. "We have to go after Germany, the UK and the US in a very short time if we want to compete – because if anyone's had an idea, you can bet other people have thought of the same thing."

In February, Amsterdam launched its Sharing City initiative, connecting startups with corporates via city facilities. And a previous weakness – the absence of repeat and serial entrepreneurs – is being corrected. Ritzen also notes that when Salim Ismail from Singularity University listed the world's top 100 unicorn companies (those valued at $1 billion-plus), ten were Dutch.

By Stephen Armstrong

52°22′ N
4°54′ E

Population
1.6 million

Size
4,892km²

Global Cities Index ranking 2015
25

Peerby

Herengracht 182,
Amsterdam 1016 BR

Peerby connects borrowers and lenders via a location-based app. It was initially developed in 2009 as a messenger tool. Founder Daan Weddepohl was getting nowhere – until he read Rachel Botsman's sharing economy manifesto *What's Mine is Yours*.

"Every sharing site in the world is basically a list," Weddepohl, 34, says. "You have about a two per cent chance of finding what you need. We send messages from people who need things, to the people willing to share."

In October, the company raised $2.1 million (£1.4 million) from XAnge Private Equity in France and an existing Netherlands-based investor, Sanoma Ventures. *peerby.com*

Treatwell →

Nieuwezijds Voorburgwal 120-126,
Amsterdam 1012 SH

After Laurens Groenendijk sold his founding stake in Just Eat in 2010, his wife said, "There's no Just Eat for hairdressers." And so Treatwell was born. "It was pure greenfield," Groenendijk, 41, says of his 2013-founded startup. "You have all these under-digitised entrepreneurs running beauty parlours and spas with clients who would prefer not to book a Brazilian over the phone at work."

Erik Wienk, 44, the former CFO of Booking.com, came on board for his experience in bookings management. Roll-out is on a city by city basis – Treatwell is across Holland, Benelux and Germany, and is expanding to Milan and Zurich. "Sometimes you have to think in postcode terms," says Groenendijk. The company is about to start searching for €10m series B funding to reach the rest of the continent. *treatwell.com*



Below: the Treatwell team: (*l–r*) Jan-Willem van Boeckel, Martijn Rozendaal, Laurens Groenendijk, Erik Wienk, Maarten Engelen



'I got so fed up spending hours on eBay searching and searching before I found one really great item'

– Rene Schoenmakers, Catawiki



Above: Mark Studholm and Suzan Claesen, founders of CrowdyHouse

Catawiki

Vijzelstraat 68,
Amsterdam 1017 HL

"I got so fed up spending hours on eBay searching and searching before I found one really great item," explains Catawiki co-founder René Schoenmakers. Launched in 2008 as a site for comic-book enthusiasts, it now holds auctions of "exceptional items", such as classic cars. In September, the company closed a €10m (£7.2m) series B round led by Accel Partners. *catawiki.com*

SnappCar

Herengracht 182,
Amsterdam 1016 BR

There are 250 million cars in Europe standing idle 23 hours a day. SnappCar aims to take 250,000 of them off the roads via a mobile app that offers private car rentals. Founders Victor van Tol, 40, and Pascal Ontijd, 34, raised €500,000 last year, and bought Danish peer MinbilDinbil, securing financing from investors that values the company at €9m. *snappcar.nl*

Adyen

Simon Carmiggeltstraat 6-50,
Amsterdam 1011 DJ

The online payments company's December 2014 funding round raised $250m (£161m) and valued it at $1.5bn. CEO Pieter van der Does, 45, raised the finance to bolster the balance sheet – the company is expanding into point-of-sale payments, and retailers like to see cash reserves. Since its 2006 launch, Adyen has grown to handle more than 250 payment methods. *adyen.com*

3D Hubs

Herengracht 182,
Amsterdam 1016 BR

An online platform connecting 3D-printer owners with local people who need something printed, it had just 15 print-hubs in Amsterdam in 2013. Two years on, founders Bram De Zwart, 32, and Brian Garret, 29, have a network with over 16,000 locations in 140 countries. A September series A funding round brought $4.5m from investors including Balderton Capital. *3dhubs.com*

↑

CrowdyHouse

Brouwersgracht 246,
Amsterdam 1013 HE

CrowdyHouse is like Etsy for professionals, giving Europe's product designers access to international markets. Launched in 2013 by Mark Studholme, former manager of architecture social network Archello, and his furniture designer partner Suzan Claesen, both 29, CrowdyHouse handles payments, promotions and PR. In April, angels invested €560,000. *crowdyhouse.com*

Quiver

Barbara Strozzilaan 201,
Amsterdam 1083 HN

Quiver provides security services for documents – from contracts to databases. "Research from the Ponemon Institute and Gartner shows that 60 per cent of all file sharing methods are unsafe. Quiver is like a smart container around your file or your data," says Django Lor, founder and CEO. Quiver protects a file by using geolocation. A pilot with ING bank is underway. *quiver.net*

ElasticSearch

Rijnsburgstraat 9-11,
Amsterdam 1059 AT

Shay Banon, 37, creator and CTO of Elasticsearch, says it's hard to find a social analytics company not running Elasticsearch under the hood. The company provides real-time data search and analytics so that companies can analyse any aspect of their data. In June last year, it raised $70m in Series C funding – bringing total funding to $104m just 18 months after launch. *elastic.co*

TravelBird

Keizersgracht 281,
Amsterdam 1016 ED

Founded in 2010, the company has 650 staff in 17 countries who plan holidays depending on local culture and hunches, and who negotiate discounts to offer six package deals per day, every day. The company turned over €95m in 2014 and closed its second funding round in May – raising €16.5m to add to early backing from Berlin tech-magnates the Samwer brothers. *travelbird.com*

This northerly capital is showing there's more to it than Angry Birds

HELSINKI

60°10'15" N, 024°56'15" E

Population
1.4 million

Size
715km²

Global Cities Index ranking 2015
N/A



Nokia and Rovio cast long shadows over the Finnish tech scene. But Nokia's gutting by Microsoft and Rovio's gradual move into the worlds of licensing and merchandising seems to have done the city's startup ecosystem a huge favour – Nokia has released more than 10,000 staff over the last decade.

"The startup scene is getting Nokia's jewels," says Jaakko Hynynen, CEO of incubator Startup Sauna. "Some very senior people with a huge wealth of experience and contacts came out of the company – the result was an explosion for the startup scene." Former Nokia employee Petteri Koponen, for instance, went on to found VC Lifeline Ventures and invested in Supercell. Today the city's strengths range from gaming to finance.

