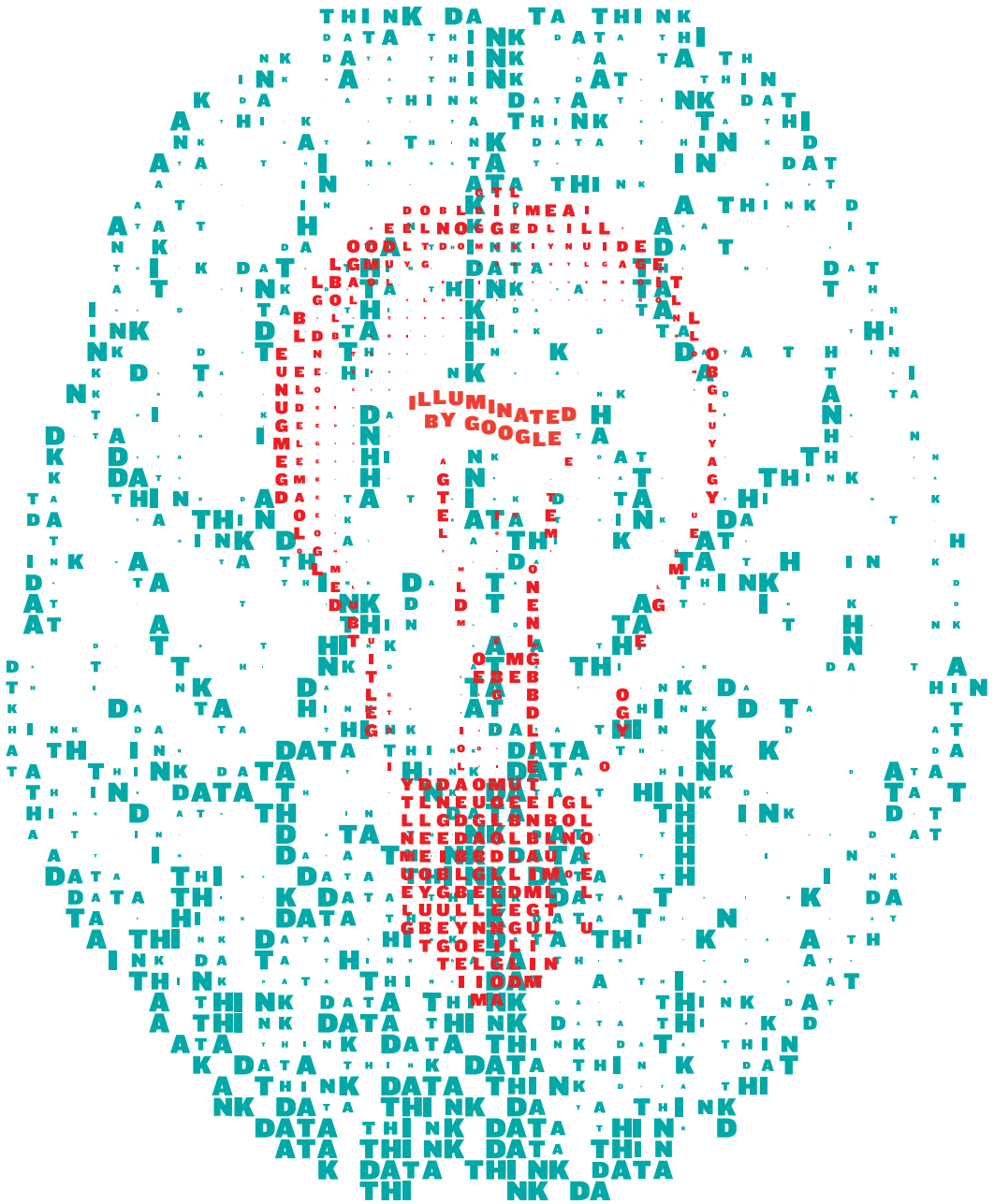
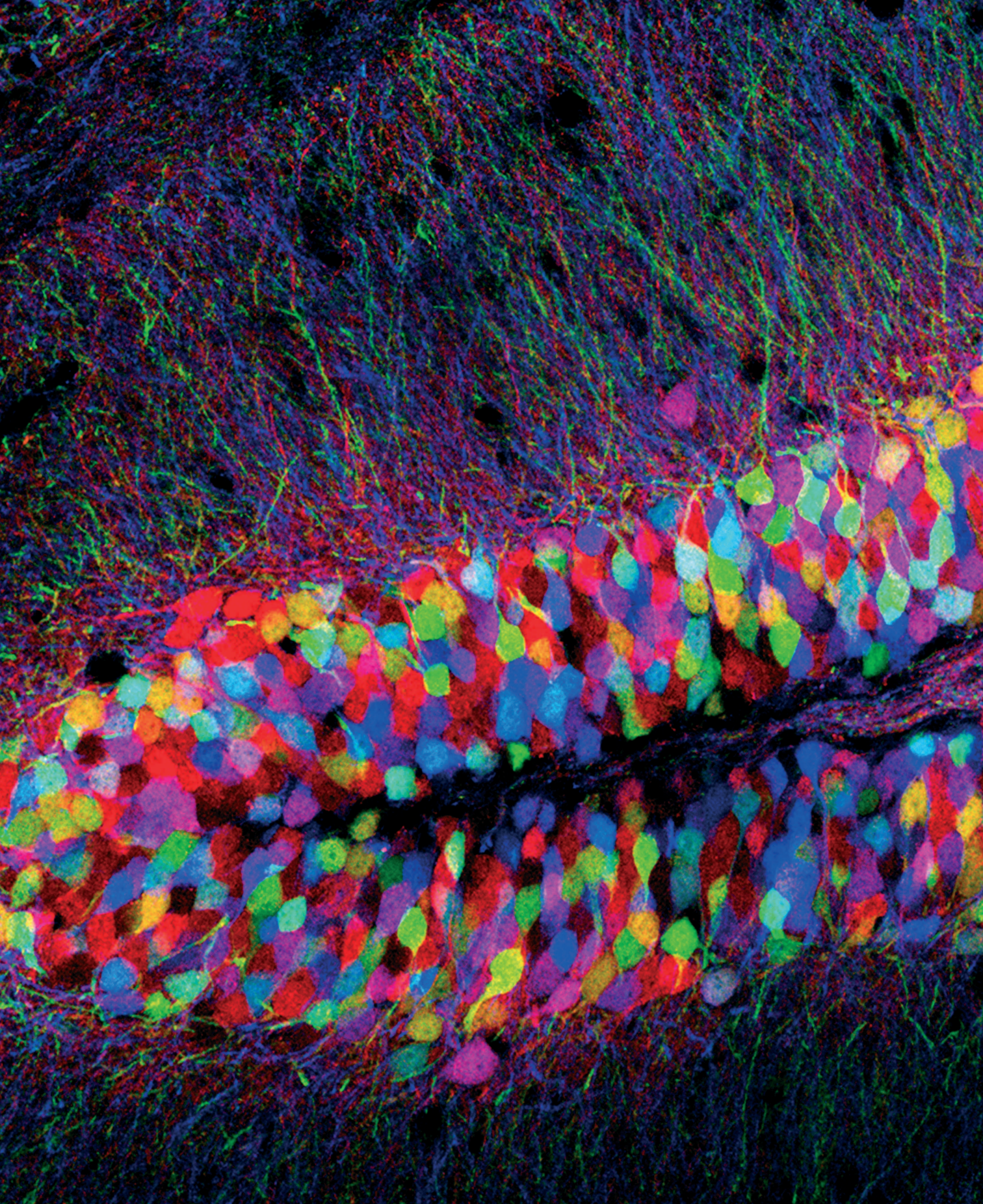
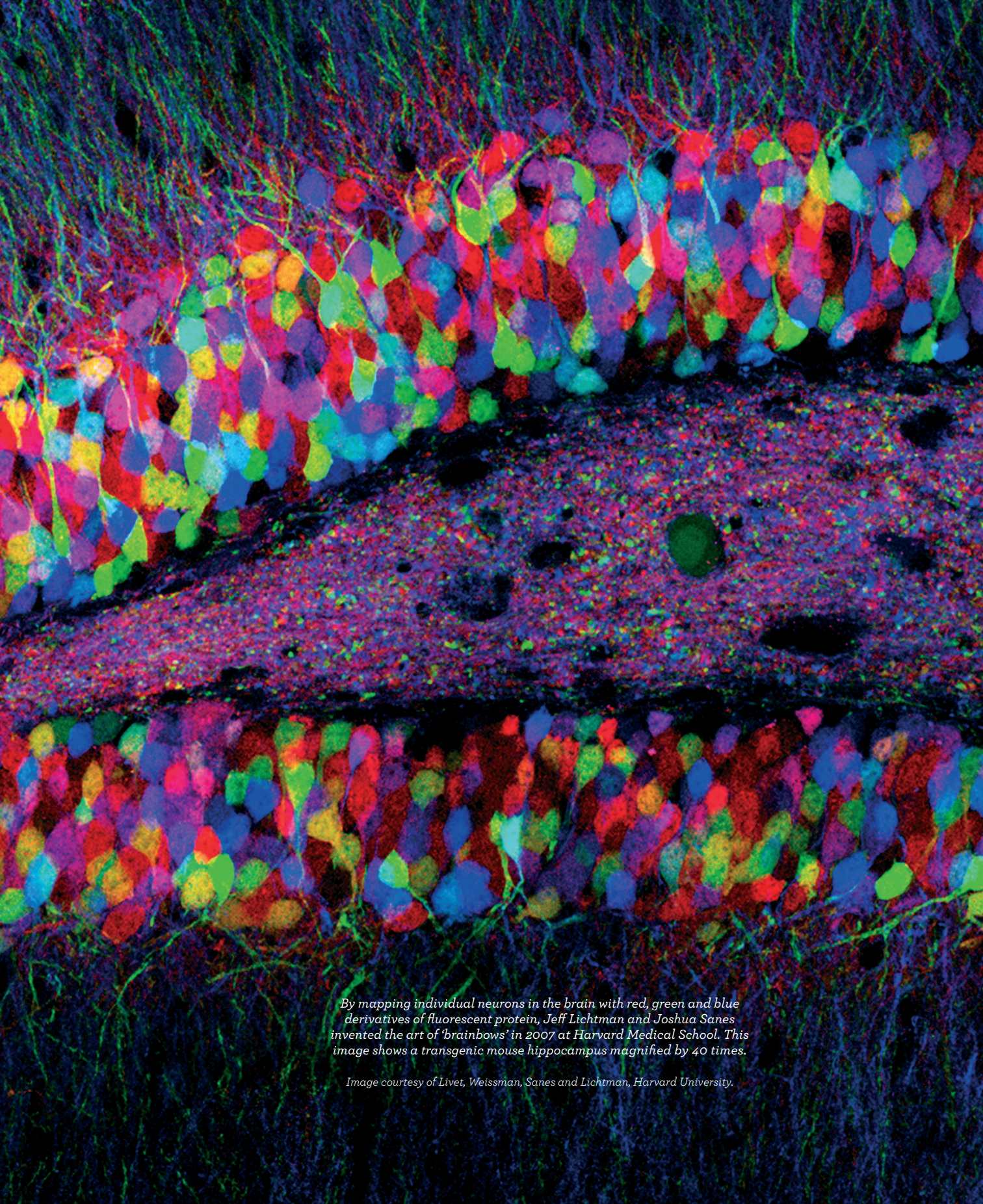


THINK QUARTERLY





By mapping individual neurons in the brain with red, green and blue derivatives of fluorescent protein, Jeff Lichtman and Joshua Sanes invented the art of 'brainbows' in 2007 at Harvard Medical School. This image shows a transgenic mouse hippocampus magnified by 40 times.

Image courtesy of Livet, Weissman, Sanes and Lichtman, Harvard University.

WELCOME TO

THINK QUARTERLY

THE DATA ISSUE

SPEED.

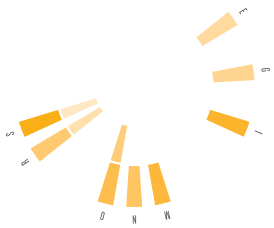
At Google, we often think that speed is the forgotten 'killer application' – the ingredient that can differentiate winners from the rest. We know that the faster we deliver results, the more useful people find our service.

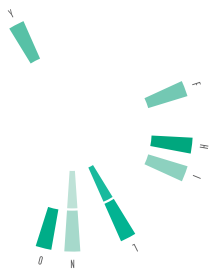
But in a world of accelerating change, we all need time to reflect. *Think Quarterly* is a breathing space in a busy world. It's a place to take time out and consider what's happening and why it matters.

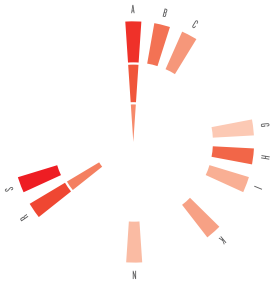
Our first issue is dedicated to Data – amongst a morass of information, how can you find the magic metrics that will help transform your business? We hope that you find inspiration, insights, and more, in *Think Quarterly*.

Matt Brittin

Managing Director, UK & Ireland Operations
Google







CONTRIBUTORS

Think Quarterly represents the imagination, insights and knowledge of a global community of contributors from journalists and academics to industry experts and Google insiders. They're united by a passion for cutting-edge ideas and seeking out the points of fundamental change in the new era of digital business.

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Ulrike Reinhard is the editor of *WE* magazine, a digital publication focussed on emergent net culture. With Peter Kruse, she co-founded the What's Next? Institute to research cultural value preferences and social megatrends. She interviews Hans Rosling on page 16; writes about the online video ad boom on page 34; and speaks to Peter Kruse about harnessing collective intelligence on page 50.

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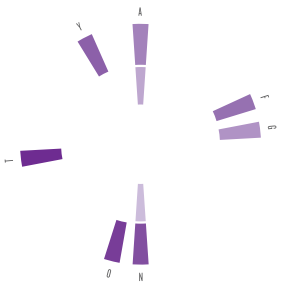

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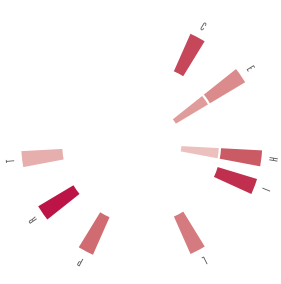

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Rich Pleeth spent three years working for a large FMCG before joining Google in 2010 as a Product Marketing Manager, with a particular focus on strategy and innovation. He lives in Fulham in south west London, but you'll most likely find him cycling around Richmond Park at the weekend. Rich is editor-at-large of the UK edition of *Think Quarterly*. He writes about Near Field Communication on page 56.

contact thinkquarterly@google.com

They're also really good. If you agree and you'd like to share them, just email us and ask.

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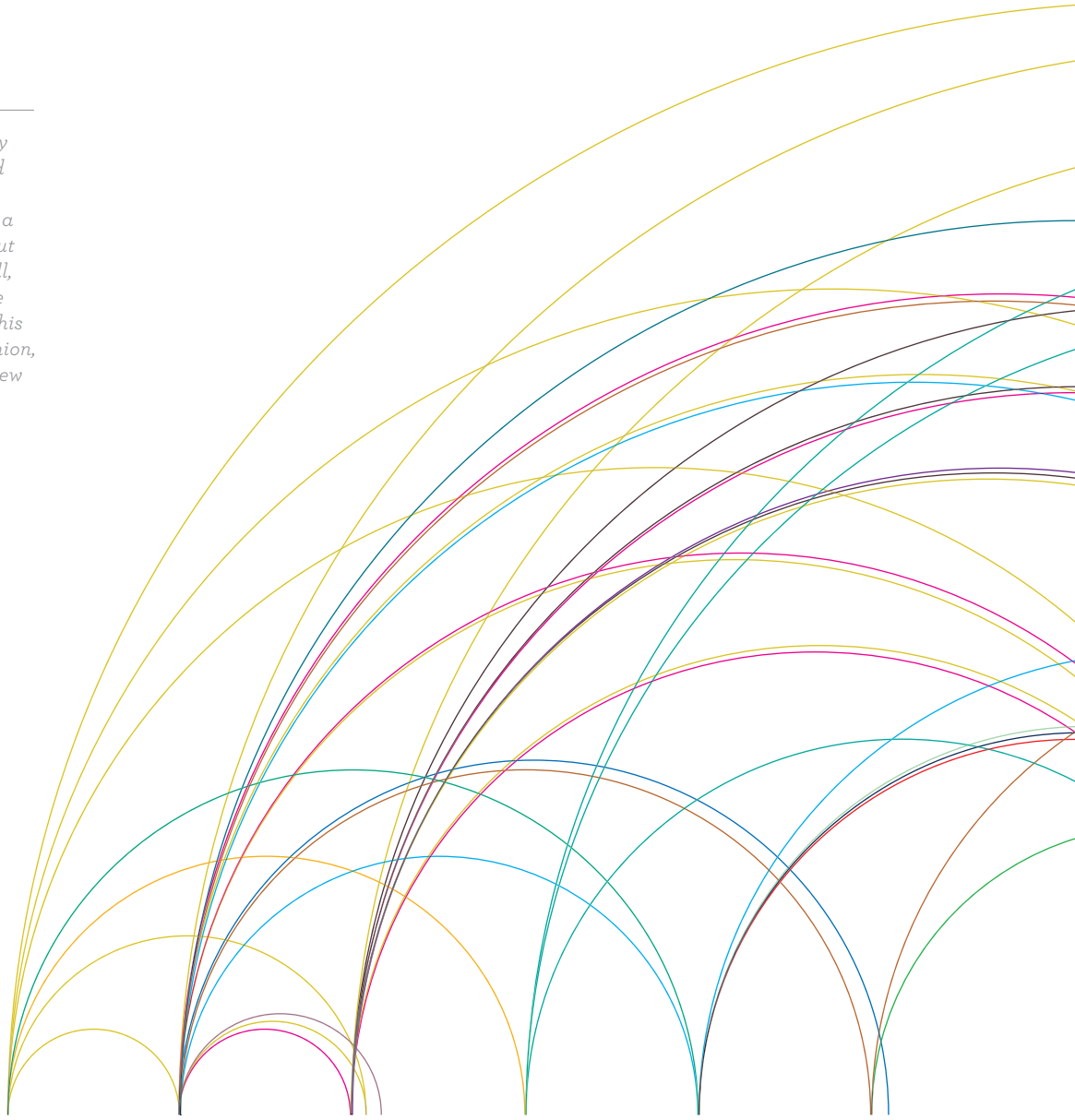
CONTENTS

Contents pages can be bossy – telling you where to go and what to do. But they can be useful, too. After all, what is a contents page but data about the book you're holding? Still, we thought we'd have a little fun with it. You can peruse this book in the usual linear fashion, but look a little closer and new data relationships emerge. Don't just read: explore.



