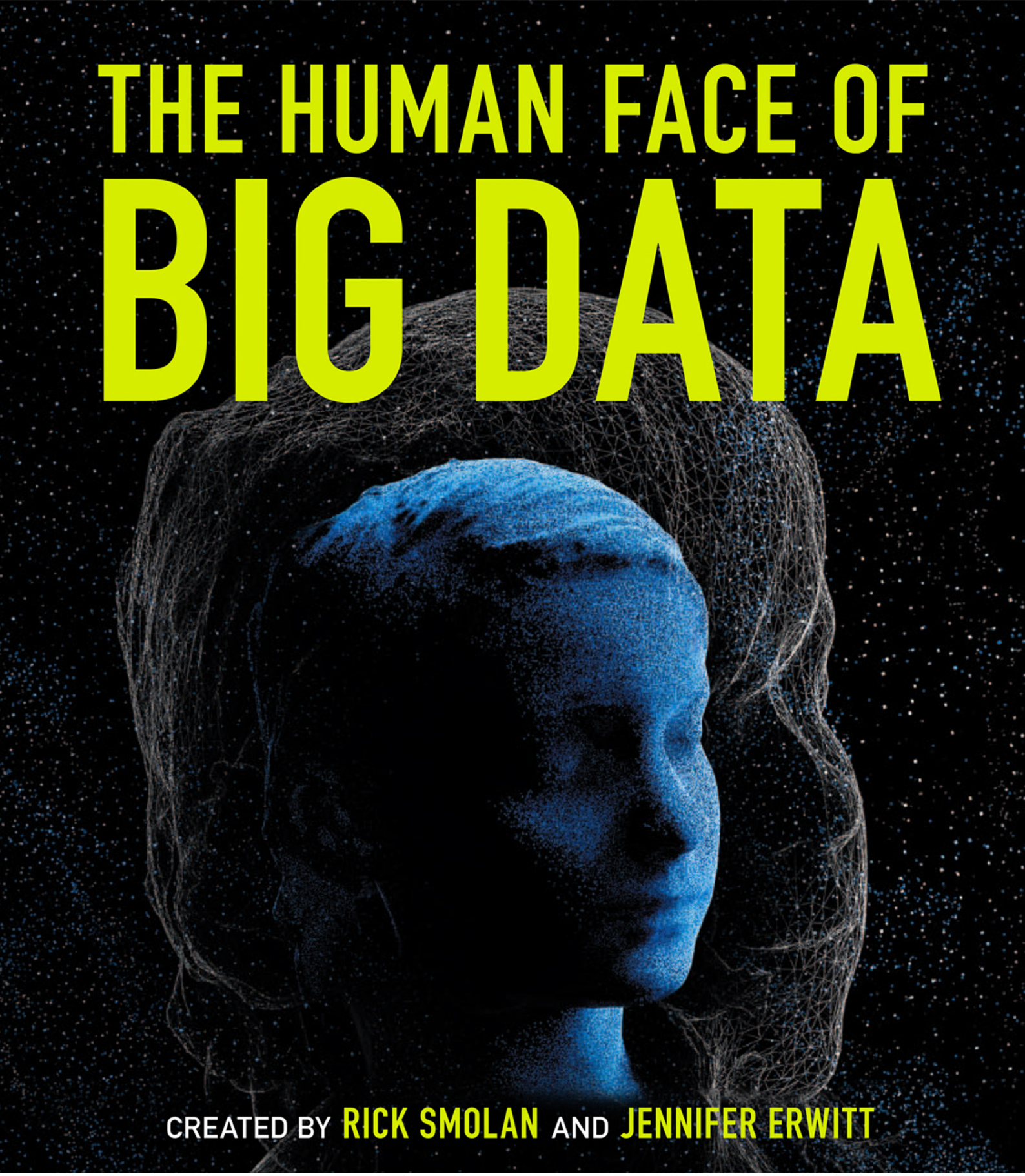
THE HUMAN FACE OF BIG DATA



CREATED BY RICK SMOLAN AND JENNIFER ERWITT

A **STUDY GUIDE** BY KATY MARRINER & SCOTT WISEMAN

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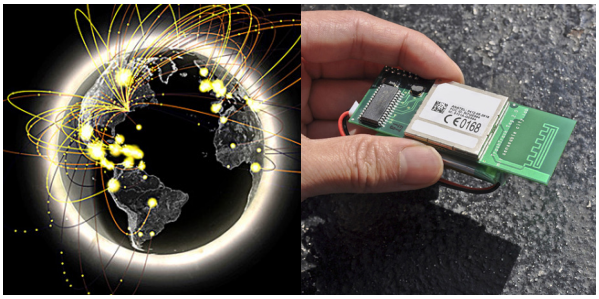
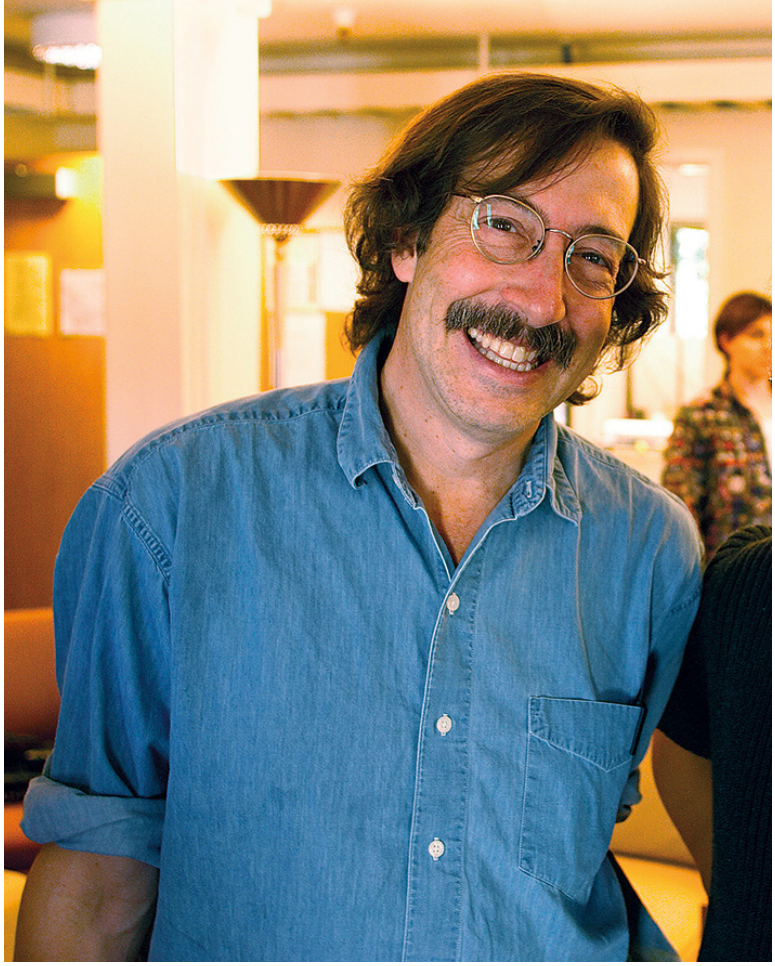




Cover image: Photo by Michael Tompert. **Top left:** Images from MIT Senseable City Lab. **Bottom left:** Photo by Christoph Morlinghaus. **Right:** Photo from Against All Odds Productions.

'Our goal is to help people better understand, visualize and navigate the wild and uncharted territory of Big Data' – Rick Smolan

The Human Face of Big Data is a multi-platform media project that explores the world of Big Data. The project's intention is to start a global conversation about an information revolution that tracks our existence in ways never before possible. The book, interactive viewer app, iPad ebook and documentary invite us to consider the promise and the peril of humanity's ability to collect, analyze and visualize the vast amounts of data generated by modern existence.