By Stephen Armstrong

Kiosked

Keilaranta 1,
Espoo FI-01250

"As the sheer volume of content online grows, the opportunity for advertisers is diminishing," explains Micke Paqvalén, co-founder and CEO of Kiosked. Its smart solutions include responsive graphical overlays – ads that float over text, pictures or video, and click through to buy. The firm has raised €12.6m (£8.9) across three rounds – with €3.7m this February. *kiosked.com*

Beddit

Kimmeltie 3,
Espoo 02110

"Sleep is the foundation of health and wellness," explains Lasse Leppäkorpi, 35, founder and CEO of sleep-monitor firm Beddit. Combining an app with a sensor strip that lies beneath the bed sheet, it uses ballistocardiography to monitor your movement. After two US partnerships failed in 2006 and 2012, the firm now has $3m (£2m) to fund expansion. *beddit.com*

Rightware

Niittymäentie 7,
Espoo 02200

Helsinki's gaming and mobile tradition provided the launch pad for Rightware – which builds user interface screens and software for car makers. The Audi TT's virtual cockpit marked its debut. Having completed a third funding round last year – bringing total investment to €11m – Rightware is looking at other industries for next-step expansion. *rightware.com*

Wolt

Itämerenkatu 11-13,
Ruoholahti, Helsinki 00180

"The future of mobile payments needs to be seamless – just as gaming is," says Miki Kuunsi, 25, co-founder and CEO of foodie newcomer Wolt. Order and pre-pay for a meal at a restaurant via the app, and the waiting-time indicator means you can turn up just as it's served. Wolt launched in autumn 2014, with a $500,000 seed-funding round led by Lapland Ventures. *woltapp.com*

Shark Punch

Kalevankatu 9,
Helsinki 00100

"The biggest mistake you can make is to launch a game, ship it, and think your job is done," says Jiri Kupiainen, co-founder and CEO of Shark Punch. Playfair is its gaming discovery platform, which connects gamers with new games: "The channels connecting the two aren't there," he says. London Venture Partners agrees – it led a €1.2m round in February. *sharkpunch.com*

Enevo

Tähdenlennonkuja 1,
Espoo 02240

Is there cash in trash? Enevo's founder Fredrik Kekalainen, 40, thinks so. The company's battery-powered sonar sensors are stuck in waste containers to measure the fill-level data of bins in real-time, saving on unnecessary rubbish-truck trips. In August 2014, the company announced an $8m funding round from Earlybird, Lifeline Ventures and Finnish Industry Investment. *enevo.com*

Holvi

Fabriksgatan 27-29 A,
Helsinki 00150

Former VC Johan Lorenzen – Holvi's 36-year-old CEO – offers every conceivable financial service for freelancers, micro-businesses and SMEs, from invoicing to bookkeeping. But at the heart of Holvi's offering is a regular current account. Founded in 2011 to take advantage of new Europe-wide banking regulations, Holvi closed its third funding round for €1m last year. *holvi.com*

Yousician

Eerikinkatu 28,
Helsinki 00180

Founders Chris Thür and Mikko Kaipainen met at Finland's Tampere University of Technology. Passionate about learning music, they realised that teaching wasn't the problem, but motivation was. So Yousician's first tutor app *WildChords* gamified learning. Seed funding of $1.4m in 2012 from True Ventures has allowed new products to be developed. *company.yousician.com*

Everywear Games

Mannerheimintie 12 B,
Helsinki 00100

"When Apple announced the Watch we decided to go all in," explains Aki Järvilehto, 42, co-founder and CEO of the gaming newbie. Its stellar board includes designer Markus Tuppurainen, 39 (formerly of Rovio), local VC Mika Tammenkoski, 40, chairman Petteri Koponen (previously chair at Supercell), and Nikolaj Nyholm, an advisor to *Minecraft* creator Mojang. *everywearegames.com*

Smartly.io

Itämerenkatu 1,
Helsinki 00180

Founded in 2013 by CEO Kristo Ovaska, 32, Smartly.io automates performance marketing primarily on Facebook. Ovaska's previous role was running Startup Sauna, making him one of the best-connected men in Helsinki and European tech. Smartly.io offers multiple A/B tests and dynamic product ads. Its series A funding round in April had Lifeline Ventures invest €2.5m. *smartly.io*

Despite Russia's economic crisis, money is still rolling into tech

MOSCOW



55°45′ N, 37°37′ E

Population
12 million

Size
2,511km²

Global Cities Index ranking 2015
14

It's impossible to ignore the Russian Federation's ongoing economic crisis. "The overall paranoia is plain," says Alexander Turkot, head of venture capitalist firm Maxfield Capital. "But it's always good to do business in Moscow because it's a source of new ideas. In Russia, to move to Moscow is like moving to Silicon Valley."

Igor Ryabenkiy of venture-capital firm AltaIR Capital is also positive. "The crisis is not forever," he says. "There are still a lot of strong young brains in Russia, and they want to bring their bright ideas to startups." The situation is forcing greater ambition: "Two years ago, the Russian market was enough, because Russia is enormous," says Ryabenkiy. "But now they are starting to think more globally because they don't want the economic uncertainty."

By Sophia Epstein

Zdravprint

Khokhlovsky 7/9,
Moscow 109028

Known in the English-speaking market as Health Print, this medical tech company was founded in April 2014 by Fëdor Aptekarev and Alexey Tsukanov. "We ask doctors what they need and we help them," says Tsukanov. So far that has meant 3D-printing models for complex surgical planning as well as lightweight casts to fit personal measurements. *zdravprint.ru*

Knopka

Sadovaya-Kudrinskaya 8,
Moscow 123001

Built for Russian entrepreneurs, Knopka provides its 1,000 clients with a team of specialists to take care of their day-to-day business needs, such as recruitment and accountancy. "We have a partnership with the biggest commercial bank in Russia," says Anton Sizov, CEO. "We make about £120,000 a month." Their main focus, they say, is customer happiness. *knopka.com*

RocketBank

Palikha 10,
Moscow 127055

This banking app lets you manage your money through your smartphone. "Major trends are moving towards mobile and away from bank branches," says CEO and co-founder Victor Lysenko. "Banking is becoming a commodity, that's why customer experience matters." You can transfer money to anyone in your contacts list, without needing a card reader. *rocketbank.ru*

Coub

Sadovaya Kudrinskaya 23,
Moscow 123001

A combination of a GIF and a Vine, a Coub is a looped video of up to ten seconds. Founded by brothers Igor and Anton Gladkoborodov and Mikhail Tabunov, Coub claims 500 million views each month, from 50 million unique users. With $3.5m (£2.2m) in funding under their belt, the founders have expanded to offices in Moscow and New York. *coub.com*

Panorics

Lugovaya 4,
Moscow 143026

Panorics has taken on GoPro, by developing a 360° camera that can stream to virtual-reality headsets. Founded in Moscow in 2013, the company also has an office in New York, and says it will be distributing its handheld cameras by the end of the year. "Facebook and YouTube have announced they will support 360° videos," says CEO and founder, Alex Boch. *panorics.com*

Too.Me

Pudovkina 6/1,
Moscow 119285

This messaging app turns words into animations. Founded in 2013 by Sergei Kuzmin, it was released in January this year. The company has expanded to Los Angeles after receiving angel funding from Hollywood director Timur Bekmambetov. At the time of publication, the company was due to enter into talks with Viber about becoming an official add-on. *too.me*

Relap

Dobrovolcheskaya 12,
Moscow 109004

Launched less than a year ago, Relap is a business-to-business service that aims to increase visit times for websites by recommending sites through embedded widgets. Sergey Shalaev, CEO of parent company Surfingbird, claims Relap increases website click-through rates by at least 30 to 50 per cent, and with deep integration by up to 150 per cent. *relap.io*

Moe Delo

Krasnoproletarskaya 16,
Moscow 127473

This accounting service for small businesses has been around since 2010, but is growing fast. CEO and founder Sergey Panov claims one million freemium customers, and over 50,000 paid. "In the first quarter of this year, the number of small businesses has increased," says Panov. "This is a good thing – those new businesses are our client base." *moedelo.org*

Fingooroo

Garibaldi 23/1,
Moscow 117335

Founded by Olga Svyatchenko in August 2014, person-to-person lending service Fingooroo operates a marketplace with lower interest rates than traditional institutions. Cross-border lending in partnership with a Spanish data-analytics company, Zed, brings together creditors in a country with low interest rates and borrowers in areas with high interest rates. *fingooroo.ru*