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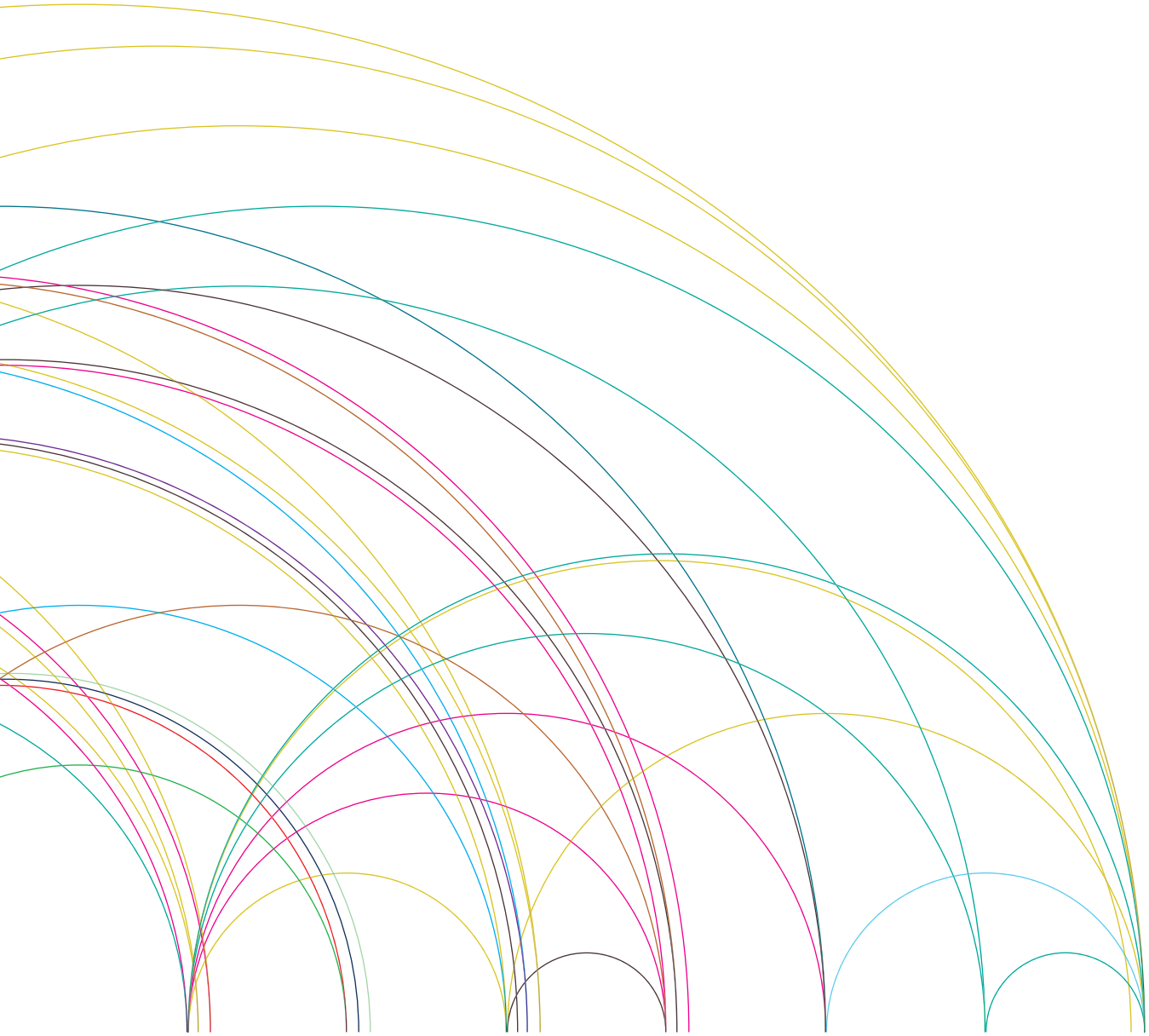

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EXECUTIVE INSIGHT

GUY LAURENCE, CEO OF VODAFONE UK, KNOWS A THING OR TWO ABOUT INFORMATION OVERLOAD. FEELING STRESSED OUT BY STATISTICS? HE HAS THE CURE FOR DATA IMPOTENCE.

WORDS BY **SIMON ROGERS**
PORTRAITS BY **SPENCER MURPHY**

A few seconds after midnight on New Year's Eve, 2010. Numbers start flying across a bank of screens in a large darkened room. London: 1,170,000; Glasgow: 115,000; Manchester: 75,000; Leeds: 70,000... The numbers scroll on as the black-clad tech team look for signs that the system might not be able to cope.

It could be a scene from futurist cult film *Minority Report*, but the room is actually a real one – at Vodafone's state-of-the-art Network Operations Centre in Newbury, Berkshire – and the figures represent the number of texts sent in the first 30 minutes of 2011. This is pure data in action.

The man responsible for this scene is obsessed with data – because of what the numbers can help him do, rather than with the ones and zeros themselves. "I don't have a relationship with numbers, I have a relationship with customers," says Guy Laurence, the 49-year-old who took over as CEO of Vodafone UK in 2009. "I focus totally on human responses to things; if you smack someone in the face, what would they do? If you kiss them on the cheek, what would they do?"

Laurence took over a company widely seen as stagnating in third place in the UK's competitive mobile market. Today, Vodafone is viewed as a powerful success story, with more than 19 million customers across the country. When you've got that many customers, the big question is: how do you industrialise something that works for each one? "You can always kiss one customer on the cheek – but how do you kiss 19 million customers on the cheek?" he asks.

Laurence carries only a few numbers in his head: his company's 'net promoter score' (which tells him exactly how well Vodafone is really doing with its customers) and the competition's market revenue share. "When you run a £5 billion company you can't avoid numbers – but if you start with numbers you'll never innovate," he says. "You have to take the action you think will work and the numbers follow."

Even when he's about to fly off with his family to live rough in the Masai Mara for a week, for Laurence, it's all about focus. He left school with one grade E A-level, having fluffed his exams by setting up a candle-making business after he realised that "making money was much more fun". It's a pattern repeated when he quit his degree to work for independent music publisher Chrysalis. Eventually he became head of distribution and marketing outside America at MGM. His job was to work out which markets a product would work in.

He will tell you, for instance, that a baseball movie will only work outside the US if it's shown in Japan. He worked on the Bond films, including *GoldenEye*, selling them to reluctant cinema owners who hadn't screened anything from the franchise in six years. "The last film had been [classified as] a 15. Therefore anyone under 21 had never seen a Bond film in a cinema." So MGM made it cool – selling the film to teenagers, dads and mums simultaneously with targeted campaigns that fuelled interest.

As Laurence explains, it's all about making the data work. "I triangulate an objective assessment of the new technologies coming in, a subjective assessment of the public's reaction to new propositions, and then I take a punt." This 'triangulation' is the combination of hardheaded data analysis, coupled with business nous. Data is something that informs his hunches – but never rules them.

Setting up the £5 million Network Operations Centre (NOC) in Newbury was the first expression of this approach at Vodafone. "It's very difficult to touch and feel a network," he says, "but at the NOC we absolutely live and breathe data in real time." Managing 90 million calls and 80 million texts on an average day is a tricky business; a typical 24 hours sees Vodafone carry 45 terabytes of data, equivalent to 11.25 million music tracks.

Vodafone's approach is to use data to manage demand before things happen. The company's plans for the Royal wedding in April include adding extra temporary base stations to cope with heavy network usage. When Take That tickets went on sale just before Christmas and the band's official website crashed due to demand, Vodafone was prepared for the surge of fans texting one another to check whether they'd got their tickets.

One of the walls at Vodafone's operations centre shows connections to 217 countries to monitor how much traffic is coming in from abroad in real time. The data shows that different cultures are 'asymmetric', says Laurence. "You can see Polish mothers are texting their sons over here to see if they're okay, but the sons are not texting back," he says. "But the French are almost symmetrical – so as the texts go out, the replies come back in. As situations unfold in real time in Egypt or Bahrain we can see how that affects the network, too."

Even a bill being sent by email triggers a whole chain of data events: customer gets bill, most open it; some have a query and call the centre. Forty thousand bills go out an hour but if the centre gets hit with too many queries, billings are dialled down to reduce calls in. It's about fighting the data overload.

And we are truly overloaded by data. Governments around the world are unleashing a tsunami of numbers on their citizens. That has huge implications for big businesses with lucrative government contracts. In the UK, the government recently published every item of public spending over £25,000. Search the database for 'Vodafone' and you get 2,448 individual transactions covering millions of pounds. Information that companies once believed was commercially confidential is now routinely published – or leaked to websites like Wikileaks.

Laurence says he is 'relaxed' about increased demands for transparency. "Companies will become more transparent as a necessity – customers now see that as an essential part of the trust equation." The bigger impact may come from the technology that is making access to this data a mobile phenomenon. "This industry is de-linking access to data from physical location," he says. In a world where shoppers can check out the competition's prices while they're in your store, keeping control of data is no longer an option.

But for now, managing the information out there is the priority. Access to information was once the big problem, says Laurence. Then it quickly flipped, through technology, to data overload. "We were brought up to believe more data was good, and that's no longer true," he argues.

Laurence refuses to read reports from his product managers with more than five of the vital key performance indicators on them. "The amount of data is obscene. The managers that are going to be successful are going to be the ones who are prepared to take a knife to the amount of data... Otherwise, it's like a virus.

"Where did it all go wrong?" he continues. "My kids weren't taught that huge volumes of data were great. Was there a university professor who stood up and said, 'If you have over 100 indicators you're a good boy'? Because whoever that professor is, we need to shoot him."

Laurence has just won a wager with his team over the number of Vodafone VIP members who bought tickets for concerts. His team, based on the data, bet on one number. Their boss, based on what he knows about people, thought it would be higher. Data plus hunch equals a powerful combination. Or, as Laurence concludes: "Data on its own is impotent."

“WE WERE BROUGHT UP TO BELIEVE MORE DATA WAS GOOD, AND THAT’S NO LONGER TRUE.”

GUY LAURENCE

UNVITAL STATISTICS

WHAT IS YOUR EARLIEST MEMORY?

Pouring Corn Flakes into a bowl at the age of four without asking permission from my mum.

WHAT'S YOUR SIGNATURE DISH?

Given my cooking abilities, signing the bill in a restaurant.

IF YOU HAD TO STAY IN ONE PLACE, WHERE WOULD IT BE?

The Colombe d'Or restaurant in Saint-Paul de Vence, France.

WHEN WAS YOUR LAST MOMENT OF CLARITY?

The last time I spent time with a customer. Fortunately, that's quite often.

WHAT DOES SUCCESS LOOK LIKE TO YOU?

Spending an hour on it, and not being able to improve it.

WHAT IS YOUR BIGGEST FAILURE?

I agreed with myself that I would get fit as soon as things calmed down at work. We had the conversation in 1982 and I'm no further forward.

WHEN DID YOU LAST LET YOURSELF GO?

Creatively, whenever I can; financially, never; mischievously, every day.

WHAT DO YOU WANT THAT YOU CAN'T HAVE?

A teleporter.

WHEN DID YOU LAST FEEL ASHAMED?

I tried to do my 15-year-old daughter's chemistry homework and failed.

WHAT ARE YOU SEARCHING FOR?

My iPod. One of the kids has borrowed it.

WHEN WERE YOU LAST SURPRISED?

Last week. A customer sent me some cookies to say thank you for showing them around our Network Operations Centre. If everything goes wrong in my current career I might become a tour guide.

WHAT IS YOUR GREATEST EXTRAVAGANCE?

Quality wine. I don't play golf, go to the pub, stay out late with the lads or go to casinos, so the deal with my wife is that she doesn't ask how much the wine costs.

WHAT DO YOU SEE IN THE MIRROR?

Pierce Brosnan on a good day, Jeremy Clarkson on a normal day and Quasimodo on a bad day.

HOW MUCH IS ENOUGH?

I don't know yet, but I promise to tell you when/if it happens.

WHO IS YOUR INSPIRATION?

Anita Roddick from The Body Shop. RIP.

WHAT WAS YOUR GREATEST MISTAKE?

Not taking enough risks.

WHAT GETS YOU OUT OF BED IN THE MORNING?

An alarm clock and the fear of being in the house when the kids wake up if they went to bed late the night before.

WHICH PIECE OF MUSIC ALTERS YOUR STATE OF MIND?

In a positive sense – Lady Gaga at 7am on the M4. In a negative sense – Wagner at any time on any motorway.

WHAT DO YOU WANT TO BE WHEN YOU'RE OLDER?

About 10kg lighter.

TELL US A JOKE...

I like simplicity in life. I heard this urban myth a long time ago and it stayed with me. When NASA first started sending astronauts into space, they quickly discovered that ballpoint pens wouldn't work in zero gravity. To combat the problem, NASA scientists spent a decade and $12 billion developing a pen that writes in zero gravity, upside down, underwater, on any surface and at temperatures ranging from below freezing to 300°C. The Russians used a pencil

DATA STATE OF MIND

INTERVIEW BY **ULRIKE REINHARD**
PORTRAIT BY **ERIKA SVENSSON**
INFOGRAPHICS BY **MORITZ STEFANER**

DATA SUPERSTAR HANS ROSLING EXPLAINS WHY A FACT-BASED WORLDVIEW WILL TRANSFORM YOUR BUSINESS.