The Human Face of Big Data (Against All Odds Productions, 2012) is a 224-page hardcover large format book created by Rick Smolan and Jennifer Erwitt. The book contains essays, photographs and infographics illustrating the existence and impact of Big Data.

The Human Face of Big Data book is powered by an interactive viewer app. The free app enables readers to access multimedia content by pointing the camera on their smartphone or tablet towards pages flagged with a yellow key symbol. The *Human Face of Big Data Viewer* app is available for download on iOS: https://itunes.apple.com/us/app/human-face-of-big-data-viewer/id573317206?mt=8 and Android devices: https://play.google.com/store/apps/details?id=com.aurasma.skinned.human_face_of_big_data_viewer.

The Human Face of Big Data iPad ebook draws on content from the book and enables users to access multimedia content about the Big Data revolution. The iPad ebook can be purchased online at https://itunes.apple.com/us/app/big-data-tablet-app/id579041860?ls=1&mt=8.

The Human Face of Big Data (2014) is a documentary directed by Sandy Smolan. The documentary can be purchased from ro*co films at http://www.rocoeducational.com/the_human_face_of_big_data.

Visit *The Human Face of Big Data* website at http://humanfaceofbigdata.com/ and https://www.facebook.com/FaceOfBigData. Follow *The Human Face of Big Data* on Twitter at https://twitter.com/FaceOfBigData.

CURRICULUM LINKS:

This study guide to accompany *The Human Face of Big Data* provides information and suggestions for learning activities for middle school and senior school students. *The Human Face of Big Data* has relevance to units of work in Digital Technology, English and Media. *The Human Face of Big Data* is a valuable resource for extended investigations, interdisciplinary projects and inquiry based learning tasks exploring the nature, role and impact of Big Data in present and future societies in the subjects listed above and in subjects such as Environmental Science, Ethics, Geography, Health and Physical Education, History, Science and Visual Art.

In Digital Technology, *The Human Face of Big Data* can be used to support student investigations of the role technologies play in transforming, restoring and sustaining the lives of people and societies locally, nationally and globally. Having examined content from *The Human Face of Big Data*, students will be required to make informed and ethical decisions about the role, impact and use of technologies, and present their findings as digital projects.

In English, *The Human Face of Big Data* can be used to discuss the place of information and communication technologies in their lives and in contemporary societies. Students will be required to examine content from *The Human Face of Big Data* and create and present their own written, spoken and multimodal texts.

In Media, *The Human Face of Big Data* can be used to explore the emergence of new media technologies. Students will be required to investigate the changes, possibilities and issues that arise from the development of new technologies and how these alter audience experience and understanding of the media.

The Human Face of Big Data is a valuable resource to promote interdisciplinary learning. Students will be required to work collaboratively to carry out an investigation that focuses on a research question about Big Data. The investigations will allow students to develop their capacity to explore, justify and defend their research findings in oral, written and multimodal forms to an audience.

Schools are recommended to purchase copies of the book and documentary for classroom use and for students to use in conjunction with the iPad ebook and interactive viewer app. The iPad ebook and interactive app support individual learning and small group collaboration. The iPad ebook and interactive app have links to a number of streamed videos from the web therefore it is recommended that you have a Wi-Fi (preferred) or cellular connection. The iPad ebook includes added material and interactive capabilities.

While many links could be made to relevant online resources, teachers and students are encouraged to use the Internet to locate the most up to date, as well as age level appropriate information about Big Data.

Above: Image from Against All Odds Productions.

WHAT IS BIG DATA?

'FROM THE DAWN OF CIVILIZATION UNTIL 2003, HUMANKIND GENERATED FIVE EXABYTES OF DATA. NOW WE PRODUCE FIVE EXABYTES EVERY TWO DAYS…AND THE PACE IS ACCELERATING.' – ERIC SCHMIDT, EXECUTIVE CHAIRMAN, GOOGLE

- When did data begin?
  Timelines of the history of data can be found online. Begin your research at: https://www.wolframalpha.com/docs/timeline/.