CarPrice

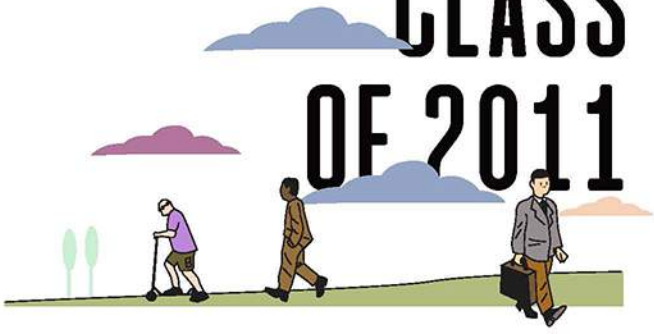
General Yermolov 1,
Moscow 121170

This secondary marketplace for used cars began in Moscow but has rapidly expanded throughout Russia. The site performs free and fast car valuation and inspection at any of its centres, and guarantees to purchase any car within 30 minutes once you've filled in the paperwork. Founded in June last year, the startup raised $2 million in its first seed round. *carprice.ru*

ILLUSTRATION: CHRISTIAN DELLAVEDOVA

WIRED'S CLASS OF 2011

We revisit the breakout successes first spotted in our 2011 startup guide



WIRED assembled our first report on the 100 hottest startups in Europe four years ago. If only we were an investment fund rather than a magazine... Four years on, it seems we were early on spotting plenty of future superstars. And yes, there's even a unicorn. Though admittedly, we weren't 100 per cent right with our predictions (anyone remember tupply.com?). Here's our roundup of the breakout firms from our first look at the state of the startup union, back in 2011, which have gone on to become tech flagships and household names. Don't say we didn't tell you...

Klarna

Sveavägen 46,
Stockholm 111 34

The Swedish e-payment platform that allows buyers to receive goods before paying is now a $1bn firm responsible for around ten per cent of Europe's e-commerce. *klarna.com*

WeTransfer

Handelskade 751,
Amsterdam 1019 BW

The Dutch file-sharing service moves some 70 million files around the globe each month, and is valued between $100 and $200 million (£63m and £126m). *wetransfer.com*

Mojang

Maria Skolgata 83,
Stockholm 118 53

The company behind *Minecraft* was acquired by Microsoft for $2.5 billion in November 2014. Next up: bringing *Minecraft* to augmented reality via Microsoft's Hololens headset. *mojang.com*

SoundCloud

Rosenthalerstrasse 13,
Berlin 13127

The audio-streaming platform cut a deal to pay royalties to 20,000 indie labels in June 2015. With 175 million monthly listeners, SoundCloud is valued at £444m. *soundcloud.com*

Face.com

62 Rothschild Boulevard,
Tel Aviv

Facebook bought the Israeli face-recognition firm for £35 million in June 2012 and is using Face.com's image-recognition technology to boost engagement. *facebook.com/face.com*

Yandex

16, Leo Tolstoy St,
Moscow 119021

Russia's most widely used search engine has grown over the last few years via a series of acquisitions, from a car-selling website to a geolocalisation company. *yandex.ru*

Supercell

Itämerenkatu 11-13,
Helsinki 00180

The Finnish maker of *Clash of Clans* is now majority owned by Japanese telco SoftBank. Supercell grosses about £1m per day and doubled its profits to £357m in 2014. *supercell.com*

Criteo

32, Rue Blanche,
Paris 75009

This Paris-based personalised internet-advertising company raised over $250m during a Nasdaq IPO in 2013, and today it operates in more than 30 markets worldwide. *criteo.com*

Withings

2 Rue Maurice Hartmann,
Paris 92130

The French electronics company debuted with a connected body scale in 2009. It has grown into a major player in wearables thanks to its Pulse and Activité smartwatches. *withings.com*

BillGuard

32 Rothschild Boulevard,
Tel Aviv

A personal finance app that detects fraud or hidden costs. Its 2013 Gray Charges Report revealed how Americans paid over $14.3bn in unwanted credit card payments. *billguard.com*

Wooga

Saarbrücker Strasse 38,
Berlin 10405

The online gaming developer, – known for A/B testing its products – got its start in social gaming on Facebook. It launched a game designed for the Apple Watch in April. *wooga.com*

Layar

Vijzelstraat 20,
Amsterdam 1017 HK

The Amsterdam-based startup pioneered making printed ads interactive by adding augmented reality elements. It was purchased by Blippar in June 2014 for an undisclosed amount. *layar.com*



Established UK startups on Europe's hottest newcomers

PHOTOGRAPHY: **NICK WILSON**



Since featuring in previous editions of the WIRED *Europe's 100 Hottest Startups* guide, online fashion aggregator Lyst has secured Series C funding of £25 million. Appear Here – the so-called Airbnb for retail spaces – has enabled thousands of pop-up triumphs, including London's BOXPARK. Direct Debit payments platform GoCardless is processing £500 million a year for over 10,000 businesses. Cycling safety company Blaze is on track to net more than £1 million in sales in 2015. And business database and information firm DueDil has gathered data on more than ten million companies in the UK. But what do the founders and CEOs of these UK successes think of the fast-growing stars featured in the 2015 *Europe's 100 Hottest Startups* list? WIRED and Pictet gathered them together to ask.

Contributors:
1 Lyst
2 Blaze
3 DueDil
4 GoCardless
5 Appear Here



LYST

Chris Morton, founder and CEO, Lyst, and **Caroline Ohrn**, Lyst product manager – on Paris and Barcelona

Inventory is out. There's a trend for marketplace business models which can scale fast and grow organically as more buyers become connected to more sellers in a trusted environment. Big data continues to create opportunities for startups. Some are making data analysis a more accessible tool for businesses, and others are using data science to create platforms that improve existing consumer behaviours.

Trading app *Wallapop* is growing fast, and is poised to own the classified ads market in Europe with its localised model. *Happn*, a dating app, is exciting because it fuses local and social technology, bringing online dating into a physical space. 8fit's plans to disrupt the gym industry are interesting; using mobile and working with self-quantifying wearables allows for real personalisation and localisation of training.

The next sectors that need disrupting are those with high consumer unhappiness. Estate agents, insurance, banks – anything that people sigh over is ripe to be done in a different, better, way. ***lyst.com***

01

All images shot at Second Home, a cultural venue and workspace for creative companies, which opened in Shoreditch in November 2014.