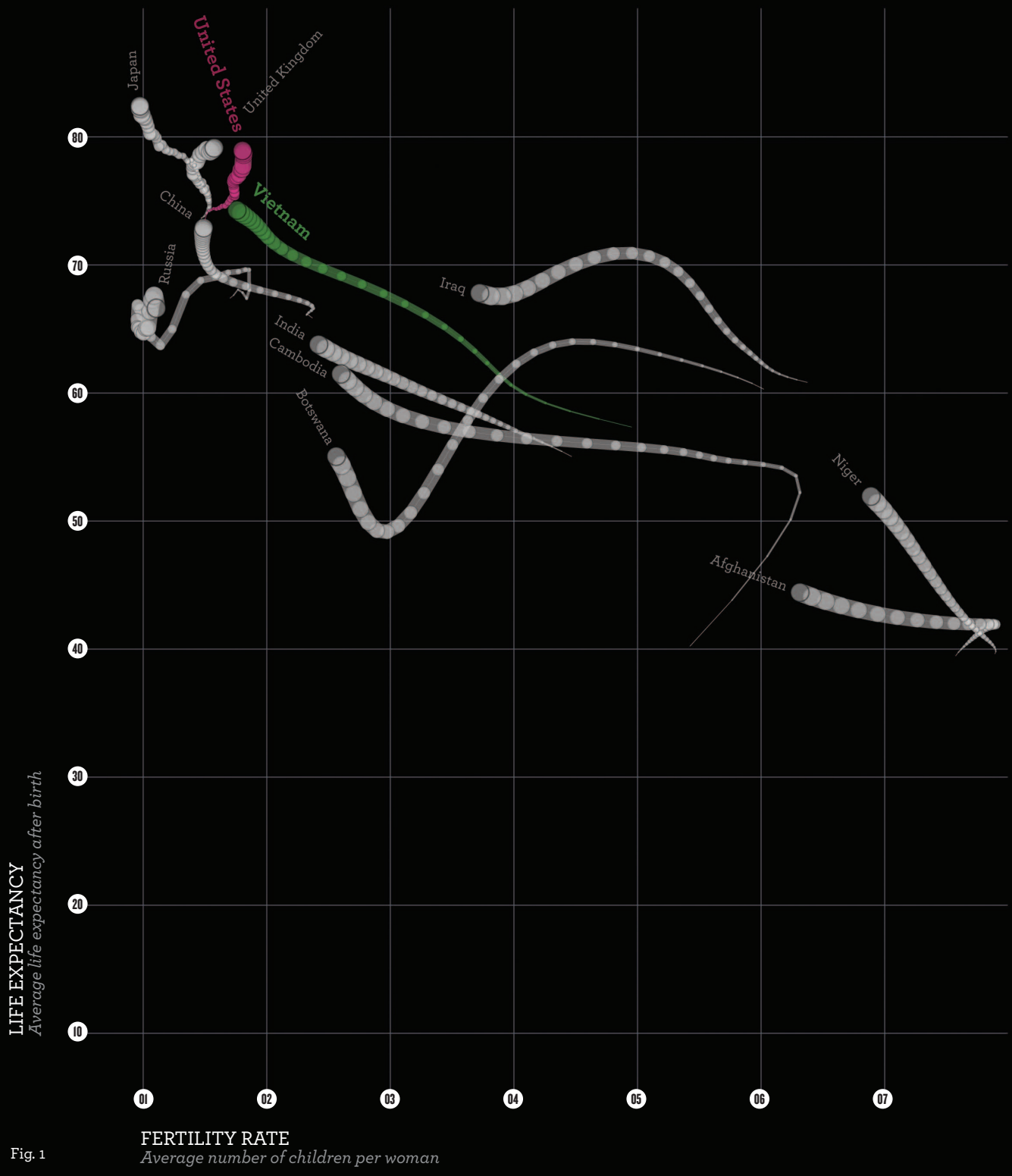

LIFE EXPECTANCY
Average life expectancy after birth
80
70
60
50
40
30
20
10
Japan
United States
United Kingdom
China
Vietnam
Russia
Iraq
India
Cambodia
Botswana
Niger
Afghanistan
01
02
03
04
05
06
07
FERTILITY RATE
Average number of children per woman

Fig. 1

How did a public health official from Sweden become the world's most famous statistician, a television personality and a regular guest speaker at corporate events?

As an undergraduate, Hans Rosling studied statistics and medicine at Uppsala University, Sweden. He earned a PhD, spent two decades studying in Africa and, as chairman of the Karolinska International Research and Training Committee, has collaborated with universities in Asia, Africa, the Middle East and Latin America.

Throughout his career, Rosling has maintained a fact-based worldview – an understanding of how global health trends act as a signifier for economic development based on hard data. Today, he argues, countries and corporations alike need to adopt that same data-driven understanding of the world if they are to make sense of the changes we are experiencing in this new century, and the opportunities and challenges that lie ahead.

Alongside his son Ola and daughter-in-law Anna, Rosling created the Gapminder Foundation to facilitate that process. Using Trendalyzer (a bespoke software tool later sold to Google), the Roslings have reinterpreted static health data as moving, interactive graphics. The results are revelatory, bringing a new awareness of the social and economic history of global health, and demonstrating that creative applications of data can yield extraordinary results.

THINK QUARTERLY You've long been a proponent of hard data and statistics. In what sense do CEOs need to change their mindset in order to develop a more fact-based view of the world?

HANS ROSLING My basic idea is that the world has changed so much, what people need isn't more data but a new mindset. They need a new storage system that can handle this new information. But what I have found over the years is that the CEOs of the biggest companies are actually those that already have the most fact-based worldview, more so than in media, academia or politics. Those CEOs that haven't grasped the reality of the world have already failed in business. If they don't understand what is happening in terms of potential new markets in the Middle East, Africa and so on, they are out. So the bigger and more international the organisation, the more fact-based the CEO's worldview is likely to be. The problem is that they are slow in getting their organisation to follow.

"MY BASIC IDEA IS THAT THE WORLD HAS CHANGED SO MUCH, WHAT PEOPLE NEED ISN'T MORE DATA BUT A NEW MINDSET."

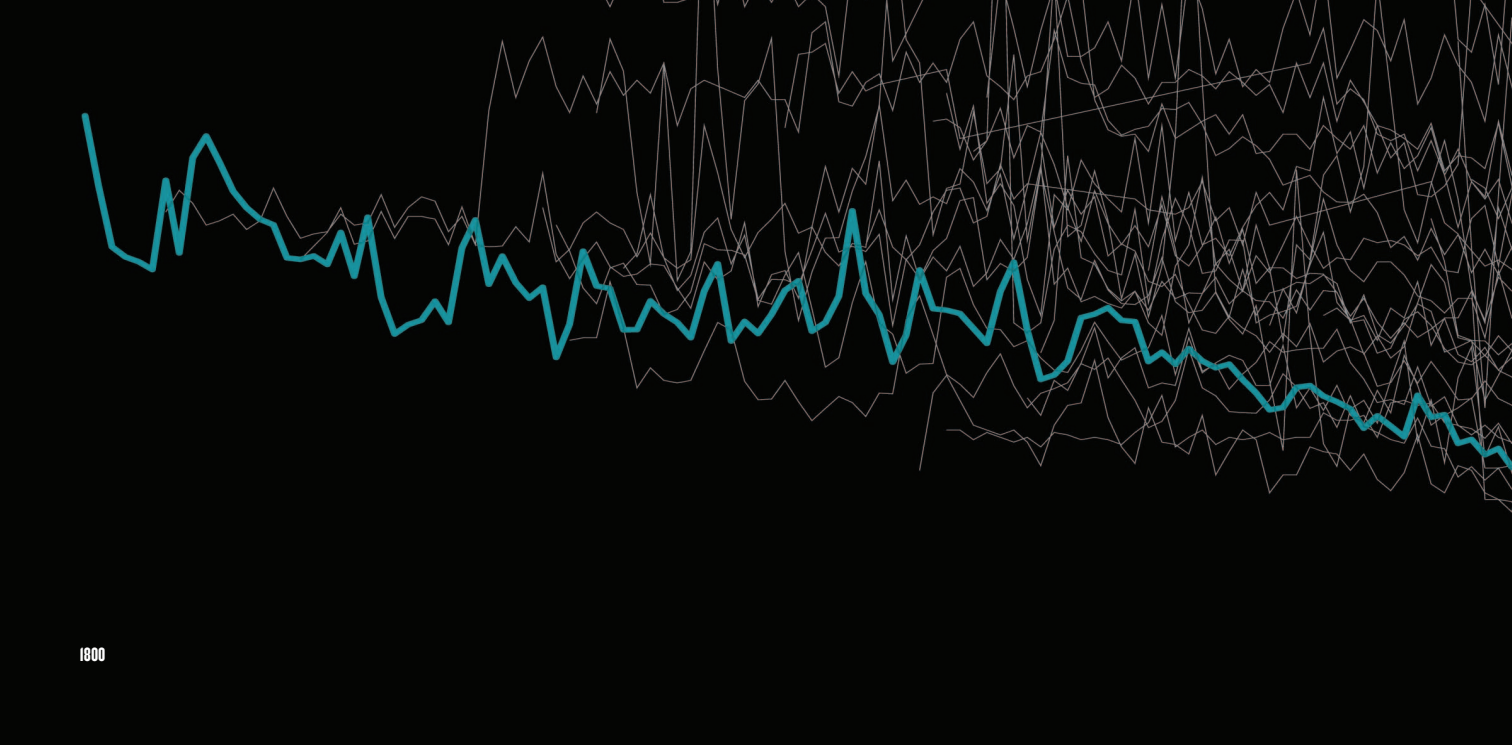
TQ Why is this?

ROSLING Companies as a whole are stuck in the rut of an old mindset. They think in outworn categories and follow habits and assumptions that are not, or only rarely, based on fact. They need to break out of that to understand the world the way it really is. For instance, in terms of education levels, we no longer live in a world that is divided into the West and the rest; our world today stretches from Canada to Yemen with all the other countries somewhere in between. There's a broad spectrum of levels and we have to realise that Asia, Brazil, Latin America and, to some extent, the Middle East are catching up with the countries we used to call the 'West'.

But even when people act within a fact-based worldview, they are used to talking with sterile figures. They are used to standing on a podium, clicking through slide shows in PowerPoint rather than interacting with their presentation. The problem is that companies have a strict separation between their IT department, where datasets are produced, and the design department, so hardly any presenters are proficient in both. Yet this is what we need. Getting people used to talking with animated data is, to my mind, a literacy project.

TQ What kind of data should we be looking at to gain this new mindset?

ROSLING What's important today is not just financial data but child mortality rates, the number of children per women, education levels, etc. In the world today, it's not money that drags people into modern times, it's people that drag money into modern times. I can demonstrate human resources successes in Asia through health being improved, family size decreasing ›



and then education levels increasing. That makes sense: when more children survive, parents accept that there is less need for multiple births, and they can afford to put their children through school. So Pfizer have moved their research and development of drugs to Asia, where there are brilliant young people who are amazing at developing drugs. It's realising this kind of change that's important.

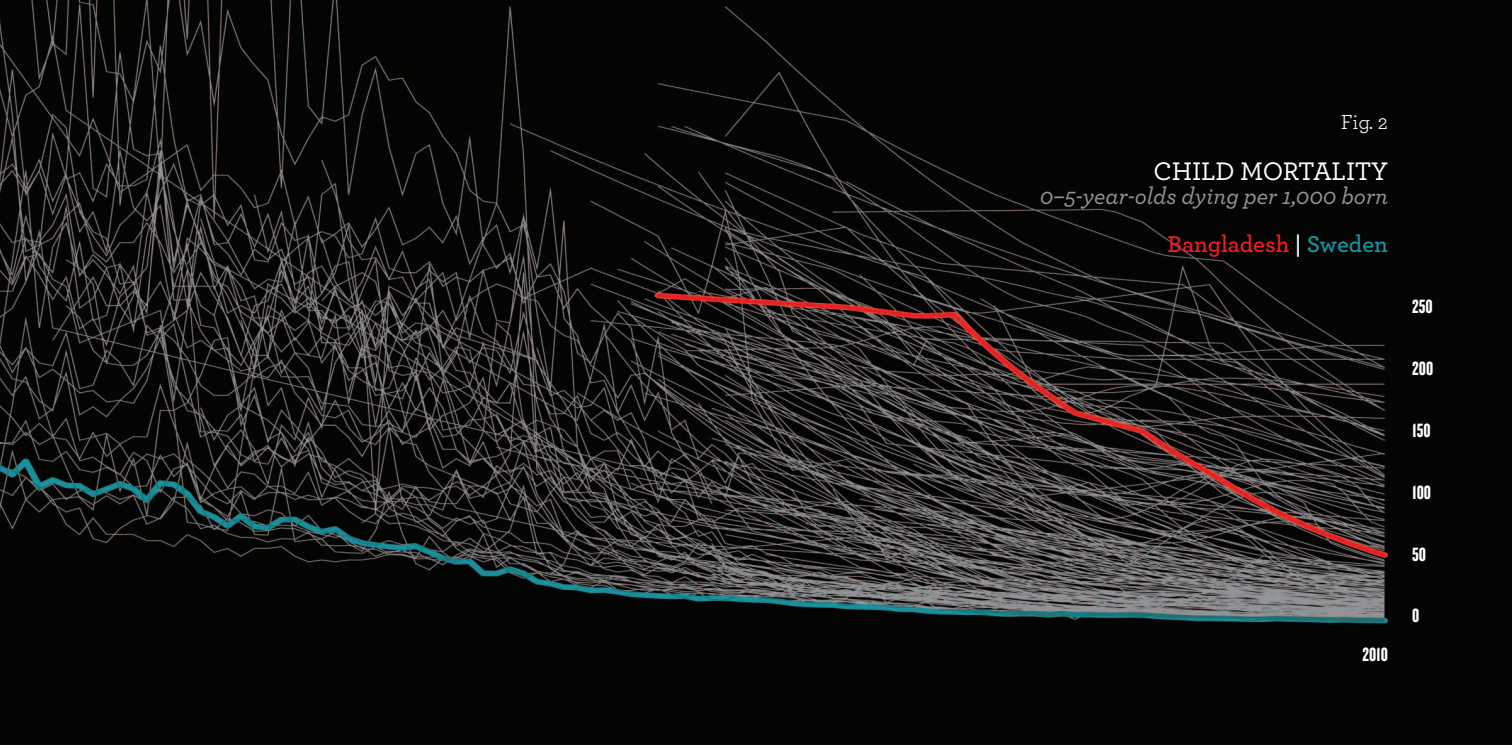
That's why CEOs ask me to talk to their staff – so they can learn to look at these interactive videos and gain this new mindset. Then they'll realise what has changed. In my first TED talk in 2006, I made Al Gore get up on stage. I showed that in Vietnam today they have the same average family size as the US, and the same health as the US in 1980 [see Fig. 1], and their economy is growing faster than the US. Al Gore told me, "I didn't have the slightest idea." The problem isn't that specialised companies lack the data they need, it's that they don't go and look for it, they don't understand how to handle it.

TQ How has Gapminder managed to present data in such a way that you're able to change people's preconceptions?

ROSLING We found that the most important thing when presenting our data [on graphs such as the Health and Wealth of Nations, which tracks 200 years of global life expectancy versus income per person in a four-and-a-half-minute video] was not to put time on the X-axis. We made time move, and when you see the movement, the data becomes like a football match – you can see who is catching up or, for instance, that a country like Bangladesh is reducing its child mortality rate faster than Sweden ever did [see Fig. 2].

Bangladesh is still at a low level economically, but at the same time there is a huge internal market with cheap distribution and only one language. So if you are a company with ambition, you have to be in Bangladesh. It's one of the 10 biggest countries in the world, but people's mindset leads them to believe that Bangladesh is a hopeless place in need of aid. What is so strong with animation is that it provides that mindset shift in market segmentation. We can see where there are highly developed countries with a good economy and a healthy and well-educated staff.

TQ Are there any points of resistance



to this process of shifting people's mindsets?

ROSLING At the moment, I'm quarrelling with Sweden's Minister of Foreign Affairs. He says that the West has to make sure its lead over the rest of the world doesn't erode. This is a completely wrong attitude. Western Europe and other high-income countries have to integrate themselves into the world in the same way big companies are doing. They have to look at the advantages, resources and markets that exist in different places around the world.

And some organisations aren't willing to share their data, even though it would be a win-win situation for everybody and we would do much better in tackling the problems we need to tackle. Last April, the World Bank caved in and finally embraced an open data policy, but the OECD uses tax money to compile data and then sells it in a monopolistic way. The Chinese Statistical Bureau provides data more easily than the OECD. The richest countries in the world don't have the vision to change.

I call this the 'database hugging disorder'. To heal it, we have to instil a clear division of labour between those who provide the datasets – like the World Bank, the World Health Organisation or companies themselves – those who provide new technologies to access or process them, like Google or Microsoft, and those who 'play' with them and give data meaning. It's like a great concert: you need a Mozart or a Chopin to write wonderful music, then you need the instruments and finally the musicians.

"THE PROBLEM ISN'T THAT SPECIALISED COMPANIES LACK THE DATA THEY NEED, IT'S THAT THEY DON'T GO AND LOOK FOR IT, THEY DON'T UNDERSTAND HOW TO HANDLE IT."

Meteorologists are one group that has a ready grasp of this idea. They receive a huge amount of data, which they process in a highly sophisticated way, translating it into stunning graphics – and there they are on prime-time TV presenting the weather while we all watch. This is exactly what we strive to emulate. We want our economic indicators, our social indicators and our environmental indicators to be communicated on prime-time television with the same level of efficiency.

This is what we're trying to do at the Gapminder Foundation – and this is what CEOs want their employees to do – play with data and give it meaning

GAPMINDER.ORG


GREEN
PRIME OPPORTUNITY
ETHICAL

WORDS BY **SARAH BRACKING**
ILLUSTRATIONS BY **MATT TAYLOR**

DATA FOR CHANGE

CAN YOU DO BUSINESS WHILE DOING GOOD IN THE DEVELOPING WORLD? THE ANSWER IS YES, BUT ONLY IF YOU FOCUS ON THE DATA THAT MATTERS.

Investing in the developing world is back at the top of the business agenda. And it's about time, too. Emerging markets, including the burgeoning opportunities presented by some African states, are fuelling an upsurge in interest from the private sector. For example, in 2009, Angola registered a 109 per cent rise in foreign direct investment (FDI) as a percentage of gross fixed capital formation. As a whole in 2010, developing and transition economies attracted half of global FDI inflows, 'leading the FDI recovery' according to the United Nations Conference on Trade and Development (UNCTAD). Opportunities like this are not only manifold and potentially lucrative; when carried out responsibly they can also act as a catalyst for transformation. Socially responsible investments won't just lead to private gain – they have the potential to shape the world.