Data is facts, statistics and items of information collected together for reference or analysis. The average person processes more data in a single day than a person in the 1500s did in an entire lifetime.

- Working with a partner list examples of data. Share your list with the class.
- Who collects data? Why?
- What types of data do you think are collected about you every day?
- Do you willingly share data with others?
- What do you think people, organizations and companies do with your data?

'BIG DATA IS GIVING US A BRAND NEW WAY TO SEE THINGS.' – RICK SMOLAN

- View the opening sequence of *The Human Face of Big Data* documentary: 0.00:00 – 0.03:57.

Rick Smolan, one of the co-creators of *The Human Face of Big Data* first encountered the term Big Data at a conference in 2011 and had no idea what it meant. It is believed that the term was coined in 1997 by NASA researchers Michael Cox and David Ellsworth to describe the challenge of processing and analyzing vast amounts of computer-generated information. *The Human Face of Big Data* project both defines and demystifies the concept. In his foreword to *The Human Face of Big Data* (Against All Odds Productions, 2012), Smolan contends that our lives are being transformed by Big Data.

'BIG DATA STARTED AS A SERIES OF SMALL WAVES BUT IS MORPHING INTO THE GREATEST TSUNAMI OF INFORMATION THAT HUMANS HAVE EVER SEEN. WHAT WE CHOOSE TO DO WITH ALL OF THIS NEW DATA MAY LEAD TO ONE OF THE BIGGEST ADVENTURES OF ALL TIME.' – JUAN ENRIQUEZ

Above: Photo by Stephen Wilkes.

At its most simple Big Data can be defined as lots of information. The term is used to describe the accumulation and analysis of information. Big Data is about people: what they do, where they go, who they know and so on. Big Data is not just more information but rather new ways of seeing and extracting meaning from information.

Big Data is usually defined in terms of its volume, velocity, variety, variability and value. Some experts define Big Data as more information than can fit on a personal computer. Other experts say that it isn't the information, but the tools that show the patterns within it. Then there are those who claim that Big Data is a term to describe the process of helping the planet grow a nervous system. What they do agree upon is that Big Data used carefully and wisely has the potential to improve human existence.

'WE'VE REACHED A TIPPING POINT IN HISTORY: TODAY MORE DATA IS BEING MANUFACTURED BY MACHINES, SERVERS, AND CELL PHONES, THAN BY PEOPLE.' – MICHAEL E. DRISCOLL

How big is Big?

Data is measured in bytes. A byte is a unit of digital information that most commonly consists of eight bits. A kilobyte equals 1,024 bytes. A megabyte equals 1,024 kilobytes. A gigabyte equals 1,024 megabytes. A terabytes equals 1,024 gigabytes. A petabyte equals 1,024 terabytes. An exabyte equals 1,024 petabytes. A zettabyte equals 1,024 exabytes. A bit can be abbreviated to a 'b'. A byte can be abbreviated to a 'B'.

- Look at the iPad ebook page with the image of Times Square on it. Use the click for more button to see how many gigabytes of data have been created, how many tweets have been sent, how many apps have been downloaded and how many photos have been shared on Instagram while you view the page.
- If you had to explain Big Data to someone else what would your definition be?
- Is Big Data a part of your daily existence?
- Do you create Big Data?
- 'Big Data is much more than big data.' – Dan Gardner
  Read 'An Ocean of Data' by Dan Gardner. 'An Ocean of Data' can be accessed on pp. 14 – 15 of *The Human Face of Big Data* and can be read on the iPad ebook.
  Why does Gardner define Big Data as 'oceans of information'?
  In his introduction to *The Human Face of Big Data*, Gardner claims that ordinary actions such as having our groceries scanned at the supermarket, our home electricity meter report a reading, a parcel passing a FedEx checkpoint and a customs officer checking a passport are all examples of Big Data.
  Working with a partner, list other examples of Big Data. Share your list with the class to generate a comprehensive list of Big Data.

Above: Photo by Catherine Balet.