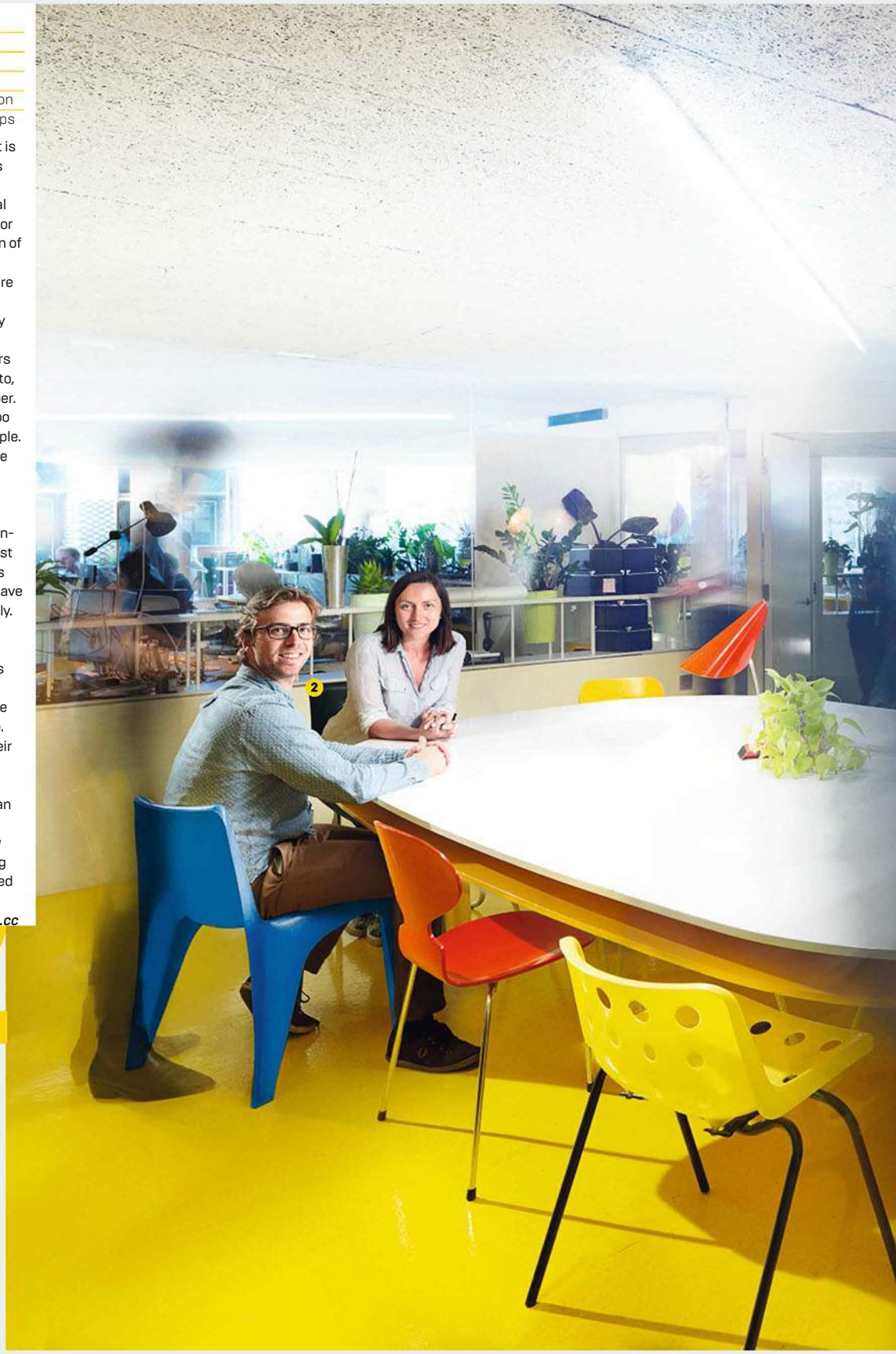
BLAZE

Philip Ellis, COO and co-founder, and **Rachel Thompson**, head of community – on London and Amsterdam's startups

One thing that stands out is the number of companies providing very traditional services in very traditional ways, with the disruption or innovation in the provision of best-in-class customer service. It might not require a revolution in customer service, but instead a very effective application of a style of service consumers have grown accustomed to, through platforms like Uber. London's Hassle, Deliveroo and WorldRemit for example.

The phenomenon of the sharing economy and crowdfunding relies on consumer trust in the platform. It's difficult to pin-point the origin of that trust – you could say it's always existed, but these firms have found how to gain it quickly. For these businesses to work, the difficult part is identifying what volume is required to sustain the platform and an affordable route to acquiring volume.

Noticeable through their absence, are any IoT companies. Perhaps underlining how difficult an area it is to work in, and maybe a reflection of how large companies are filling the space that some hoped would be occupied by startup innovators. ***blaze.cc***





03

DUEDIL

Justin Fitzpatrick, COO & CFO, and **Damian Kimmelman**, Founder and CEO, on Berlin and Istanbul startups

Tech companies are bringing luxury to a mass audience by providing things that people want through the casual economy. Uber did this by taking people with cars and spare time but without steady jobs and letting them realise the economic value of their assets. Many companies are applying this approach to a more diverse set of problems – from delivering food or football scores, to helping with wedding plans.

People are getting more used to trusting how technology provides for them. Only five years ago, ordering a taxi in Turkey through an app, or allowing an online assistant to decide what you should wear would have seemed absurd. But now tech companies supply us with services that are integral to our lives, so we are more likely to try new products from others.

So far, we have seen most disruption in social spaces – with creations like Google, Facebook, and Skype. Tech will next target the fabric of society – major industries like transport, food, biotech, and aeronautics – but especially finance, where we are already beginning to see big changes. ***duedil.com***



04

GOCARDLESS

Grey Baker, co-founder and VP of engineering, and **Corinne Thompson**, head of finance – on Helsinki and Stockholm

Although the Scandinavian startups are diverse there's a clear theme of design-led thinking. Rightware, True Caller, Flic and Smartly are all improving traditional interfaces, from in-car dashboards to our phonebooks, with customer-centric design. Holvi and Wolt take this trend a step further, attempting to improve the interface of entire industries – in these cases banks and restaurants.

Scandinavia has an extremely strong heritage in design, but equally important is the fact that it's an area where small companies have something of an advantage over incumbents. Startups are close to their customers, and can iterate design as quickly as they iterate their code – it's clear that Scandinavian startups are increasingly using that as a competitive advantage.

Further, there's a trend of businesses becoming as demanding of the interfaces they use as consumers. Two of the startups, Smartly and Holvi, are firmly B2B targeted but still basing their offering on simple interfaces.

gocardless.com



APPEAR HERE

Ross Bailey, founder and CEO – on startups from Tel Aviv and Moscow

There are three things that strike me as really interesting. The first is how we're sharing content. Startups are using the likes of Facebook and Twitter to create new content platforms. People are looking to their friends and friends' followers for entertainment, rather than big news corporations and journalists. Moscow's video platform, Coub, and Tel Aviv's PlayBuzz – where people create their own quizzes to share – are leading the way in this. Playbuzz is now the most shared site on Facebook.

The second is how tech is disrupting well-established industries like security. Adallom is defending against cyber attacks and Windward gathers huge amounts of data for security in the shipping industry – both by using unprecedented levels of data and analytics.

The final thing is the connection of online and offline. Technology brings scale and efficiency, but with Airbnb, Uber and others we're seeing startups make use of people's latent capacity, and deliver it differently. That means gaining a lot of unique data, which enables them to have a clearer oversight of an industry than ever before. And more importantly, even better oversight than the incumbents that have historically been hard to disrupt. ***appearhere.co.uk***

05

Pictet's founding principles encourage a spirit of collegial management and entrepreneurship, a long-term vision and commitment by the partners as well as a prudent risk-management policy. The Pictet Group, headquartered in Geneva, employs more than 3,400 people. It also has a presence in 25 major business hubs around the globe.

Europe's economic powerhouse is an online force to be reckoned with

BERLIN



It's impossible to write about the Berlin startup scene without mentioning Rocket Internet. The company-building-machine created by three brothers – Oliver, Marc and Alexander Samwer – had a €6.5 billion (£4.6bn) initial public offering in October 2014, one of the largest in Europe. In May 2015, it reported that its loan portfolio value had risen by €2 billion since the IPO. Its influence in the Berlin digital community is striking. Out of the startups on our Berlin list, Rocket has invested in two (Delivery Hero and HelloFresh) and at least two of the founding teams profiled include former Rocket executives in their teams (NUMBER26 and GoButler).

"The success of Rocket has increased the relevance of the Berlin ecosystem," says Sebastian Esser, a former journalist, conference organiser and now CEO of Home eat Home. Yet despite the rising international interest in Berlin-based startups among venture capitalists, the city is still attracting only limited investment from the US and London. "When big cheques get written, it tends to be to non-German firms in 99.9 per cent of all instances," says Philipp Hartmann, vice-president, product at SavingGlobal.