But the power to effect change is a double-edged sword; poor investments, irresponsibly made, will have just as wide an impact – only this time it won't be for the greater good. When the ripples of investment seep beyond private borders, questions of risk and the potential for loss or gain become a global affair. Lives, not just bottom lines, are potentially at stake.

The historical challenge of investing in poorer parts of the globe was magnified by widespread decolonisation in the 1960s and '70s. In Africa, expropriation of foreign-owned enterprises forced businesses to rethink whether it was necessary to own rather than maintain secure access to local assets. Over the next 40 years, companies lengthened their supply and subcontracting chains, and generated new types of relationships, from parallel investing with publicly funded Development Finance Institutions (DFIs), to using state-backed export credits, and developing other risk-sharing relationships such as leasing, forward-contracting and investment agreements.

However, the instinct that having a stake in a derivative income stream from an asset in the developing world is safer than an ownership stake in the actual fixed asset had to be reassessed after the global financial crash of 2007-8, since so much derivative stock was proved worthless or degraded. At the same time, such arms length contact with developing countries has often proved of little use to the countries themselves, sometimes provoking a backlash against offshore equity, as happened in Buenos Aires, which banned all investments from shell companies held in tax havens in 2005.

So how does one go about making sound *and* socially responsible investments in this new era? By focusing on the facts.

The poorest countries often present the most challenges to today's global investor, not least because future risk is highly context-specific. Assessing diverse and fluctuating contexts is generating ever-greater complexities of data, and bringing the worlds of business and academia – particularly political scientists and international development experts – closer together. Digesting that data, however, is another story entirely.

Business data, economic, social and governance indices, corporate social responsibility measures and development impact data are combining into effective predictive instruments. But hazards remain, not least in the level of mathematical complexity generated. Is the world really this complicated, or is the data industry out of control, feigning precise forecasting but exhibiting no greater reliability than gut instinct?

The only way through this statistical blizzard is to look at the figures, one dataset at a time.

POLITICAL RISK

Can it be measured?

There was a brief period in the 1950s when the boundaries of the Cold War defined a space that Western governments were prepared to protect for business. But that world is gone. In its place is a complex political geography where the apparent stability of a country can change quickly, as has been the case in Tunisia or Egypt. Conversely, countries widely considered dangerous, such as the eastern Congo, Angola, Myanmar/Burma, or Sudan, are proving profitable for business – as Chinese and Indian corporations have discovered, leaving the rest of the world trailing behind.

Faced with this unpredictable landscape, how does one spot a sound investment amongst those riddled with risk? The most common indices for investment risk are the International Country Risk Guide from the New York-based PRS Group; ratings from the Economist Intelligence Unit, and from Eurasia Group; alongside the more traditional Standard & Poor's, Dun & Bradstreet and payments data from the Bank of International Settlements.

These indices focus on two aspects of political risk: regime (in)stability and the (un) certainty of the macro policy environment. But these indicators struggle to keep pace with nebulous political identities and regime characteristics. The predicted 'top 10 most dangerous countries' at the beginning of a decade are rarely the same 10 that actually collapse by its end. Evidence of political stability on its own is not enough: while authoritarian regimes can prove safe places for investment for a time, sometimes a long one, a lack of democracy means that change, when it does come, tends to be eruptive and unpredictable. Businesses can quite literally lose everything.

So how can predictive datasets like these be improved? For starters, institutional quality must be taken into account, since political risk 'events' (i.e. mass protest or regime change) are better understood by knowing how political institutions are likely to react. Some can manage rapid change, while others falter. Institutional quality measures, which are proving reliable, will mark the future world, and it is in the contemporary design of these that academics and business people are meeting. For example, the Freedom House index, Transparency International's Corruption Perceptions Index (CPI), or the quite specific Polity IV series all depict institutional quality, and provide context and depth to investment and risk planning. The CPI is good for general context, but relies on perception, which can lag behind actual political change. Freedom House has only a handful of classifications: free, partly free and unfree. But the Polity IV gives accurate measures of the legal constraints on a country's executive, which turns out to be a good predictor of transparency, which in turn is positively related to economic growth. The most recent World Bank Governance Indicators measure the quality of political institutions across six categories: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption.

DEVELOPMENT DATA

Making the numbers work for you.

Almost every aspect of a country's socioeconomic reality is documented by statistics. But filtering through the abundance of information and retrieving a reliable dataset that answers questions about the world we live in is not always as straightforward as it seems.

Over 175 governments send data to the IMF for the International Financial Statistics and to the World Bank for World Development Indicators, which in turn are used by investment risk analysts. The most well-known development indices, the Human Development Index and the data collected for the purposes of checking progress towards the Millennium Development Goals (MDGs) provide an overview of wealth and wellbeing in developing countries. It may not be obvious at first how we can use this knowledge to make better, more effective and ethically sound business choices, but even a perfunctory analysis shines some light. For example, secondary school enrolments from World Development Indicators are a good sign of a more productive workforce, of better governance and the probability in turn of a stable macroeconomic environment.

These early development indicators have recently been complemented by more complex impact assessment tools – usually in response to demands from the public or donors concerned about a project's wider impact. Concern with carbon emissions, or assessment of an investment's impact on culture, heritage or happiness might seem

irrelevant to the businessperson of the past, but future leaders will not be able to evade demands for quantifiable, evidence-based statements. In this way, data can help us achieve more transparent and accountable working practices.

But how do we value the quality of air, the protection of a heritage site, the treatment of workers? An overall assessment of a company's 'social worth' is some time away, but those taking the bridgehead approach will be thinking about this now. Efforts in 'greenwash' will no longer satisfy the informed global public of the future.

So how can intangible externalities that affect social welfare or the environment be measured? An active relationship with a Development Finance Institution is a good place to start.

The DFIs are required to produce matrices of developmental impact, which means they demand more social value from their private sector co-investors. For example, the Corporate-Policy Project Rating (GPR) of the Deutsche Investitions- und Entwicklungsgesellschaft (DEG) and the Emerging Markets Private Equity Association (EMPEA) framework are both exemplary systems that measure the impact of a DFI investment.

Adopting measures like these aren't just about 'being good'. According to advocates of corporate social responsibility, meeting the 'triple bottom line' of financial, social and environmental returns – or 'people, planet, profit' – grows the business in the long term. Customers are increasingly demanding that their money be put to good use; that the businesses they choose to buy from promote democracy, social welfare and development on the ground – or, at the very least, don't reverse patterns of progress. For example, widespread HIV awareness, such as that sponsored by Aureos Capital (with investment from CDC Group and Norfund) can reduce HIV prevalence, which can be measured by the World Bank's Development Indicators. Successes like this make customers happy.

Better use of development indicators can prove corporate social responsibility *and* defend against the risk of reputational damage affecting the customer base. 'Clean' goods are in demand, and whether it's diamonds vetted by the Kimberley Process or cocoa trading structures by The Fairtrade Foundation, ethically sound production practices can all be corroborated by datasets. Likewise, guaranteeing an associational distance from child labour, environmental harm and land grabbing is just as imperative, though they do require a much more sophisticated dataset.

All this information already exists. It can help you do business *and* 'be good'. Learning how to filter the noise and focus on the facts that matter to you is the first step. Then an even bigger issue comes into play: how do you make sense of it, digest it and absorb its meaning into the work that you do?

The answer is simple: you need to visualise what the data is trying to say. The four organisations below are doing just that

GAPMINDER

gapminder.org

If you think global statistics are boring, think again. Gapminder's bubbly Trendalyzer tool breathes life into the trends shaping our world. By reimagining obscure patterns of social change as graphs that move organically over time, Gapminder is smashing through the mythical glass ceiling that hangs over the 'developing world' and inspiring more people to absorb the facts. Everything from wealth and health to education and climate is rigorously analysed, then effortlessly interpreted as dynamic graphs that represent life in every corner of the globe.

DEVELOPMENT SEED

developmentseed.org

The straight-talking brains at Development Seed have created an innovative range of tools to combat information overload and 'make data more actionable through design'. With a focus on international development, they help government agencies and the private sector embrace the open data revolution by making complex datasets easy to understand. Quirky toolkits like MapBox and Managing News turn tough data into easy-to-read visualisations or maps, and have been used by everyone from Google to the World Bank. Whether they're processing election results in Afghanistan or monitoring relief efforts in Haiti, simplicity is key.

STATPLANET

sacmeq.org/statplanet

Free to download, StatPlanet is a browser-based application that creates customised maps, graphs and visualisations from all manner of interlocking datasets. It's turned Transparency International's befuddling Corruption Perceptions Index into an interactive gateway, and allowed Social Watch to publish a constantly updated map that charts relative poverty and wellbeing across the world. This easy-to-use tool has helped everyone from the UN to Dell realise that evidence-based decision-making can be a pleasure, not a chore.

HEALTHMAP

healthmap.org

If the campaign for open data needs a poster child, then HealthMap is it. This online mapping tool aggregates information from disparate open data sources to offer a comprehensive view of the state of global health. This year sees the launch of Predict, a tool that will help the public track outbreaks of animal diseases that might affect humans. Pooling information from sources such as the World Health Organisation, Google News and the Wildlife Disease Information Node, HealthMap proves that freely available information can be a progressive social force.

THE KNOWLEDGE

SIMON ROGERS PICKS THE 10 BEST PLACES TO SEE 'SEXY' DATA ONLINE.

Information is Beautiful

informationisbeautiful.net

Data journalist and design whizz David McCandless' Information is Beautiful blog is a treasure-trove of cool visualisations and mash-ups. His work has also been published in a bestselling book of the same name.

Flowing Data

flowingdata.com

If someone, somewhere, is producing a great data visualisation or analysis, Nathan Yau's blog will find it. Yau has an unerring ability to unearth the best data visualisations on the web. He also produces graphics, and is a regular poster to the *Guardian* Datastore Flickr group.

OWNI

owni.fr

If you're looking for time series economic data – and a nifty way of creating a sophisticated, embeddable graphic – this is the place to come. Timetric updates thousands of datasets every day and provides an easy-to-use interface that makes it very simple to create your own.

Timetric

timetric.com

Patrick Cain's Map Blog

patrickcain.ca

Canadian Patrick Cain is a 'journalist who makes maps for the web'. Based in Toronto, Cain takes the city's data and maps it – producing guides to everything from crime figures to World War I deaths and single parent families. A fan of open data, Cain has a record of demanding data from the city's authorities using Freedom of Information laws.

Although a lot of the best data work is done in English, Paris-based OWNI is a collective of geeks and data freaks producing visualisations and apps that manage to be imaginative and innovative. The collective's work on Wikileaks – which allowed people to interrogate the data – won a 2010 Online Journalism Award for General Excellence.

DataMarket

datamarket.com

This brand new site combines an innovative data search function with bright and imaginative visualisations. It also allows you to create your own, download them and put them in your PowerPoint presentation or company report.

Guardian Datablog

guardian.co.uk/data

The *Guardian* and its Datablog publishes raw data behind the news every day, and encourages readers to visualise and work with it. The site publishes its data using Google spreadsheets and Google Fusion Tables, and allows readers to search thousands of government datasets around the world.

LinkedIn

linkedin.com

It might be better known for its impact on the world of social media, but LinkedIn also has a hugely innovative approach to data. LinkedIn has made collating and using data a priority, with lead data scientists completely integrated into the commercial operation.

London Datastore

data.london.gov.uk

Governments around the globe are opening up their data, from data.gov in the US, via Australia, the UK, New Zealand and France. One of the best and most useful is the London Datastore. Created by the Greater London Authority, it publishes thousands of datasets with the emphasis on useful, live data, such as transport and economic numbers. Developers are using those figures to create interesting apps, such as Matthew Somerville's live train map for the London Underground

The big brains at Infochimps have come up with an innovative way to find, share and sell formatted data. Both users and the site's own contributors collate and scrape datasets so that they're easily accessible. With big plans for expansion and lots of intellegegent developers onboard, it's definitely one to watch.

Infochimps

infochimps.com/datasets

LUNCH WITH HAL

HAL VARIAN, CHIEF ECONOMIST AT GOOGLE, SINKS HIS TEETH INTO DATA OBESITY AND HOW TO TREAT IT.

Not 10 minutes into our lunch at Google HQ in Mountain View, California, a groupie sidles up. He's got a guest nametag and an outstretched hand. He wants to say hello to Hal Varian, Google's Chief Economist. Varian, employee number 441, author of *Information Rules*, Emeritus Professor at the University of California, Berkeley (where he was founding dean of the School of Information), and a former columnist for *The New York Times* is, it turns out, quite a star in the statistics world.

The young man quotes a line from the elder circa 2009. That's when Varian famously pronounced that "the sexy job in the next 10 years will be statisticians." He added: "I'm not kidding."

Of course, sexy, like funny, is subjective (does a T-shirt that reads 'Statisticians do it with models' make you laugh?). But Varian's prediction is backed up by trends. In 2010, the human race created 800 exabytes of information, from tweets and Facebook updates to PowerPoint presentations and photographs. That's 800 billion gigabytes, or the amount of data you can fit on 75 billion 16-gig iPads. To put that into context, between the dawn of civilisation and 2003, we only created five exabytes; now we're creating that amount every two days. By 2020, that figure is predicted to sit at 53 zettabytes (53 *trillion* gigabytes) – an increase of 50 times.

Multiply data and you multiply the need for people to make sense of it. That's where Varian and the statisticians, analysts and econometricians who work with him come in.

WORDS BY **HOLLY FINN**
ILLUSTRATIONS BY **ADRIAN JOHNSON**

Data is like food, says Varian. "We used to be calorie poor and now the problem is obesity. We used to be data poor, now the problem is data obesity." Google's strength, he continues, was to recognise back in 2001 that "we would be handling massive amounts of data, and would need to develop tools for that." Another foresight was to hire an economist. Eric Schmidt hired Varian to 'have a look at the auction', the bidding system for ads that soon became Google's lifeblood. Other companies were built up around auctions – eBay, Yahoo! – but they didn't hire experts until much later. Now Yahoo!, Microsoft, Apple and Intel all have chief economists.

For businesses that are gorging on a surfeit of information, Varian says the fix is clear. It's the same for data as food: "You need to focus on quality. You'll be better off with a small but carefully structured sample rather than a large sloppy sample," he says. More locally sourced fine dining, then, less all-you-can-eat buffet.

Varian looks trim enough, dressed in a blue shirt and plain khaki trousers, with brown shoes and a navy sleeveless sweater – the uniform of a mind with more important things to think about than fashion. He takes a similarly practical approach to his food.

This on-campus café serves a smorgasbord of exotic treats – including, today, Beautifully Braised Short Ribs, Local Oysters (Kumamoto, Point Reyes and Marin Bay), Artichoke Poached in Court Bouillon, and Espresso Chiffon Cake. But Varian arrives at the long white refectory table having quickly heaped his plate with iceberg and shredded carrot doused in Thousand Island dressing. He's also got a hastily plonked-together chicken salad sandwich on a white roll with one slice of tomato. You can take the boy out of Wooster, Ohio...

For Varian, everything – including his culinary choices – can relate to data. Last year, while looking to buy a pepper shaker online, he hit upon the idea of a Google Price Index (GPI). It uses Google's web shopping database to create a daily measure of inflation. It could, one day, be a complement – or competitor – to the official, yet less frequent, Consumer Price Index (CPI).

There's a systemic gap, Varian points out, between the low-frequency data employed by governments and the high-frequency data of business. Government is working on it, though. "It's now using supermarket scanner data to predict inflation rates," notes Varian. How did it predict them before? "They used to send people out with notebooks to write it down."

"IF YOU'RE THE CHIEF ANYTHING, YOU ALWAYS HAVE A PROBLEM WITH PEOPLE TELLING YOU WHAT YOU WANT TO HEAR. IT'S HARD TO GET CRITICISM."

More communication between government and business clearly benefits both, says Varian. Business can provide more real-time data. "If you look at most businesses now, pretty much everyone – think of UPS, FedEx, MasterCard – has a real-time database. And that's powerful." Government can, in turn, aggregate information, giving businesses insight into their industry and the economy as a whole.

The trick, in both directions, is getting high-quality data. But neither governments nor businesses guarantee it. Last year, Canada's conservative cabinet voted for a weakened census. By removing the requirement for citizens to fill out a 'long form' (considered intrusive), it reduces its own access to vast amounts of quality information. "The head of the census bureau resigned over it," says Varian. "And there's some discussion of similar things here [that] the US is considering."

Companies, too, should be concerned about the quality of the decision-influencing data they are getting, says Varian. He recalls Lou Gerstner, before joining IBM, doing reconnaissance. Externally, "he asked people how the company was doing, and everyone gave it a C. Then, when he got to the company, he asked the same question: 'How're we doing?' And the answer was: 'All our customers give us an A!' So he said, 'Where's that data from?' 'Oh, we asked our sales people to collect it.'