Above: Photo by Jack Parker. **Below:** Photo by Erin Patrice O'Brien

REFLECTIONS IN A DIGITAL MIRROR

'BIG DATA COULD KNOW US BETTER THAN WE KNOW OURSELVES.'
– DAN GARDNER

Data suggests that many babies have an online presence that predates their actual birth. Parents-to-be keen to share their happy news with family and friends post a black and white sonogram on Facebook or Instagram or Twitter. Within hours of a baby's birth, a photograph is sent via text message announcing his or her safe arrival.

In his introduction to 'Reflections in a Big Mirror', Juan Enriquez examines the way we live our lives online, documenting who we are, whom we are with and what we like every time we search, post, blog, tweet, share, comment, search, check in, like and unlike.

While it is overwhelming to think that the world's total data is doubling every two years, Enriquez acknowledges that what is really overwhelming is 'what we, as individuals, attempt to digest daily'.

- What makes up your daily online diet?
- Read the introduction to 'Reflections in a Digital Mirror' by Juan Enriquez. The essay can be accessed on pp.18 – 21 of *The Human Face of Big Data* and can be read on the iPad ebook.

INVESTIGATION: YOUR DIGITAL REFLECTION

If you looked into a digital mirror, what would you see? The purpose of this task is to assess your online presence and to construct your digital reflection.

A. Google your name. What does a Google search tell you about you?

Log out of all your online accounts. Type your name into the Google search window. Why do you have a presence on the Internet? Is that presence a consequence of your actions or someone or something else? How many other people share your name? If somebody else Googled you what would they learn about you?

Unlike your parents and grandparents your adolescence is Googleable. What does the data that you have collected tell you about your digital self? Make a record of your search results. Did you find what you expected to find? Are there any surprises? Are there any results that you would rather not see?

B. Selfies

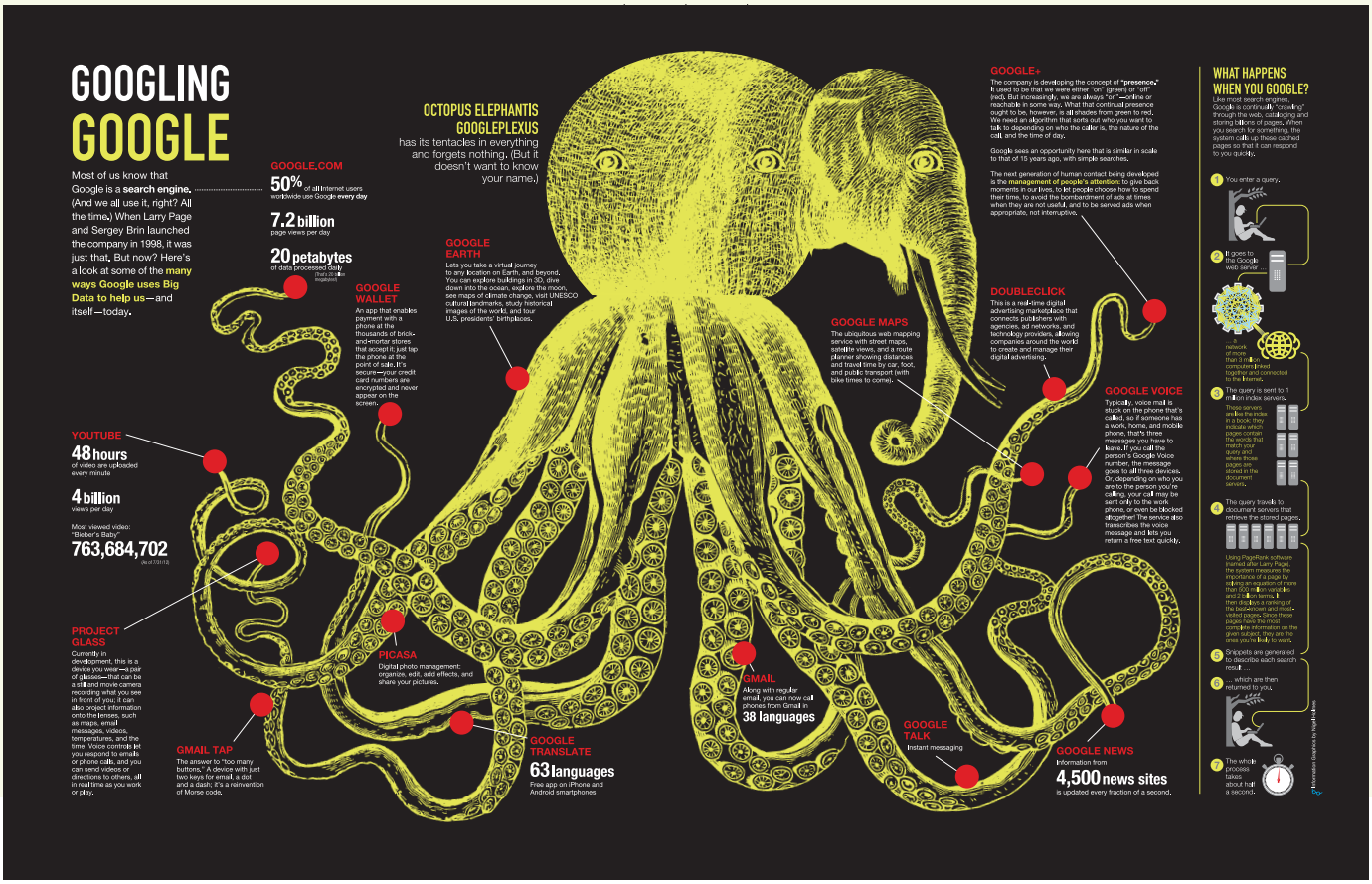
A selfie is a photographic self-portrait, typically taken with a hand-held digital camera or camera phone. Selfies are typically taken with a camera held at arm's length or in a mirror. Selfies are portraits of the photographer. A group selfie includes the photographer and as many other people that can fit into the shot.