By João Medeiros

NUMBER26 →

Unter den Linden 26,
Berlin 10117

NUMBER26 is a bank built for smartphones. "Other banking products are not really connected to digital natives," says Valentin Stalf, CEO and co-founder. It launched in January. "Banks have a hard time figuring out how to build digital products. We're rethinking the whole process, from signing up to customer experience. We place mobile at the core and everything works in real time." Stalf is planning to incorporate features including "smart personal financial management" and fraud detection. "We can compare the geolocation of smartphones with the location of transactions and block a fraudulent transaction before it actually happens," he says. In April, NUMBER26 raised €10m (£7m) from Valar Ventures, a VC firm backed by Peter Thiel, along with Daniel S Aegerter, Earlybird and Redalpine. *number26.de*

52°31 N
13°23 E

Population
3.5 million

Size
891km²

Global Cities Index ranking 2015
17

glispa

Sophienstrasse 21a,
Berlin 10178

In March 2015, mobile advertising startup glispa raised $77m (£49m) from UK-based Market Tech Holdings. Founded by Gary Lin in 2008, glispa launches marketing campaigns for mobile and online apps. It serves 400 billion monthly ad impressions and claims it is adding six million new customers a month. Clients include Wooga, King, Kaspersky Lab and Deezer. *glispa.com*

Delivery Hero

Mohrenstrasse 60,
Berlin 10117

In 2014, this hungry online-food startup gobbled up HelloFood, a South American competitor, and in March 2015, it swallowed Talabat.com, a food delivery firm in Kuwait. It works with more than 200,000 restaurants in 34 countries. In February 2015, Rocket Internet acquired 30 per cent for €496m. A $110m pre-IPO funding round in June gives it a $3.1bn valuation. *deliveryhero.com*

HelloFresh

42 Berlin,
Berlin 10178

Founded in 2011 by Rocket Internet alumni Dominik Richter, Thomas Griesel and Jessica Nilsson, HelloFresh delivers weekly meal-kits (including a veggie option) to more than four million customers in the US, the UK, the Netherlands, Austria and Australia. In February 2015, Rocket Internet invested $126 million in exchange for a 52 per cent stake. *hellofresh.co.uk*

Right: Valentin Stalf and Maximilian Tayenthal of e-bank NUMBER26



'Banks have a hard time figuring out how to build digital products. We're rethinking the whole process from signing up to customer experience. We place mobile at the core of everything'

– Valentin Stalf, CEO, NUMBER26

'The biggest problem in photography nowadays is not how you share your images, but how you find ones of interest. The hashtag is a dumb datapoint'

– Florian Meissner, EyeEm

Below: Julia Bösch (*left*) and Anna Alex of Outfittery



Outfittery →

Leuschnerdamm 31, Berlin 10999

Founded in 2012 by Anna Alex, Julia Bösch and Tobias Nendel, Outfittery curates clothes shopping for men. The company employs around 80 stylists who personalise the online shopping experience for its 200,000-plus customers. So far, they have raised €20 million, with an investment round in March 2015 that included Mangrove Capital Partners. *outfittery.de*

Clue

BioWink GmbH, Adalbertstrasse 7-8, Berlin 10999

Clue is an app that enables the tracking of menstrual cycles. By inputting data relating to periods, symptoms, mood and sexual activity, *Clue* can predict a woman's next period and when she is most fertile. Founded by Copenhagen-born Ida Tin, it was the number-one app in 28 countries in Apple's Health & Fitness category in 2014. It has raised $3.3m. *helloclue.com*

EyeEm

Kohlfurter Strasse 41/43, Berlin 10999

Founded in 2010 – after CEO Florian Meissner was mugged for his camera equipment – this platform for smartphone photography has evolved into a global picture agency with ties to Mercedes-Benz, Getty Images and the Huffington Post. It claims 13m photographers in 150 countries, and raised $18m in April during a series B funding round. *eyeem.com*

Blacklane

Oranienstrasse 25, Berlin 10999

Named Germany's fastest growing tech startup by the European Tech5 Awards, this taxi app operates in more than 180 cities in 50 countries. Blacklane uses reverse Dutch auctions: a fixed ride fare for passengers is auctioned to the drivers, rising until the first driver agrees to buy it. Founded by Jens Wohltorf and Frank Steuer in 2011, it has raised $22.5 million. *blacklane.com*

Onefootball

Greifswalder Str. 212, Berlin 10405

Onefootball for iOS, Android and Windows provides live match updates from more than 100 leagues to more than 20 million users, making it the world's most popular soccer app. The startup has raised $20.1 million from Union Square Ventures and EarlyBird Venture Capital. It is currently working on projects with Microsoft and Twitter. *onefootball.com*

GoButler

Stralauer Allee 9, Berlin 10245

Need to book a flight? Snag a table at a restaurant? GoButler offers a free, 24/7 SMS-based assistant service. Co-founded by Navid Hadzaad, previously MD at Rocket Internet's ZipJet, GoButler was launched in February 2015. Three weeks later it was available in five countries and its assistants had processed more than 300,000 requests. *gobutlernow.com*

After a year of record-breaking exits in 2014, Tel Aviv is now betting on global successes

TEL AVIV

32°4′ N, 34°47′ E

Population
414,000

Size
52km²

Global Cities Index ranking 2015
60



Tel Aviv is where the money is. The startup nation became the exit nation in 2014, with Israeli tech sales and IPOs hitting $15 billion (£9.5bn) according to analysis by PriceWaterhouseCoopers. Expect 2015 to be another huge year, with $910 million raised in one January week alone and Outbrain and IronSource preparing IPOs. "What sets Israel and Tel Aviv apart is its openness," says Naomi Krieger Carmy, director of the British embassy's UK-Israel Tech Hub. "You can meet almost anyone, and everyone knows and talks to – and about – each other."

The next step, says Windward CEO Ami Daniel, is scaling up. "Entrepreneurs will focus not only on innovative technologies," he says, "but on building disruptive companies out of Israel."

By Oliver Franklin-Wallis

Consumer Physics

11 Galgalei Haplada Street, Herzliya 46773

Consumer Physics wants to build a molecular map of the world. Founded by Dror Sharon and Damian Goldring in 2011, it makes the $250 USB-sized SCiO molecular spectrometer that can identify the chemical make-up of objects. It raised $2.7m on Kickstarter, and says it will be ready to ship its first SCiO this autumn, with 1,000 developers signed up. *consumerphysics.com*

PlayBuzz

37 Menachem Begin Street, Tel Aviv 65220

PlayBuzz is an app and tool for creating listicles and personality quizzes. Founded in 2013 by Shaul Olmert – son of former Israeli prime minister Ehud Olmert – the company now claims 80 million unique users per month. In March 2015, it announced $16m in funding to expand, and has hired 60 staff. It has also opened an office in New York. *playbuzz.com*

StoreDot

16 Menachem Begin Street, Ramat Gan 5270003

Spun out of Tel Aviv University in 2012, StoreDot has developed a smartphone battery that can be charged in one minute. It has raised $42m in Series B funding from private investors to develop the battery, which uses bio-organic compounds to create ultra-fast charge storage. It is now working on partnering with smartphone makers and plans a 2016 launch. *store-dot.com*

Windward

2 Har Sinai Street, Tel Aviv 65816

Founded in 2010 by former Israeli Navy officers, Windward analyses commercial satellite feeds and maritime data to track the location and contents of every major seafaring vessel in the world. The company secured £7m in funding led by Horizon Ventures in April 2014. Its aim: real-time updates and insights for maritime markets and intelligence agencies. *windward.eu*