"If you're the chief anything, you always have a problem with people telling you what you want to hear," adds Varian. "It's hard to get criticism." So Varian courts it. His team conducts random surveys constantly. The Ad Happiness Survey, for instance, continually picks advertisers at random and asks them about their experience. In order to remove some selection bias, he's even hired someone to be (at least some of the time) 'Chief Nag' to get results out of resistant responders.

Google also conducted 5,000 search experiments last year, which led to 400 search improvements (and the same again for ads experiments). Such insistent experimentation is an academic means to a capitalist end. Or, as Varian

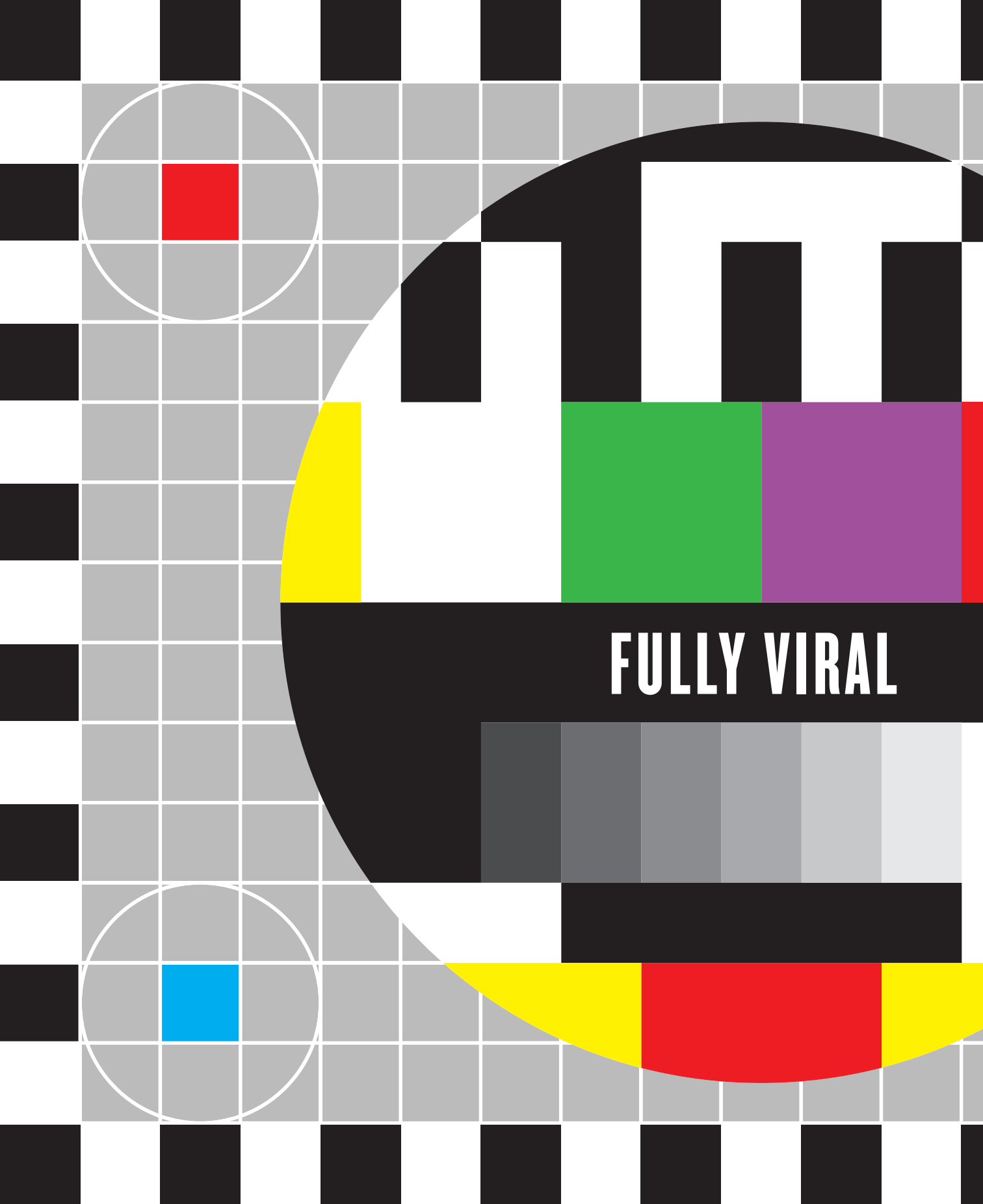
puts it: "Google is like a university, but with money." It's a cheering thought – and possibly why, in a recent talk at the 150th anniversary of MIT, Varian was notably more optimistic than his peers.

"Economics is really on a roll in Silicon Valley," he says. "The good news is that standard techniques from economics work very well on big problems. It's a little discouraging working as an academic economist because the problems that you work on are so hard. They're much, much easier in industry."

He means all industry, not just Fortune 500 companies. Varian, a man who quotes feminist playwright Edna St. Vincent Millay as easily as MIT founder William Barton Rogers, points to the proliferation of what he calls 'micro-multinationals' – small companies, mostly connected to universities, working around the globe and around the clock. "The smallest company now has access to computing and infrastructure only the biggest tech company had 15 years ago. So it's a much more fertile environment for start-ups. We're seeing all these little companies. And guess what, some of these little companies become big companies."

Information Rules, Varian's seminal book with Carl Shapiro, re-popularised the phrase 'network effects' – the value of a product or service increasing as more people use it. His next book will focus on new ideas, including 'co-opetition', the notion of capitalist symbiosis (Google and news organisations both championing content, for instance). Varian is always thinking about what's next. Asked to define his job, he says: "To answer the questions that management will ask next month."

So, what is next for the economy? Is it gaining steam? "Yes," says Varian emphatically. And how does he know? "I inspect the entrails," he says. Food is data, and data a kind of food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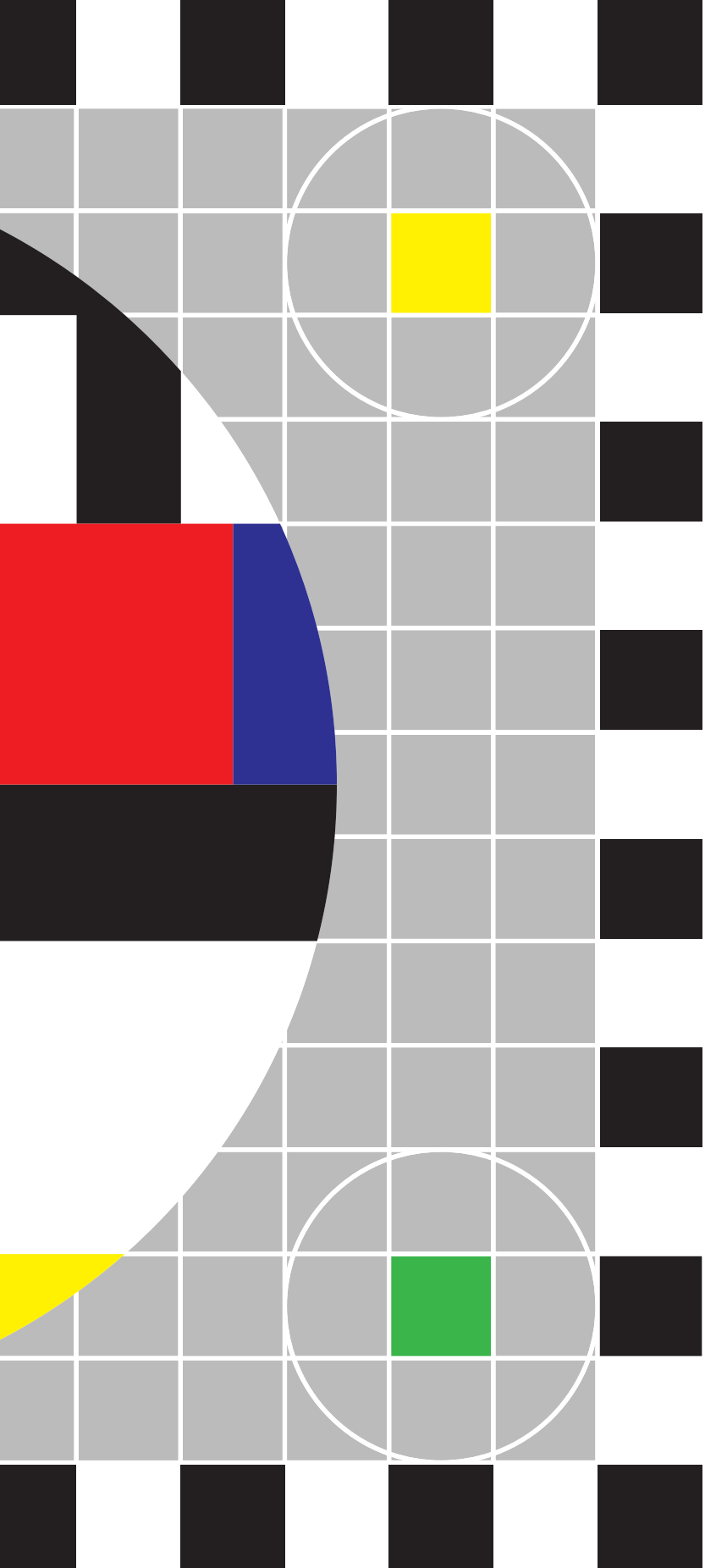


ONLINE VIDEO ADVERTISING IS ALLOWING BRANDS TO SPEAK TO AUDIENCES ON A GLOBAL SCALE. BIG IDEAS WILL REAP REWARDS, PROVIDED YOU GET TO KNOW YOUR AUDIENCE BY PUTTING DATA FIRST.

WORDS BY **ULRIKE REINHARD**

Every minute, 35 hours of footage is uploaded to YouTube globally. With over two billion views a day, it's become the epicentre of a video advertising boom. Last year saw brands embracing innovative online video campaigns like never before. Tipp-Ex's 'Shoot the Bear' and French Connection's 'YouTique' led the way, generating millions of views and acres of publicity.

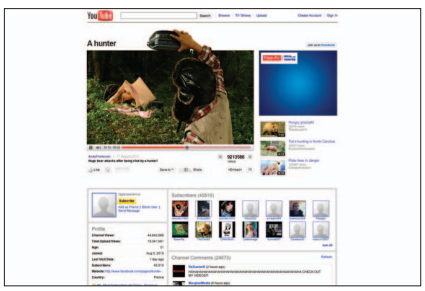
These success stories are telling marketers that big numbers are within reach. But how do you go about creating a campaign capable of capturing a mass audience? Is it through deep data analysis, or could the secret be something less tangible?

As the following case studies with Tipp-Ex and French Connection show, real-time data analysis during and after the process, combined with an unexpected and interactive narrative, are the foundations on which a campaign can be built.

TIPP-EX

Shoot the Bear

Client ***BIC***
Agency ***Buzzman***
Search ***'NSFW. A hunter shoots a bear!'***



Shoot the Bear was Tipp-Ex's web debut. The briefing given to Buzzman, the Paris-based creative agency behind the campaign, defined its goals as: 'To raise short-term brand awareness and to be on top of customers' shopping lists. To go Europe-wide and tell the story of how the product is used.' Surprisingly, going digital wasn't part of it, but after mining data on YouTube's most popular videos, Buzzman came up with a viral ad titled *NSFW. A hunter shoots a bear!*

In the 30-second clip, a hunter in a forest is approached by a bear. Users are asked whether the hunter should shoot the bear, and their decision leads to a second video which sees the hunter reach out of the player to grab a Tipp-Ex Pocket Mouse from what appears to be a static ad and erase the word 'shoots' from the title. Viewers are then invited to write whatever they want in the blanked-out space and watch as the hunter does exactly what they've written.

"We produced 42 scenes," reveals Thomas Granger, Managing Director at Buzzman, "with one search query for each scene. Based on a survey, we found that for each query – let's say 'plays with' as an example – there were 40-60 words used by respondents to express the notion of 'play'. So whenever somebody types in one of these expressions, the query leads them straight to the specific scene. Real-time data showed us which scenes were hot and which were not. That's a great source for identifying what YouTube viewers want and telling us how to react.

"To maximise the chance of people clicking on the video and increase viewing numbers," he continues, "we first had to analyse code and implement certain technical solutions within YouTube's guidelines. This is where the 'NSFW' in the video title comes in – it stands for 'Not Safe For Work'. We checked all the most viewed videos on YouTube. We analysed people's behaviour, and when we examined all this data we were pretty sure that we didn't want a branded video or our own Tipp-Ex video channel. It became pretty clear that a simple video on the main YouTube platform was the right thing to do. A video with the look and feel of a video shot on a mobile phone by you or me. The data taught us that we need to surprise the viewer – and that's what we did at the end when the hunter starts freaking out. This is where interactivity kicks in. People love being involved – being part of the story."

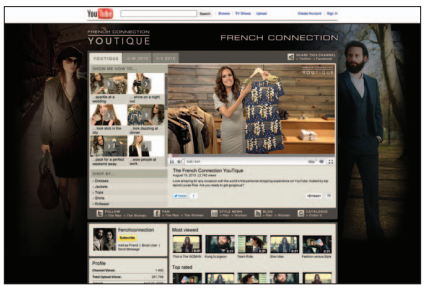
With a total layout of around €900,000 (including production, advertising and agency fees), Shoot the Bear was a Europe-wide campaign unbeatable in cost efficiency. It went viral from day one: with one tweet per second in the first 10 hours, and one million views after 36 hours. To date, the video has had almost 500,000 shares on Facebook, been posted on more than 1,300 blogs and more than 43 million people have watched it.

It's a winner in business terms, too. A survey by Tipp-Ex showed that the 'buying attention' of potential customers – which positions the brand as the first product they are likely to buy – increased by 100 per cent, while sale volumes were up by 30 per cent compared to the same timeframe the year before.

FRENCH CONNECTION

YouTique

Client ***French Connection***
Agency ***Poke***
Search ***'French Connection, YouTique'***



Unlike Tipp-Ex, FCUK is an old hand at e-commerce. Their goal was to grow business by reaching out beyond their website and using new communication channels in an innovative way. Not only would they reach customers in the US and UK, but they'd also develop insights about the way video is used on the web.

Poke, FCUK's East London agency, created YouTique – a YouTube boutique – as a place where YouTube and commerce intersect. It makes clever use of YouTube's pop-up buttons by letting viewers buy what they see with just a few clicks. Though the pop-ups traditionally only link to other YouTube videos, FCUK was the first brand in the UK to make an arrangement with YouTube to let them use what YouTube calls 'annotations', which enable viewers to leave the platform and go off to other destinations on the web – in this case to the FCUK website.

"YouTube data showed us that people were actively searching and browsing for fashion tips and tutorials, DIY instructions that showed them how to dress sexily for a date, what to wear on a business trip or what's the latest fashion must-have," says Emma Pueyo, Creative Director at Poke. "And the data also showed that people are most likely to engage when the video set-up reflects their own lifestyle, rather than that of the catwalk jet-set.

"So our decisions weren't by any means based on blind judgments. Data mining gave us clear indicators, which really helped in creating the right atmosphere in the videos. Knowing the data, we were fairly sure that people would buy."

"Since we made the experience ourselves, we were able to take measurements and now we can optimise for the upcoming season," adds Jennifer Roebuck, Director of E-commerce at FCUK. "The data tells us exactly the right length for our new videos, the best spots for calls for action, the best starting points, the best way to place content and label it to achieve number one search results. These are just a few of the lessons the datasets are teaching us. Now we're ready to improve."

Like the Tipp-Ex campaign, YouTique is a winner in business terms, too. It was among the three most popular YouTube channels in the UK for a month. A 100 per cent increase in channel views meant a significant increase in brand awareness while the click-through rates were among the highest YouTube has ever seen – up to five or six per cent – and online sales soared.

Data-based web advertising was the big breakthrough of 2010, utilising the power of social media to transform the relationship between consumers and advertisers. Tipp-Ex and French Connection have pioneered a new model. The next move is yours

FROM STICKS TO CLOUDS

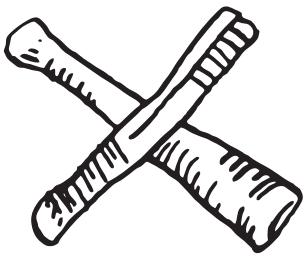
A VISUAL HISTORY OF DATA CAPTURE THROUGH THE AGES

WHY NOT OPEN ME UP AND CHECK ME OUT?

TALLY STICKS

20,000-10,000 BC

The Ishango bone, a tally stick from the Upper Palaeolithic era, represents the beginnings of our understanding of mathematics and data.



SUNDIALS

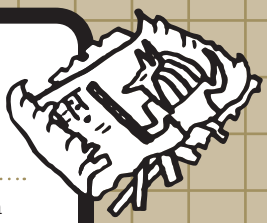
3,500 BC

Egyptian obelisks show humans manipulating light and shadows to measure data about the time of day.

PAPYRUS

3,000 BC

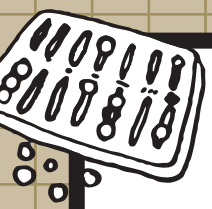
Papyrus, manufactured in Egypt, revolutionises the way data and language can be recorded.