The first photographic self-portrait was taken by Robert Cornelius in 1839. Cornelius produced a daguerreotype of himself. He did not post the photograph online but today it can be viewed on the Internet. Just type 'Robert Cornelius' into the Google search window and the image will appear.

* A daguerreotype is an obsolete photographic process employing an iodine-sensitized silvered plate and mercury vapour.

In 2013, the word selfie was announced as word of the year by the Oxford English Dictionary. You can read about why 'selfie' won online at http://blog.oxforddictionaries.com/2013/11/word-of-the-year-2013-winner/.

Is the taking of selfies part of your daily



Above: Illustration graphics by Nigel Holmes.

or weekly routine? Why do people take selfies? Is it an act of self-expression? Is it narcissistic? Is it about validation? How many selfies are in your digital photograph album? What do your selfies say about you? Who is the audience of your selfies? How do you share your selfies? Why do you share your selfies? Are you a Snapchatter or an Instagrammer?

C. Life logging

'Eating a sandwich. LOL'

Are you logging your life online?

Make a list of your online accounts. For example do you have a Facebook page? Do you have an Instagram account? Do you have a Twitter account? Do you use Tumblr or have a Tumblr? Are you a blogger? Are your online accounts an archive of all that you do and all that you are? What do your status updates say about you? Is your digital self the real you?

D. Your digital reputation

What type of netizen are you? Do you care about your online identity? Is your online presence positive? Have you ever posted something online that you later regretted? Did you edit or delete the post?

Does your online presence include things that were intended to be private, or inaccurate information posted by someone else?

Your digital reflection is also the information that others post about you online. What have others posted about you online?

E. Have you made a digital mess?

Each of us now leaves a trail of digital exhaust, an infinite stream of phone records, texts, browser histories, GPS data, and other information that will live on forever.

How many obsolete online profiles do you have? How many email addresses do you never use? How many folders and files do you never open? Do you ever empty the trash?