Moovit

3 Pinhas Sapir Street, Ness Ziona 74063

Moovit's transport app provides real-time public navigation on buses, trains and tubes. Using a combination of public-data feeds and feedback from users, it claims to provide travel times more accurately than its rivals. Founded in 2011, the company had 15 million users worldwide and, in January 2015, raised $50m from investors including Nokia Growth Partners and BMW. *moovitapp.com*

SimilarWeb

23 Menachem Begin Street, Tel Aviv 6618356

SimilarWeb is a tool that lets you analyse the performance of websites and apps. It provides traffic rankings and insights by analysing a pool of data from various sources. In November 2014, it raised $15 million in series D funding with plans to expand into app analytics and to open a New York office, having already expanded to London and Dubai. *similarweb.com*

Zebra Medical

32 Ben Gurion Street, Ramat Hasharon 4732116

Zebra Medical teaches computers to diagnose diseases. Founded in 2014 by Eyal Gura, Eyal Toledano and Elad Benjamin, the startup has partnered with Israeli imaging centres and universities worldwide to build a database of images. "We have millions of diagnosed MRIs, CT scans and X-Rays," says Gura. In April it secured $8m in funding led by Khosla Ventures. *zebra-med.com*

AppsFlyer

85 Medinat Hayehudim Street, Herzliya 4676672

More than 5,000 advertisers use AppsFlyer's analytics platform to measure campaigns and user acquisition on their smartphone apps – for example, tracking the impact of a Super Bowl ad on downloads in real time. Founded by Oren Kaniel and Reshef Mann in 2011, it tracked two billion app installs in 2014 and claims it is now found on nine out of ten smartphones. *appsflyer.com*

Adallom

1 HaBarzel Street, Herzliya 6971001

Adallom provides security to companies using software such as GoogleApps and Office365 by detecting potential security breaches in real time. Founded in 2012 by former members of the Israeli Intelligence Corps, it counts Netflix and Pixar as clients. Since appearing in last year's list it has raised a further $30m in series C funding, led by Rembrandt and HP Ventures. *adallom.com*

FeeX

22 Maskit Street, Herzliya, 46733

Calling itself "the Robin Hood of fees", FeeX identifies hidden charges in investment and retirement funds and suggests ways for users to save money. Founded in 2012 by Yoav Zurel, David Weisz and Waze co-founder Uri Levine, it claims to have saved $277m to date. In August 2014, it raised $6.5m in series B funding, with plans to expand further in the US. *feex.com*

Record funding and an expanding investment network are helping startups in the smoke to break into new sectors

LONDON



"London's tech sector is flourishing," said Mayor Boris Johnson at the launch of an £85 million London Co-Investment Fund in December 2014. The numbers back him up: startups in the capital secured a record £437 million in funding in Q1 2015, according to analysis by London & Partners, with total VC investment expected to surpass £1 billion this year. A vibrant cultural scene, international workforce and wide network of tech hubs and accelerators also help the UK's capital continue to attract young businesses. "What's so special about London's tech scene is that it's transforming other industries – finance, fashion, advertising," says Rohan Silva, David Cameron's former tech adviser. "It's a collision of fields and disciplines which isn't happening anywhere else."

By Oliver Franklin-Wallis

'In some of our restaurants we've increased their revenues by 30 per cent'

– Will Shu, Deliveroo

Deliveroo

76-78 Charlotte Street, London W1T 4QS

Deliveroo isn't just a food-delivery service. "We're also a logistics platform," says 36-year-old Will Shu, who co-founded the startup in 2013 with his childhood friend Greg Orlowski. It lets customers order food from local restaurants such as Gourmet Burger Kitchen, Nando's and Gaucho, not just takeaways like rivals Just Eat and Hungryhouse. Deliveroo drivers collect the food and deliver it "usually seven to eight minutes after it leaves the kitchen". "We provide them with a tablet and an android app," says Shu. Now in ten UK cities – as well as Dublin, Paris and Berlin – Deliveroo raised £16m in January and plans to expand into 30 cities and launch a consumer smartphone app this year. *deliveroo.co.uk*

51.5072° N
0.1275° W

Population
8.4 million

Size
1,738km²

Global Cities Index ranking 2015
2

Funding Circle

3 Dorset Rise, London EC4Y 8EN

Even in the buzzing peer-to-peer lending market, Funding Circle is making waves. The five-year-old company has overseen more than £600 million in loans from 40,000 investors to more than 8,000 UK businesses – £100 million in the first quarter of 2015 alone. In April, it closed a $150 million (£95m) round led by DST Global, and has set a target of $1 billion in loans in 2015. *fundingcircle.com*

WorldRemit

66 Hammersmith Road, London W14 8UD

The World Bank estimates that international money transfers will hit $646 billion in 2015. WorldRemit makes the process easier while charging lower commission than high-street banks. Founded in 2010 by former UN adviser Ismail Ahmed, it raised $100 million in February from Technology Crossover Ventures and Accel, with plans to expand into the US and worldwide. *worldremit.com*

Improbable

20 Farringdon Road, London EC1M 3HE

Improbable is taking the kind of distributed systems used in high-frequency trading and applying them to video games. Co-founded by Cambridge graduates Herman Narula and Rob Whitehead in 2012, the company recently announced $20 million in funding from Andreessen Horowitz. Its vision: create vast online games with thousands of players in persistent online worlds.* *improbable.io*



*DISCLAIMER: WIRED EDITOR DAVID ROWAN IS A PERSONAL INVESTOR IN IMPROBABLE AND KNYTTAN AND WAS NOT INVOLVED IN UK COMPANY SELECTION



Deliveroo co-founder and CEO Will Shu spends an hour delivering items on one of its branded bikes every week



Left-right: Hassle co-founders Jules Coleman, Tom Nimmo and Alex Depledge

Hassle

Westminster Business Square, Durham Street, London SE11 5JH

Co-founded in 2012 by Jules Coleman, Alex Depledge and Tom Nimmo, Hassle helps its customers find and book a pre-vetted home cleaner for £10 an hour. A graduate of TechStars London, the company secured $6m in funding from Accel partners in 2014, with plans to expand into providing services such as carers, tutors and personal trainers. *hassle.com*

Lyst

48 Hoxton Square, London N1 6PB

Lyst aggregates items from multiple luxury e-commerce sites into a personalised feed and universal shopping cart. The five-year-old company's sales have grown by 300 per cent every 12 months for the last three years. It secured $40m funding in April 2015. Its secret: using data scientists to comb 4.5 million data points per hour to better target individual users. *lyst.com*

Qubit

20 Broadwick Street, London W1F 8HT

Founded by ex-Googlers Graham Cooke, Emre Baran, Daniel Shellard and Ian McCaig, Qubit lets businesses create websites that optimise data-targeting and A/B testing. Clients so far include Topshop, Emirates and Thomas Cook. In September 2014, it raised $26 million led by Accel Ventures and Balderton Capital to expand in the US and Europe. *qubit.com*

Knyttan

Somerset House, The Strand, London WC2R 1LA

Knyttan helps its customers design and produce high-quality knitwear. Founded by RCA graduates Ben Alun-Jones, Kirsty Emery and Hal Watts in April 2013, its Somerset House factory knits its designs in a matter of hours before shipping. Knyttan has partnered with designers such as Nicolas Sassoon and Studio Moross. Next up, it aims to sell its API to retailers.* *knyttan.com*

Jukedeck

207 Old Street, London EC1V 9NR

Jukedeck uses AI to generate unique, copyright-free music for everything from YouTube videos to games and lifts. Founded by Cambridge graduates Ed Rex and Patrick Stobbs, it lets its clients pick a genre before software composes the piece. The company won both HRH The Duke of York's Pitch@Palace and Le Web in 2014, and raised £500,000 in seed funding. *jukedeck.com*