THE BOOK ON NUMBERS AND COMPUTATION

200 BC

Dating back to the Han Dynasty of ancient China, this mathematical treatise brings together interest rate calculations with government statutes and law reports.



ABACUS

2,700 BC

Ancient civilisations develop a counting system that enables complex data manipulation.

CENSUS

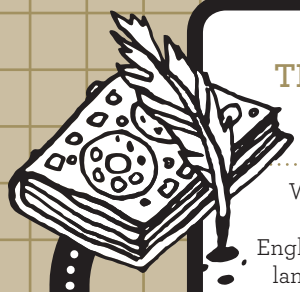
800-500 BC

In Israel, a primitive census is undertaken and recorded in the Hebrew Bible. Social data capture is born.

THE DOMESDAY BOOK

1086 AD

William the Conqueror conducts a survey in England and Wales recording land and livestock. It takes over a year to complete.



STOCK EXCHANGES

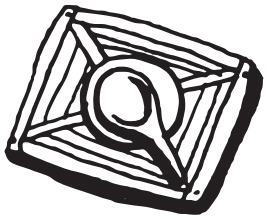
1200s AD

The earliest stock exchanges emerge in Bruges and Italy in the thirteenth century. Data about trades is written down by scribes and transported by couriers.

NAVIGATIONAL COMPASS

1000s AD

Chinese scientists develop instruments that attract a needle north, creating a navigational tool only recently superseded by GPS.



GREGORIAN CALENDAR

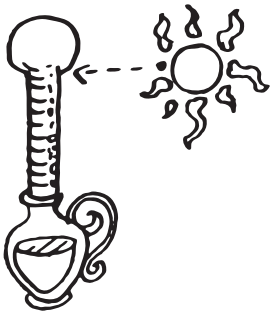
1582 AD

Pope Gregory XIII launches the Gregorian calendar to eradicate an 11-minute discrepancy in the Julian calendar, which is causing the official date of equinox to creep further away from the actual cosmological event.

THERMOMETER

1600s AD

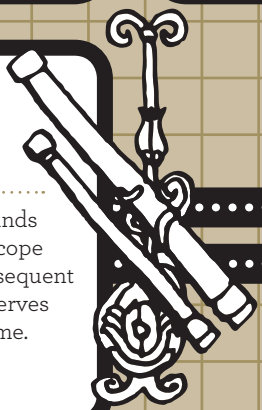
Cornelius Drebbel, Robert Fludd, Galileo Galilei and Santorio Santorio make progress on a device to measure temperature in real time.

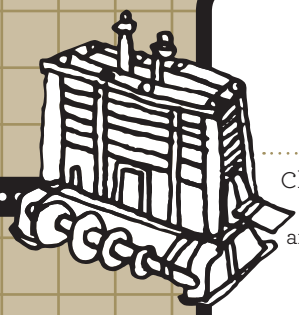


TELESCOPE

1600s AD

Scientists in the Netherlands develop a refracting telescope that Galileo improves in subsequent years. The instrument observes remote objects in real time.





ANALYTICAL ENGINE

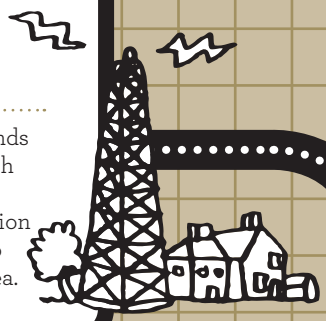
1837 AD

Charles Babbage develops the Analytical Engine, and modern computation is born.

WIRELESS TELEGRAPH

1897 AD

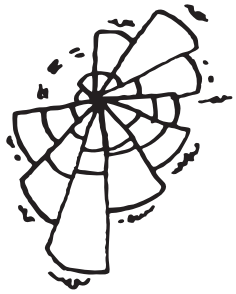
Guglielmo Marconi founds The Wireless Telegraph & Signal Company, pioneering communication between coastal radio stations and ships at sea.



DATA VISUALISATION

1857 AD

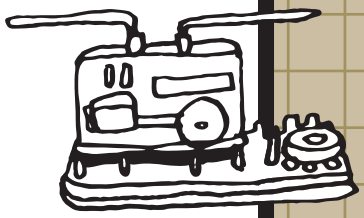
During the Crimean War, Florence Nightingale records the mortality rates of British soldiers in field hospitals. The information is published in a series of striking graphics, persuading the government to improve conditions.



TELEMOBILOSCOPE

1904 AD

Christian Hülsmeyer uses radio waves to detect distant metallic objects, inventing the first radar application.



TELEGRAPH

1837 AD

The first commercial telegraph is introduced at Euston Station. It soon crosses the oceans to every continent but Antarctica, making instant global communication possible for the first time.

GPS

1957 AD

Sputnik – the first artificial satellite – is launched by the Soviet Union on October 4, 1957, as a global positioning system for precise weapon delivery and paves the way for GPS as we know it today.

GOOGLE EARTH ENGINE

2010 AD

The Google Earth Engine – a cloud computing platform – processes real-time satellite imagery and other Earth observation data. Initial applications of the platform include mapping the forests of Mexico, identifying water in the Congo basin, and detecting deforestation in the Amazon.

CLUSTER EXPLORATORY

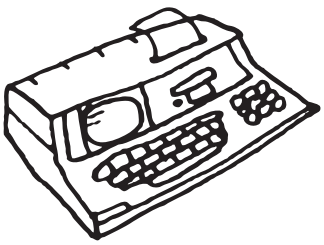
2008 AD

Cluster Exploratory (CluE) is a National Science Foundation-funded program that analyses massive amounts of data to search for patterns.

PERSONAL COMPUTER

1970s AD

Hewlett-Packard introduces programmable computers that fit on top of a desk. The personal computer allows economical collection and management of data.



SUPERMARKET METRICS

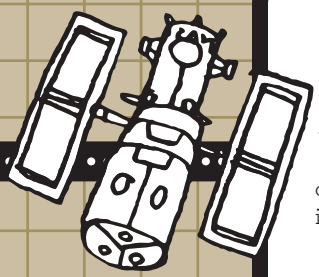
1995 AD

Tesco's Clubcard scheme revolutionises consumer metrics by allowing supermarkets to target offers and optimise their stocks.

RADIO-FREQUENCY IDENTIFICATION

1980s AD

Radio-frequency identification technology (RFID) takes hold in transportation and business. Real-time monitoring systems are developed to process the new data.



HUBBLE SPACE TELESCOPE

1993 AD

The Hubble Space Telescope captures images of outer space in real time, allowing scientists to determine the rate of expansion of the universe.

AV AD VALUE

TONY FAGAN, DIRECTOR OF RESEARCH AT GOOGLE, ANSWERS THE SIX QUANT QUESTIONS EVERY CMO SHOULD BE ASKING IN ORDER TO MAXIMISE THEIR RETURN ON SEARCH ADVERTISING.

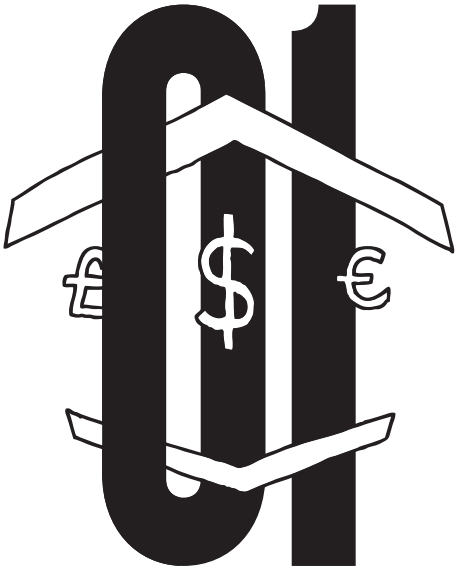
WORDS BY **TONY FAGAN**
ILLUSTRATIONS BY **ADAM HAYES**

Welcome to the age of experiments. At Google, we believe that online advertising is a more measurable medium than television, radio and print. How can we be sure? Because we look at the stats.

Business is about trial and error, but with statistics comes a method to make the process work better. With the data generated from search, click-through and conversion rates, we're able to address and improve ad campaigns on the fly.

The process is called 'test-and-learn' and it's the gold standard for calculating whether something caused something else. In marketing, we call them 'A/B tests'. The idea is simple: test A versus B to see which one works better. That gives us the 'incremental' improvement – the difference between doing something and not doing it.

We can use these experiments to address six commonly asked questions about running search ad campaigns on Google. The answers will give you an insight into how to make online advertising work efficiently for your organisation.



SHOULD I MANAGE MY SPEND THROUGH BIDDING OR A DAILY BUDGET CAP?

Some advertisers choose to manage their spend using the daily budget cap feature in AdWords. This is fine unless you're hitting your cap, because that's when we remove you from all future auctions for that day. And this is potentially expensive.

If you were to lower your bids so you just meet your budget cap at the end of each day, you would potentially spend the same amount but get more clicks. How? When you lower your bid, you lower your position and the cost of clicks. This saves money throughout the day, allowing you to participate in more auctions.

We conducted an A/B experiment on behalf of an electronics manufacturer to analyse how budget caps affected their AdWords performance. By removing the budget cap, this advertiser was able to spend 170 per cent more with 170 per cent more clicks at the same cost-per-click. Pretty good, right?

HOW MUCH SHOULD I SPEND TO MAXIMISE PROFIT?

Auction theory tells us to increase a bid until the 'marginal' cost-per-click equals the value-per-click. The marginal cost-per-click is different than the average cost-per-click, and is often higher. So if you're managing your spend to an average cost-per-click, you're paying too much – and making less profit. We recently released a few tools to help you with this, including Google Bid Simulator, which estimates the traffic you'll get for a keyword at a different bid.

We ran a second experiment with the same electronics manufacturer to determine its optimal spend, testing different spend levels by changing bids and adding/subtracting keywords. We found that reducing bids by half resulted in 37 per cent lower spend but 20 per cent more clicks. Using the results data, we were able to draw the 'marginal cost-per-click curve', which plots the marginal cost-per-click against spend. By selecting the point on the curve where the marginal cost-per-click equals your value-per-click, you have your optimal spend.

SHOULD I BUY BRANDED KEYWORDS, NON-BRANDED KEYWORDS OR BOTH?

This is a hotly debated topic among advertisers. To answer this question we conducted a geo experiment with Vineyard Vines. In a control group we purchased generic keywords. In a test group we purchased both generic and branded keywords. The test group generated 14 per cent more total clicks across both organic and paid clicks combined. Conclusion: they should buy branded keywords.

But how much should they pay? Consider a search results page that contains both an organic search link and a paid search ad, where the user clicks on the ad. What would have happened if the paid ad wasn't there?

Either the user wouldn't have clicked through, or they would have clicked on the organic link and found the website anyway. The first case generates an incremental click; the second case is called 'cannibalisation'. If we know how many of the paid clicks are incremental then we can calculate how much to pay for them.

Suppose the test group generated 63 incremental clicks, yet AdWords reports 100 clicks from branded keywords. We know that the cost of 63 incremental clicks equals the average cost-per-click reported in AdWords divided by 63 per cent. If the average cost-per-click is £1, the average cost-per-click of the incremental clicks is £1.59. That's how much to pay for branded keywords.

HOW MUCH 'INDIRECT' TRAFFIC AM I GETTING FROM ADWORDS?

Suppose someone views your search ad but doesn't click on it, then subsequently navigates directly to your website by typing your web address into their browser. Now suppose that the user directly navigated to your site because of previously viewing your ad. This is an indirect effect that won't show up in your AdWords report even though it was still caused by your ad.

Some people call this the 'view-through' effect, because a user viewed but did not click on the ad. There are many possible combinations of views and clicks across natural search, paid search and other media. Rather than try to decipher this mess, we simply run our usual A/B test to measure the effect in aggregate, which will help us better value our search ads.

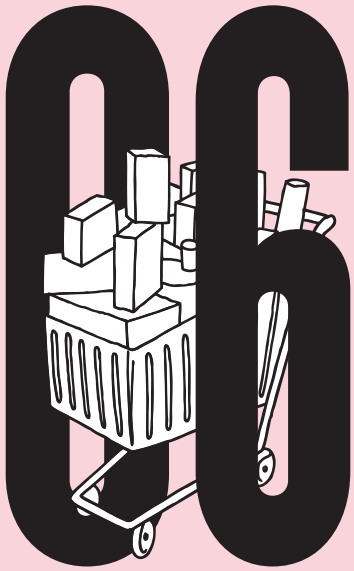
In this case, we'll recruit a panel of users who opt-in to participate in this study and use a software plug-in for the browser to control which ads they see and don't see. The search ads shown to the test group will be suppressed for the control group.

Then we'll compare the total website visits for each group, including both visits from users clicking on the ads and indirect visits from users visiting the site having been exposed to the ads. For a retailer, we observed a 62 per cent increase in total visits to their website.

IS THE CAMPAIGN INCREASING TRADITIONAL BRAND METRICS?

We can also use A/B experiments to measure traditional brand metrics such as awareness, consideration and favourability. We simply survey the test group who were exposed to the search ads and the control group who weren't, and then compare the results. This setup is sometimes called a 'laboratory environment' because we're artificially asking the panellists to perform specific searches rather than observing their behaviour in the wild. We'll use a study with General Electric (GE) as our example.

As part of the experiment, we asked the panellists to search 'renewable energy' then changed the search results pages in a variety of ways for the test group and control group. When a GE ad was shown in the top spot on the search results page for the test group but not for the control group, 28 per cent more respondents cited GE as the first company they thought of when it comes to renewable energy. And 36 per cent more respondents correctly recalled GE's 'Ecomagination' tag line.



ARE MY ADWORDS ADS INCREASING IN-STORE SALES?

This is a good one. We don't provide a measure of in-store sales in AdWords, but we can measure it with a geo experiment. We'll need to look at a few months of sales data for each retail store, the amount of search ad inventory available around each store location, and historical AdWords performance.

This information will allow us to determine how much to spend each day, how long to run the experiment and how big an increase in sales we will be able to detect (assuming there is one). This is called a 'power analysis'. The next step is to run the experiment and analyse the results. We obtain the increase in in-store sales by comparing in-store sales from the test group to the control group. Results from a recent experiment with Vodafone found a 1.5 per cent increase in in-store sales, with 400 per cent return-on-ad-spend

USE THE QR CODE ON PAGE 61 TO VIEW THE ONLINE VERSION OF THIS ARTICLE WITH SUPPORTING CASE-STUDY LINKS.

OPEN FOR BUSINESS

AFTER CONVINCING THE GOVERNMENT TO PUBLISH OVER 5,000 DATASETS ONLINE, NIGEL SHADBOLT IS TURNING HIS ATTENTION TO THE BUSINESS WORLD. IT'S TIME TO OPEN YOUR MIND TO OPEN DATA.

WORDS BY **NIGEL SHADBOLT**
ILLUSTRATIONS BY **MIKE LEMANSKI**


POLICE
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OPEN
DATA

The first decade of the twenty-first century has been defined by our insatiable demand for information. It has led to the emergence of the 'open data' movement, whose powerful advocates include politicians and government officials. In January 2010, Tim Berners-Lee and I unveiled data.gov.uk, providing a single point of access to thousands of UK government datasets, from detailed local and national spending data to street-level crimes and hospital infection rates.

Why is there a growing momentum behind open government data (OGD)? What are the benefits of making non-personal public data freely available? And what does it mean for both businesses and ordinary citizens?

Open data provides a platform on which innovation and value generation can flourish. If governments publish their data and get out of the way, the applications that people want will emerge. In the UK, services like FixMyStreet reduce the pain of reporting local problems like dog fouling and broken streetlights by allowing the public to share their complaints online. Who's Lobbying helps keep track of the special interests influencing government ministers. Schooloscope makes school performance information useable. SpotlightOnSpend shows not just how various councils are spending our money, but which companies are profiting. And there are dozens of apps like TravelOptions that make finding your way around London easier. All are powered by open data.

The really cool thing is that OGD can be the agent of its own improvement. In the UK, there has been a crowd-sourced effort to improve the Department of Transport's database, which, amongst other things, details the precise location of the nation's bus stops. Or at least it purports to – about 18,000 aren't where they're supposed to be, so the public has been busy bringing the database into alignment with reality.

The lesson is to appreciate the larger economic and social prize – letting the data go enables value to be built at scale.

And let's not forget that detailed information about spending, education, transport, energy, environment, crime and health enables citizens to be better informed and hold public service providers to account. If we really do believe in evidence-based policy then it is essential to have data that is open to scrutiny and debate.

For data.gov.uk, it wasn't enough just to establish a single point of access and then populate it with datasets. We had to draw up the Open Government Licence (OGL), which grants blanket permission to re-use the majority of government data. Developers won't use data if it is ring-fenced by restrictions and limitations. We established the UK's Public Data Principles to determine the 'what' and 'how' for publishing government data on the web. We set out a simple 'five stars of openness' test for judging how open and re-useable data is, from simply putting data on the web under an open licence, to linking it to other data to enrich and give it context. But there is plenty more work to be done.