JustPark

53-79 Highgate Road, London NW5 1TL

JustPark is an Airbnb for parking spaces. Customers can rent out spots at their homes or businesses, which drivers can book using an app. In August 2014, it announced a partnership with BMW, whose cars – including MINIs and soon Rolls-Royces – will have a *JustPark* dashboard app built in. In January 2015, the startup raised £3.7m on Crowdcube. *justpark.com*

WE'RE ALSO WATCHING: CAMBRIDGE

Silicon Fen was producing world-class companies long before Tech City. It's now getting the attention, VC funding and success it deserves. OF-W

Darktrace

Founded in 2013 and backed by Autonomy's Mike Lynch, Darktrace tracks and counters cybersecurity threats. *darktrace.com*

Raspberry Pi

Sales of its mini-computer have passed 5m; this year the Pi 2 was unveiled. Next up: a push on computing education. *raspberrypi.org*

Neurence

Neurence's Sense platform lets devices respond to objects. It claims to be able to recognise thousands of items, from books to art. *neurence.com*

Kymab

Kymab has created a platform for developing human antibodies in mice. Clinical trials are expected in 2016. *kymab.com*

Featurespace

This Cambridge University AI spin-out provides behavioural analytics to predict user behaviour and detect fraud. *featurespace.co.uk*



A strong investment network is ensuring Turkey remains a talent hotbed

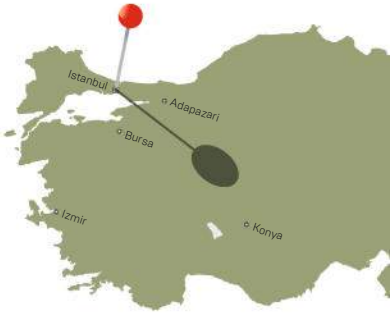
ISTANBUL

41º00'49" N, 28º57'18" E

Population
1.6 million

Size
5,343km²

Global Cities Index ranking 2015
29



VCs and angel activity in Istanbul are thriving, but the city remains relatively small on the European stage. To help fill the gap, Turkey's stock exchange launched its Private Market platform in 2014, aimed at securing finances for companies without their going public. Other obstacles remain, however, such as the capital's diminished quality of life due to high prices, congestion and political unrest. The city has lost some talent abroad as a result, and multinationals often relocate to Dubai. On the flip side, Turkey's huge market is attracting global players, with recent entries from Uber and Zomato. "Local entrepreneurs will need to think of strong defensive strategies, and have deeper war chests," predicts Earlybird partner Cem Sertoğlu.

By Liat Clark

Prisync

201/3 Rumelihisari Mah Bebek Yolu Sokak No:2/5, Sariyer, Istanbul

Prisync claims it provides the same level of competitor price-tracking that Amazon uses in its verticals – from electronics stores to horse-feed shops. Prisync now has 50 clients in 12 countries, and with €180,000 (£130,000) in seed funding from 2014 it plans to acquire "one client from every e-commerce market on Earth", explains co-founder Burc Tanir. *prisync.com*

BiTaksi

Kusbakisi Cd 7, Maden Is Merkezi Kat 2, Altunizade, Uskudar, Istanbul

Uber recently launched in Istanbul, but BiTaksi has 95 per cent of the local market, a strong supply of drivers and a 24/7 call centre. It has its eye on other cities of more than five million, where competitors haven't yet made an impact. "We plan to launch with local partners and a driver app taking into account local culture," says co-founder Turancan Salur. *bitaksi.com*

Parasüt

Tomtom Mahallesi Nuri Ziya Sokak No. 16, 1 Beyoglu, Istanbul

The Turkish economy is 99 per cent small businesses, amounting to 75 per cent of all employment. Yet these businesses are a third less productive as corporates. The problem? Finance admin. So in 2013, Sean Yu and his team founded Parasüt, a cloud platform for managing finances. In the past year they have secured $1.9m (£1.2m) in funding and gained 12,000 users. *parasut.com*

Scorp

4 Levent Sanayi Sitesi, Huzur Mh, Beyazıt Cd No 15, Istanbul

Video-messaging app *Scorp* launched in February 2015, before rivals Meerkat and Periscope. By the end of April, 500,000 15-second clips had been shared. The startup is the brainchild of Izzet Zakuto and Sercan Isik, helped by Koc University and $250,000 in seed money. Monetisation will come after its Android and web platforms have been developed. *scorpapp.com*

Düğün

Kuledibi Cikmazi 13 Galata, Beyoglu, Istanbul

Düğün's success has been a slow burn: launched in 2007, it didn't evolve into its present form until 2010. Along with planning tools, it connects couples with the wedding marketplace – suppliers pay a fee to be represented. It's now ready to compete internationally: in 2015, it launched in eight countries in the Middle East and doubled its revenue for the fifth year in a row. *dugun.com*

Volt

Ensiz Sokak, 8, K3, Asmalimescit, Beyoglu, Istanbul

Launched in September 2014, ride-sharing app *Volt* avoids legal issues by keeping costs up to 70 per cent cheaper than taxis, which makes the service technically non-commercial. Volt this year received a government grant to support R&D on its real-time route-matching algorithm and a second, simplified version of the app, ready for expansion in 2016. *thevoltapp.com*

Hazelcast

Mahir Iz Cad. No:35, Altunizade, Istanbul

Hazelcast is an in-memory data grid based on Java. In 2010, the company started to compete with the likes of Oracle by using an open-source model. $13.25m in funding later, the company claims $300,000 in monthly revenue and has offices in Ankara, London and Palo Alto. Co-founder Talip Ozturk says "e-commerce players will be very interested" in its new features. *hazelcast.com*

Ininal

Trump Towers, 5th Floor, Mecidiyekoy, Istanbul

In 2013, prepaid card provider Ininal leapt into a market where only half the population has bank accounts or debit cards. Its success reflected that gap, with users growing from 300,000 to one million within a year, and spending over $5m per month. A virtual version has been launched, along with developer tools that allow Ininal to be integrated into apps and sites. *ininal.com*

Modanisa

Halk Caddesi Sunar Is Merkezi 37 A Uskudar, Istanbul

Since being featured in last year's list, the Islamic fashion e-commerce platform has raised $5.5m from Saudi Telecom Ventures and Aslanoba Capital, and topped 220,000 daily visitors the following month. Modanisa recently hired a CMO from Proctor & Gamble to help with planned expansion in Europe and the Middle East. *modanisa.com*

Incir

Egitim Mahallesi, Sadikoglu Plaza 5 39, Kadiköy, Istanbul

Incir helps its customers set up an e-commerce platform, but takes care of the back end – from payment processing to the production of marketing materials. Although currently in stealth mode, the startup has attracted attention from VCs: it has an average reported revenue of $2m a month and 2,500 per cent growth from 2013 to 2014. *incir.com*

SPOT ILLUSTRATION: CHRISTIAN DELLAVEDOVA

WE'RE ALSO WATCHING: TALLINN

The Estonian capital continues to grow as a digital city, with its government hoping to welcome millions of "e-residents" in coming years. OF-W

Teleport

Teleport helps digital "nomads" find the best location to launch a new startup. It has $2.5m (£1.6m) in seed funding. *teleport.or*

fits.me

The virtual fitting-room software's e-commerce clients include Hugo Boss. In December 2014 it bought US rival Clothes Horse. *fits.me*

Testlio

Testlio provides on-demand quality-assurance testers for developers. It secured $1m in seed funding in January 2015. *testlio.com*

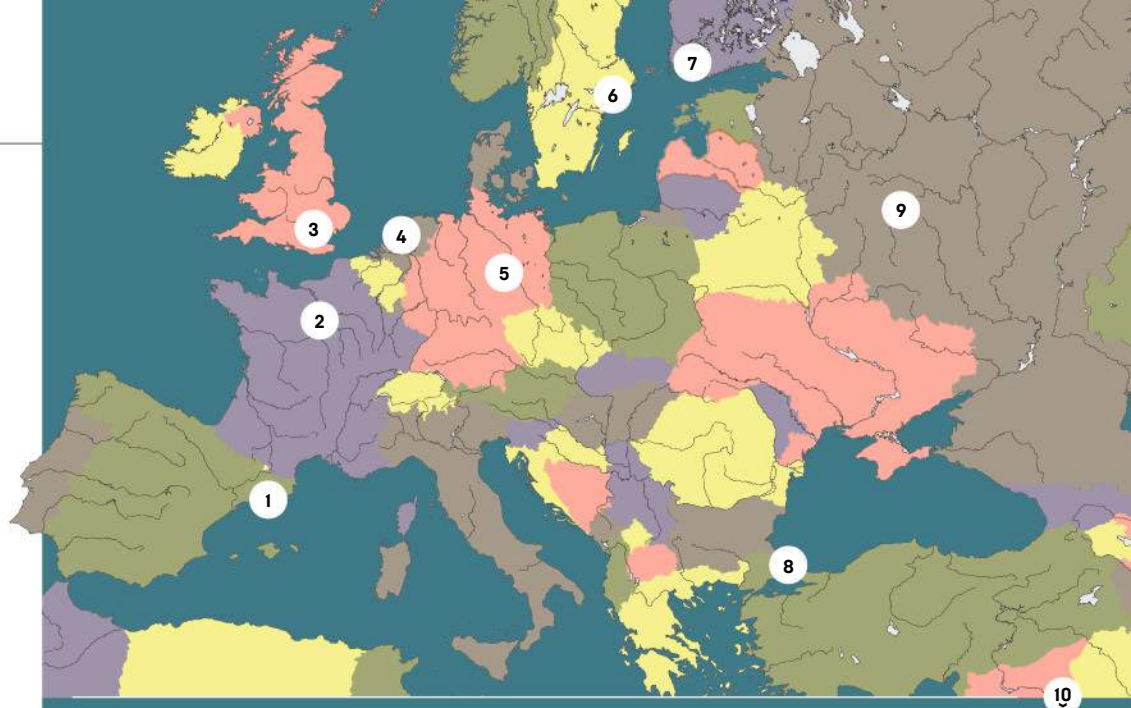
Bondora

Users of the P2P loan service have lent over €30m (£21m) since 2009. A February funding round raised €4.5m led by Valinor. *bondora.com*

Taxify

Taxify provides on-demand apps for licensed cabs. Already in four countries, it raised €1.4m in December 2014. *taxify.eu*





A BIG THANK YOU TO ALL THOSE WHO CONTRIBUTED THEIR EXPERTISE TO THIS YEAR'S SURVEY, INCLUDING:

1. BARCELONA
Michiel Kotting, Accel Partners // **Axel Serena,** angel // **Jesus Monleon Castello,** angel // **Oriol Juncosa,** angel **Harry Briggs,** Balderton Capital // **Albert Armengol,** seed investor // **Xavier Capellades,** Telefónica

2. PARIS
Roxanne Varza, Microsoft France // **Pascal Gauthier,** CRITEO // **Philippe Botteri,** Accel Partners // **Samantha Jerusalmy,** Elaia Partners // **Yann Lechelle,** SonetIN // **Cyril Bertrand,** Xange Private Equity // **Gilles Babinet,** CaptainDash // **Celine Lazorthes,** Leetchi // **Alice Zagury,** TheFamily // **Nicolas Dessaigne,** Algolia // **Jean-David Chamboredon,** ISAI // **Martin Mignot,** Index Ventures // **Liam Boogar,** Rude Baguette

3. LONDON
Taavet Hinrikus, TransferWise // **Emily Brooke,** Blaze // **Joanna Christie,** Lyst // **Tushar Agarwal,** Hubble // **Harry Briggs,** Balderton Capital // **Fred Destin,** Accel Partners // **Rohan Silva,** Second Home // **Bryce Keane,** 3 Beards/Albion Drive // **Sonali De Rycker,** Accel Partners // **Reshma Sohoni,** Seedcamp // **Azmat Yusuf,** Citymapper // **Hugh Campbell & Alexis Scorer,** GP Bullhound // **Marcus Kirby,** The Future Mapping Company

4. AMSTERDAM
Patrick De Zeeuw, Startupbootcamp // **Don Ritzen,** Rockstart // **Richard Gorodecky,** Amsterdam Worldwide // **Joost Holleman,** Prime Ventures // **Steven Schuurman,** Elastic // **Jake Noakes,** Jake Noakes Design // **Micha Hernandez van Leuffen,** Wercker

5. BERLIN
Sebastian Esser, Home Eat Home // **David Knight,** Silicon Allee // **Alexander Ljung,** SoundCloud // **Philipp Moehring,** AngelList // **Gabriel Matuschka,** Berlin Tech Meetup // **Philipp Hartmann,** Rheingau Founders // **Michael Treskow,** Accel Partners // **Niko Waesche,** Gfk // **Candy Behunin,** Startup Extreme // **Nikolaus Roettger,** WIRED Germany // **Aydogan Ali Schosswald,** hy!

6. STOCKHOLM
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7. HELSINKI
Riku Mäkëla, Slush // **Maria-Christina Tsitsopoulos,** UP Europe // **Jaakko Hynynen,** Startup Sauna // **Lena Pellilä,** EnterpriseHelsinki // **Dmitri Sarle,** ArcticStartup // **Micah Gland,** Helsinki Business Hub // **Petteri Koponen,** Lifeline Ventures

We discounted recommendations where the nominator has a vested interest, eg as an investor

8. ISTANBUL
Çigdem Toraman, Startupbootcamp // **Sia Houchangnia,** Seedcamp // **Bora Uygun,** angel // **Cem Sertoglu,** Earlybird Venture Capital // **Cankut Durgun,** Aslanoba Capital // **Dogan Taşkent,** Arkan & Ergin // **Cem Soysal,** Inventram // **Joachim Behrendt,** BIC // **Bora Yilmaz,** Revo Capital // **Ali Karabey,** 212 // **James Cameron,** Accel Partners // **Eran Filiba,** angel // **Burak Büyükdemir,** Startup Turkey

9. MOSCOW
Igor Ryabenkiy, AltaiR Capital // **Alexander Turkot,** Maxfield Capital // **Christoffer Norman,** Avito // **Galina Chifina,** ru-Net // **Konstantin Kardyshev,** Klever // **Edward Shenderovich,** Kite Ventures // **Liliana Pertenava,** Runa Capital // **Irina Goryacheva,** Almaz Capital

10. TEL AVIV
Ayelet Noff, Blonde 2.0 // **Raphael Ouzan,** Startup Nation Central // **Ran Natanzon,** Ministry of Foreign Affairs // **Naomi Krieger Karmy,** UK Israel Tech Hub // **Yoni Assia,** eToro // **Guy Bejerano,** SafeBreach // **Shaul Olmert,** PlayBuzz // **Assaf Rappaport, Roy Reznik & Ami Luttwak,** Adallom // **Michael Eisenberg,** Aleph Venture Capital // **Micha Kaufmann,** Fiverr // **Saul Klein,** Index Ventures // **Adam Fisher,** Bessemer Venture Partners // **Mor Assia,** iAngels

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recalibrating every business

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