The challenges are organisational and cultural. Persuading state departments to publish non-personal public data necessitates a significant change in attitude. We have to show the benefits so that the advantages of publication are clear. Often our public services are operated by the private sector on a franchised, regulated or subsidised basis. The UK government will be looking to extend its open data principles to these organisations, too. If a private company is in receipt of public funds to run a public service then the data it uses to run these services should be open.

As governments grapple with these challenges, the next question is how open data works for business.

An increasing number of companies are selling added-value services that build

"OPEN DATA PROVIDES A PLATFORM ON WHICH INNOVATION AND VALUE GENERATION CAN FLOURISH."


POLICE

on OGD. From business intelligence to spending analysis and data-driven journalism as practised by the *Guardian* in the UK and *The Texas Tribune* in the US, there is value in data – whether it is a paid-for app built from now-open UK mapping data, or the latest free travel app that makes its developer money through advertising.

But what about the deeper question of whether businesses' own data might be better exploited if it was open? There was a time when bookshops regarded their inventory a trade secret. They wouldn't tell anyone else – customers, competitors or their supply chain – exactly what stock they held. This is now inconceivable: you expect to know what the online bookshop carries and when you can expect to receive your order. Price comparison and product aggregation sites are a good example of how companies can't afford to hide their information. Whether you're the cheapest offer or the more expensive one with additional features, your product or service data needs to be seen.

The airline industry demonstrates how opening up data can help a business, while also helping the industry overall. Only a few years ago, you had to go to an airline's website to find a flight, visiting more than one in order to make a decision on what to book. Then we saw the emergence of flight search engines such as Kayak and Skyscanner. They started scraping the airlines' sites for timetables, prices and search results to help prospective travellers make a choice. The airlines fought this – blocking and banning the harvesting of their sites. But over time they came to realise that having their flight data on more sites and in more searches meant more business. They have started to recognise the value of making their data more openly available.

We know that better information makes better markets. Lack of access to information about demand and supply makes it difficult for both suppliers and traders to plan, economise and improve their activities.

"ASK YOURSELF: WHAT INFORMATION DO YOU HOLD? CAN ANY OF IT BE PUBLISHED FREELY TO IMPROVE TRANSPARENCY OR ENHANCE BRAND REPUTATION?"

Open data offers the prospect of instant connectivity between partners, as in open supply chains, where businesses source from places they might never have considered or even suspected could be a source. Open data can reduce integration costs, improve transparency and harness the innovation of others. If you release your data then others will develop applications that make best use of it – providing new services that benefit you directly, like all of those free travel apps that the travel companies didn't have to write, but which nevertheless drive people onto the transportation network.

Of course, in the world of abundant data, where we see significant amounts being made freely available – or available at marginal cost – there is a clear business challenge. The question is what sort of data provider you'll become. The world wants high-quality data with a good provenance. Data authorities like Google, EnGadget or the Internet Movie Database do well out of their 'trusted brand' status.

So what should you do? An 'open data assay' is a first step. Ask yourself: what information do you hold? Can any of it be published freely to improve transparency or enhance brand reputation? Is there data which, if published, could make your business more efficient, or generate value, whether directly or indirectly? Take the OGD checklist and frame it in a company context. Think hard about where value is generated in our new information environments. We know how to architect and set up open data portals – so the next steps are ones we can take together. Think about registering data.YOURCO.com or data.YOURSECTOR.com – you might need it sooner than you think.

The OGD revolution is important. Viewed as a precursor to a wider open data movement, it could be as important as any we have seen in the web era

DATA.GOV.UK

INTERVIEW BY **ULRIKE REINHARD**
PORTRAITS BY **JONNEK JONNEKSON**

SOFT VALUES, HARD FACTS

PETER KRUSE HAS DEVELOPED A TOOL THAT CAN TAP INTO THE INTUITIVE BELIEFS THAT DRIVE SOCIAL CHANGE. BY ACCESSING THE PARTS OTHER DATA CAN'T REACH, IT OFFERS YOU THE MOST VALUABLE INSIGHT OF ALL: WHAT'S COMING NEXT.

Professor Peter Kruse is the founder and CEO of nextpractice, based in Bremen, Germany. Alongside a team of psychologists, economists, sociologists, computer scientists and designers, he develops customised management tools to support entrepreneurial decision-making and empower collective intelligence. Using the 'nextexpertizer' tool, Kruse is able to access the collective intuition of groups, revealing the hidden value patterns underpinning social change. The data that emerges enables us to answer the question: what's next?

THINK QUARTERLY We produce so much data every day that it is becoming difficult to generate genuine insights. How can we use these data streams more efficiently?

PETER KRUSE The biggest challenge is to reduce complexity by detecting meaningful patterns. Otherwise the risk of sudden and dangerous breakdowns – like the financial crisis we've just recovered from – is far too high.

So the question is how to get the right data. Using customers, citizens and other experts as detectors for relevant information maximises complexity reduction in data analysis. This is where the nextexpertizer method comes in.

TQ The mantra of nextpractice is 'A Matter of Fact in a World of Values'. What does this mean?

KRUSE In established methods of collecting data, like standardised questionnaires and predefined scales, people give their judgments on the basis of hopefully intelligent questions and simple categories like 'yes' and 'no', multiple choice, ranking, etc. The respondent can only add value when the intentions of the interviewer are decoded correctly. But language is a very tricky phenomenon, so the first difficulty to be tackled is the problem of semantics, which adds a lot of noise to every measurement. The second problem is a direct consequence of the first. Interpretation of language is a mainly conscious process that isn't well connected with a person's intuitive knowledge and unconscious valuations, which are crucial for complexity reduction.

Only when people are given total freedom to explain something in their own words – as in a qualitative interview – can their full potential to add reasonable information be enabled. But a qualitative interview only shifts the problem of semantics over to the person collecting the data. Now the one listening to the answers is in charge of interpretation.

To solve this dilemma of quantitative versus qualitative measurement, about 20 years ago we started a project to develop an interview technique that combines the strengths of both forms of measurement. We aimed for a method that was able to get full access to a person's unconscious valuations and was then capable of mathematically combining this individual data into a common picture that merited the name of 'collective intuition'. Our nextexpertizer computer-based interview tool is the result of all these endeavours.

What it basically does is, first, creates a list of elements for comparison. This list can contain up to about 60 short word descriptions, pictures or even video clips to direct the attention of a person to a chosen topic of interest.

Then a relatively small sample of 100-200 people with in-depth practical experience of the topic of interest is interviewed. The interview is strictly ritualised. Interviewees are confronted with two elements from the predefined list, asked to decide whether these two elements are more similar or more different, and to describe in their own words why they are similar or different. The 'experts of experience' are then told to rate all the other elements very quickly on the basis of the dimension they have created for differentiation. With every decision, a slight indication of their unconscious value system passes the threshold.

At the end of the procedure, which usually takes up to two hours, every interviewee has described his or her picture of the topic of interest in a matrix associating all the elements of comparison by 10-20 freely formulated dimensions. Due to the enormous amount of decisions taken to create the matrix, there is no chance of intellectual control. The meaning of comments can be assigned by the way words are used to define the relationship between the compared elements. By calculating three-dimensional representations of the vector spaces created by the expert interviewees, it is easy to perceive directly the implicit value system they share. The right data is presented in the right way for the upgrading of decision-making processes. Unconscious soft data is transformed into facts and mathematically defined key performance indicators.

The measurement of collective intuition is a very promising alternative for understanding the actual behaviour and predicting the future behaviour of customers, citizens and other persons ›

involved in complex cultural order formation processes. As our studies show: you can be years ahead.

TQ What you are saying is that you can predict people's behaviour by analysing the dynamics of these collective value patterns?

KRUSE To be honest, in the beginning we were very sceptical ourselves. But after years of involvement in very different fields of application, and after analysis of many thousands of matrices, the answer is clearly 'yes'. Three value propositions of nextexpertizer can be substantiated by the studies made so far. One: understanding the dynamics of cultural value patterns is possible on the basis of relatively small interview samples. Two: changes in value patterns take place on a far slower timescale and a lower level of variety than attitudes, opinions or behaviour. Three: despite the problem of semantics it is possible to compare individual as well as cultural value systems using the same method. The same interviews can be conducted in different countries without additional work. The cultural context is created by the people interviewed and represented in the matrices.

For Volkswagen, for instance, we analysed the cultural value system for cars in Europe and Asia since 2006. Years before the financial crisis – and clearly ahead of the decline in the premium segment in Germany and other mature markets – changes in cultural value systems indicated a significant breakdown in the status function of cars. People's preferences turned to the functional aspects of mobility – a big chance for public transportation. The collective intuition of a few hundred people was able to anticipate an upcoming shift in consumer behaviour that went against the grain of what public opinion and the mass media were saying. Even the growing importance of the new segment of small premium cars was indicated long before any real increase in sales volume. But as one can see by looking at the actual performance of public transportation, any given chance needs spirited decision-making in order to be realised. So it makes sound sense to upgrade entrepreneurship by providing leaders in business and politics with data that is able to back up complexity reduction by pattern formation.

"FOR VOLKSWAGEN, THE COLLECTIVE INTUITION OF A FEW HUNDRED PEOPLE WAS ABLE TO ANTICIPATE AN UPCOMING SHIFT IN CONSUMER BEHAVIOUR THAT WENT AGAINST THE GRAIN OF WHAT PUBLIC OPINION AND THE MASS MEDIA WERE SAYING."

TQ Why are you so convinced that measuring the dynamics of cultural value systems is the order of the day?

KRUSE The internet is the key. Success is no longer a matter of pushing by presence in the mass media. It's not even a question of attracting people's attention. The new magic formula is pull by resonance.

When millions and millions of people interact in a high connectivity network like the internet, small causes may have great effects. When a topic or an event hits the value system of people in such a way that they tune in by active promotion, positive feedback loops occur and the hype kicks in. This effect of crossing the threshold to active involvement based on emotional impact is called 'resonance'. A person can become world famous, a product can turn into a blockbuster, a brand can be ruined or a population can topple a hated regime – and all in only a few days. This becomes possible when cultural value systems enable resonance effects, and this is why it is so important to understand their dynamics today. For business leaders, entrepreneurs and politicians, access to the data which make these dynamics transparent is vital for coping with the challenges of a networked world. It's not necessary to become a data freak like I am, but reducing complexity by order formation is the number one skill needed by all leaders in the twenty-first century

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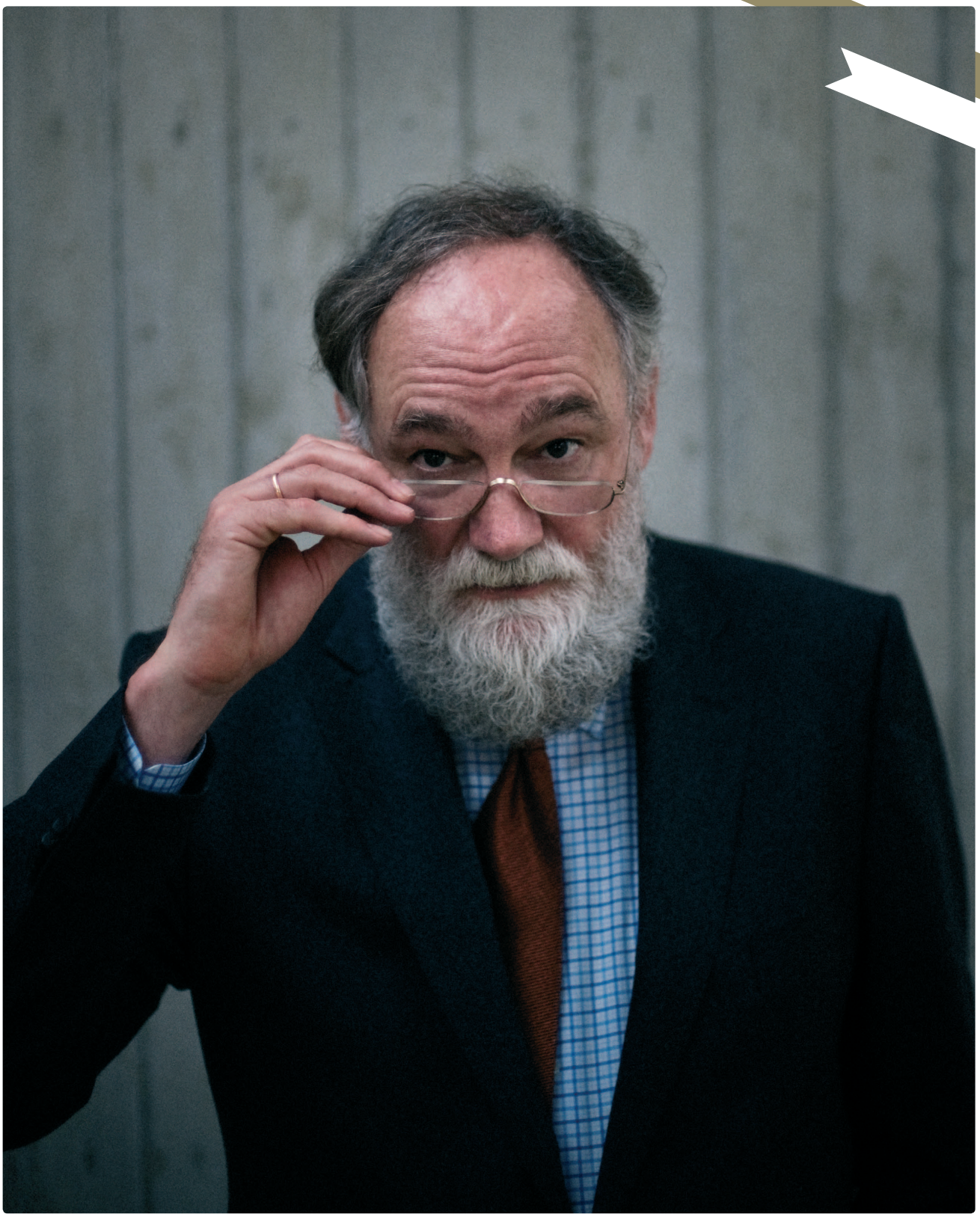
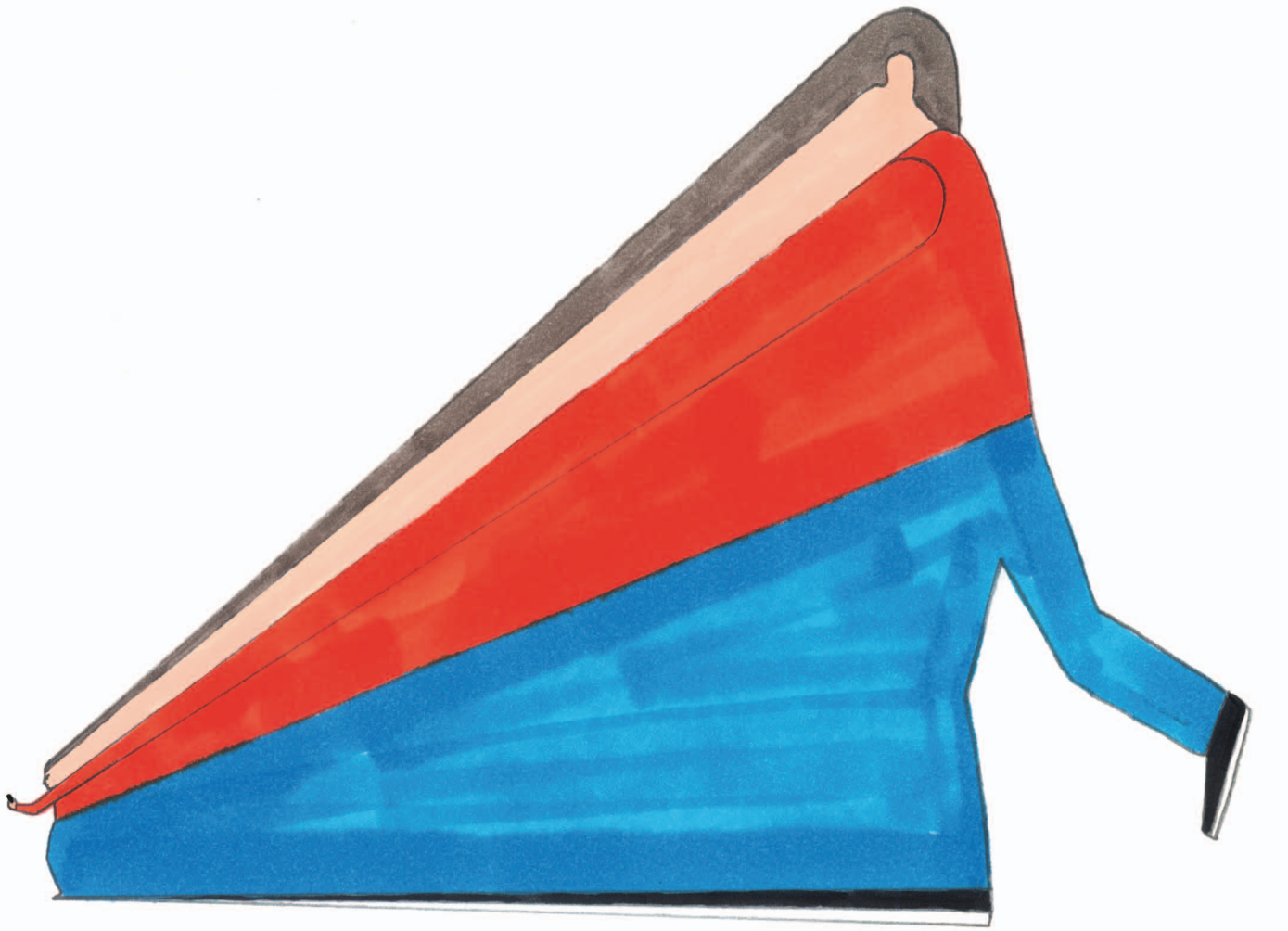




NEAR FIELD COMMUNICATION IS THE WIRELESS TECHNOLOGY THAT'S ABOUT TO FIND ITS WAY INTO YOUR MOBILE PHONE. WHAT IS IT AND WHY SHOULD YOU CARE?

FREE YOUR POCKETS

Over 10 million Oyster travel cards have been issued in London since their introduction in 2003, with five million touched against readers on the Underground every day. But do you know what they do or how they work? Should you even care? Well, yes you should: the ingenious little chips in these cards are going to shape how consumers interact with brands, and ultimately dictate consumer behaviour.

Oyster-style systems are well established at major transport hubs around the world. They operate by sending data to a mainframe, which acknowledges the transaction and updates your travel card. But the same system could just as easily transmit data to your bank, credit card supplier, mobile phone operator or the personal account of someone you know.

WORDS BY **RICH PLEETH**
ILLUSTRATIONS BY **GEOFF McFETRIDGE**

The technology is called Near Field Communication (NFC), and as it's reshaping the future of how payments are made, you're going to be hearing a lot about it over the next few years. So what exactly is NFC, and what's it actually good for beyond five extra minutes in bed before you fast-track your way through the morning commute? Unfortunately, there's no way of explaining without resorting to techno-jargon. NFC is a short-range wireless technology that interacts with electromagnetic radio fields. It's meant solely for applications where a physical touch (or something close) is required in order to maintain security, which differentiates it from Bluetooth's direct radio transmissions.

The big news is that the technology will soon be ubiquitous in mobile phones (simply taping your Oyster card to the back of your device is a primitive form of this). In basic terms, there'll be a chip in your phone that will be able to talk to payment terminals specially designed for NFC, eventually replacing credit and debit cards. In Japan, NFC is already being used to pay for a range of items, from transport to alcohol, clothes and refreshments from vending machines.

Google launched the first NFC-enabled device, the Nexus S, in December, and other manufacturers will follow suit. So not only will you be able to make payments from your phone – throwing your wallet out the window and creating extra space in your pockets for your hands – the same device will also contain your ID, railcard and all those frustratingly addictive membership and loyalty cards that you can never find when you actually need them.

How will this happen? The NFC chips are tiny, so anything and anyone – from burly bouncers to train conductors – can become NFC-enabled. And the really great news is that it isn't going to be expensive to invest in the technology.

The bandwagon is already rolling and it's not going to stop. Thousands of retailers have already installed NFC readers, including Pret A Manger and Starbucks, both of whom are enthusiastically promoting them as a means of payment that rewards brand loyalty and minimises queuing time.

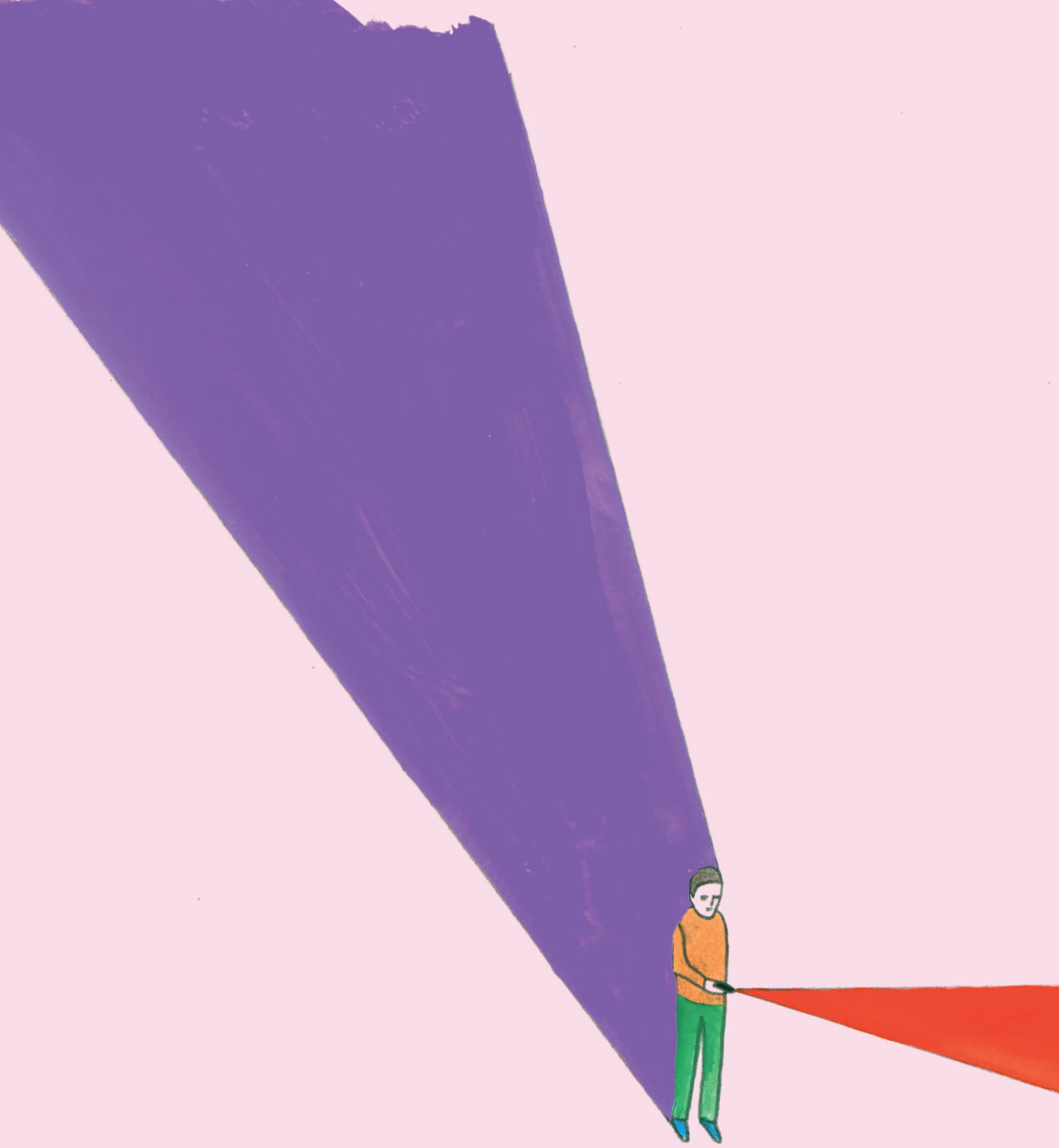
"NOT ONLY WILL YOU BE ABLE TO MAKE PAYMENTS FROM YOUR PHONE, THE SAME DEVICE WILL ALSO CONTAIN YOUR ID, RAILCARD AND ALL THOSE FRUSTRATINGLY ADDICTIVE MEMBERSHIP AND LOYALTY CARDS THAT YOU CAN NEVER FIND WHEN YOU ACTUALLY NEED THEM."

Over the next few years we'll see a range of devices offering NFC capabilities, but one point worth emphasising is the functionality of location-based services, such as being able to offer consumers personalised discounts on items. For example: you regularly frequent a large coffee chain, let's say Starbucks, but you haven't stopped in for three weeks. The Starbucks boffins could create a program that recognises this change in behaviour and, with your permission, sends you a message checking you're okay and asking if you'd like a free drink. Just imagine – maybe you've done something as simple as move office and there's no longer a Starbucks on your way to work. The NFC app can recognise a store close to your new journey and offer a tailored discount. Perhaps as you walk in, you receive a message offering you a free snack with your coffee, which you can redeem immediately through the wonders of NFC. The brand has gone out of its way to check that you're okay and thrown a free caffeine hit into the bargain. Brilliant: you're now as loyal as an old dog. The knock-on effect from word-of-mouth will be huge. Customers want brands to care about them, and NFC technology can help businesses do just that.

This is only one example of how smart and adaptable the technology is – and it's only going to get smarter and more interactive as it matures. Soon, NFC will affect all your daily habits, whether at the petrol station, supermarket or on a night out.

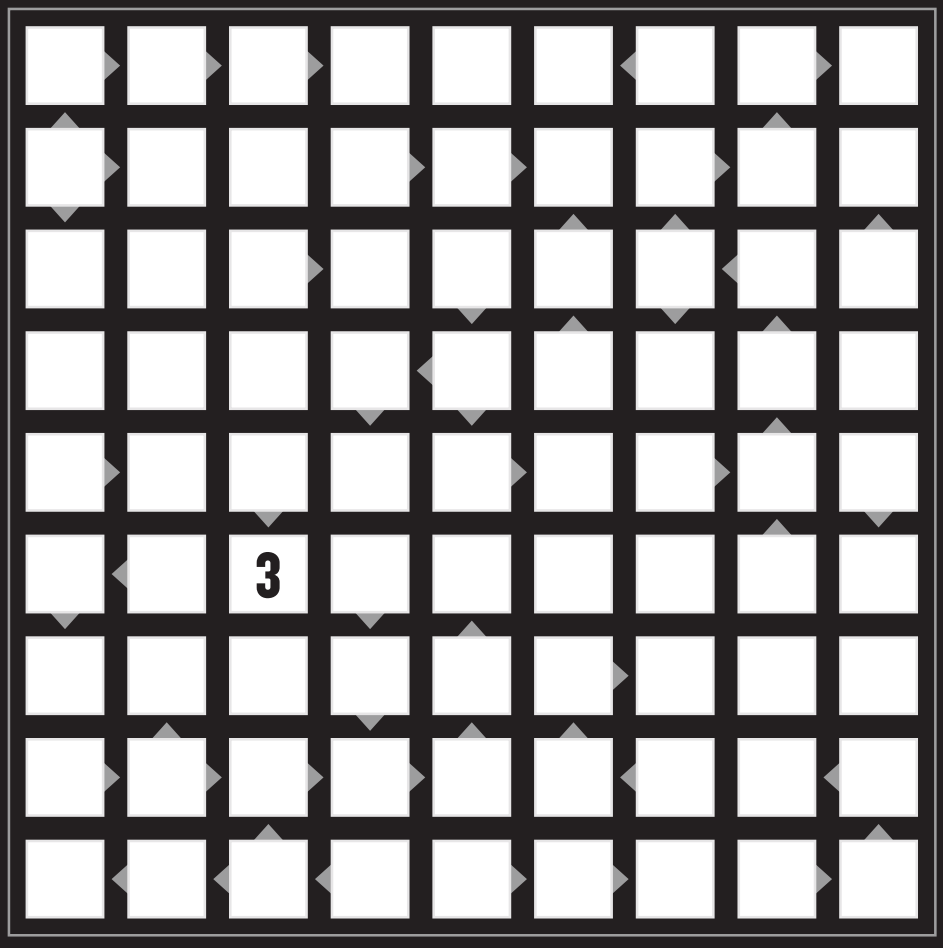
We're on the cusp of a new era in consumer relationships. The time to act on NFC is now; otherwise you'll be touching into the train after it's already left the station

FOR UP-TO-THE-MINUTE INFORMATION, VISIT NFCTIMES.COM. IF YOU WANT YOUR ORGANISATION TO GET INVOLVED IN AN NFC PROJECT, CONTACT THINKQUARTERLY@GOOGLE.COM.



LONG FLIGHT AHEAD

Named after the Japanese word for 'inequality', Futoshiki is a classic test of logic. Each horizontal and vertical line must be filled with the numbers 1-9. The same number can't occur more than once in any line. Your only clues is the number given and whether a number is greater than (>) or smaller than (<) the adjacent number.



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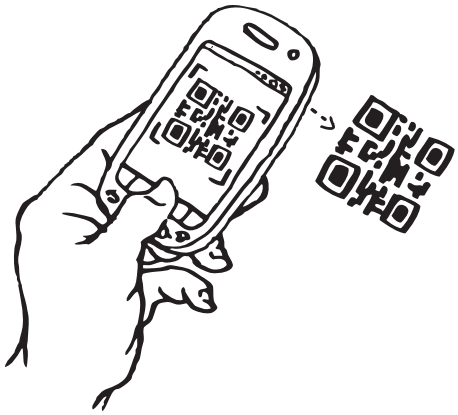

EXECUTIVE INSIGHT

A DATA STATE OF MIND

DATA FOR CHANGE

THE KNOWLEDGE

LUNCH WITH HAL

FULLY VIRAL

FROM STICKS TO CLOUDS

AD VALUE

OPEN FOR BUSINESS

SOFT VALUES, HARD FACTS

FREE YOUR POCKETS

THE MOBILE REVOLUTION

THE MOBILE

AS BARCLAYS CYCLE HIRE APPROACHES ITS FIRST BIRTHDAY, WE CONSIDER ITS STRENGTHS AND WEAKNESSES AS A SOURCE OF DATA, AND OFFER A UNIQUE VISUALISATION OF ITS MOST AND LEAST POPULAR DOCKING STATIONS.

WORDS BY
MATT BOCHENSKI

POP-UP BY
DAVID CARTER & DAVID PELHAM

ILLUSTRATIONS BY
ADAM HAYES

Launched on July 30, 2010, in central London with 5,000 bikes situated in 315 docking stations, the Barclays Cycle Hire scheme (known colloquially as 'Boris Bikes' after Mayor Boris Johnson) has established itself as a key part of the city's transport network, with over one million journeys undertaken in the first 10 weeks alone.

It was, as Transport for London (TfL) Project Manager Nick Aldworth explains, a huge undertaking. "The speed of development and system integration needed to meet the required launch date for Barclays Cycle Hire drove most of the challenges in the IT field," he says. "The final system had 14 interfaces for nine individual components supplied by international subcontractors to our service provider, Serco. Other big challenges coming out of the multi-national organisation involved supply chain logistics. At various times in the project, plans were changed or delayed due to volcanic ash clouds in Europe, floods in Mexico, a heat wave in Montreal and a hurricane in the US."

Data collection was a key consideration from the start, with data-capture technology worked into all facets of the system. "Every cycle, every member key and every docking point is identifiable via a unique RFID chip and number," says Aldworth. "This means they are traceable through the system, and at any given time we can ascertain where a bike is or which docking point it was most recently removed from.

"The system can also tell us which user removed that bike and, when it's returned, how long they had been riding. Our on-street equipment can then inform the Serco data centre in real time of the cycle distribution patterns as well as any problems with the terminal, payment device or any faulty cycles

that are reported. The data allows us to understand the customer and ensures that Serco provides the most efficient and responsive service possible."

But although TfL has an impressive data capture system in place, some critics have been less kind about its attitude to making that data available to others. Right now, much of the really innovative data use is being fuelled by independent designers and app builders, some of whom have clashed with TfL over its failure to release information in a timely fashion.

One of those is freelance data analyst Adrian Short. "A month before launch, TfL issued a press release calling on developers to get involved and help contribute to the scheme's success," he explains. "Six months and more than two million journeys later, developers are still using unreliable hacks to get the data they need to power their apps. Currently, TfL is publishing no open data about the cycle hire scheme and no real-time data about bike and docking station availability to help cyclists." Furthermore, he says, "Developers wanting access to the official datasets must apply for permission to access them, stating their intentions and agreeing to a lengthy and onerous contract. This is a huge disincentive to casual experimentation and also to commercial developers who discover that their access to necessary data can be revoked unilaterally at any time."

The sheer speed with which the project was put together has, in effect, weighed against it. "We were unable to anticipate some of the demands we see today," admits Aldworth. "The procurement process for the service provider began in mid-2008 and expectations around data provision have moved on remarkably since then, not least in expectations around real-time data and in facilitating applications for the smart phone market.

"As a public sector body, it's important to us to be as transparent as we can, but we have to balance this within the limitations of a bespoke system, which is being developed and improved," he continues. "Our primary objective is to provide a transport service effectively and efficiently, and to provide the associated passenger information. When this coincides with the private sector's desire to utilise data to provide an additional service to the public then we do try to facilitate it, but many initiatives are competing for funding and there are always difficult choices to be made when investing public funds.

"It's in our interests and our customers' interests to provide a deep level of access to data," he concludes. "In the longer term it can be used by us, and by others, to make Barclays Cycle Hire bigger and better."


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