F. In conclusion

Drawing on all the data that you have collected, compile your digital reflection.

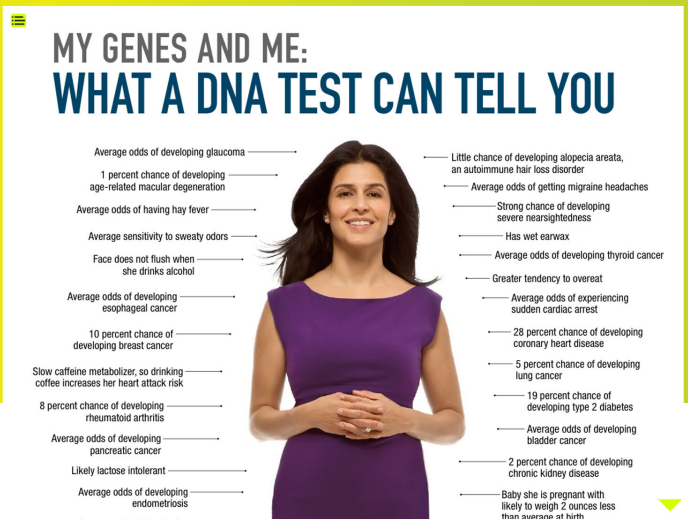
DISCUSSION: GOOGLING GOOGLE

'Google's mission is to organize the world's information and make it universally accessible and useful.' – Google

Google is an American multinational corporation specializing in Internet-related services and products. These include search, cloud computing, software, and online advertising technologies. Google's unofficial slogan is 'Don't be evil'. Fifty percent of all Internet users worldwide use Google every day. Google's 'Ten things we know to be true' statement – http://www.google.com.au/about/company/philosophy/ – explains the corporation's philosophy.

- What Google products do you use on a regular basis? For more information about Google's products,

Above: Photos by Andrew Esiebo; illustration from Against All Odds Productions.



Above: Photo by Douglas Kirkland.

visit http://www.google.com.au/about/products/.

Read the 'Googling Google' infographic on pp.38 – 39 or on the iPad ebook. When using the iPad ebook students can tap any of the red dots to gain further information about the Google elements. Students should also look at 'What happens when you Google?'

- Is Google good?
- Where would you be without Google? Lost? Do you ever use any other search engine?
- Give up Google?
  Your challenge is to go a week without using Google. Keep a digital diary. Your daily entries should offer an account of how you searched and found (or didn't find) the information that you needed.
- In 1986, only six percent of the world's data was digital and 'www' was still three years away. There was no Google.
  Interview someone who was born Before Google (BG) or went to school in the days BG. How did they survive? How did they cope? How did they get anything done?
- Drawing on all that you have considered about Google, design a Google infographic that describes your relationship with Google.

SMART VIEWING

Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:

- 'Hidden Aspects of Death' p.22
- 'A Digital Library Free to the World' p.24
- 'The Birth of a Word' p.30 and also available on iPad ebook.
- 'A Prosthetic Eye to Treat Blindness' p.43

OUR DATA, OURSELVES

In the introduction to 'Our Data, Ourselves' Kate Greene examines the phenomenon of self-tracking.

Self-tracking is the practice of systematically recording information about one's diet, health, or activities, typically by means of a smartphone, so as to discover behavioural patterns that may be adjusted to help improve one's physical or mental wellbeing.

- Read Kate Green's essay 'Our Data, Ourselves' on pp.44 – 47 or on the iPad ebook.

Greene believes that personal data collecting has huge potential payoffs. Self-trackers have the potential to change their behaviour for the better and improve their health and wellbeing. Self-tracking allows individuals to know their most productive time of day; eliminate foods that may cause aggravation; and improve their sleep habits. Applied more broadly, data collected by self-trackers could support the diagnosis of illnesses before symptoms become obvious and help find better treatment for diseases. A world in which it is easy to collect and securely share data with medical researchers could be a healthier place for us all.

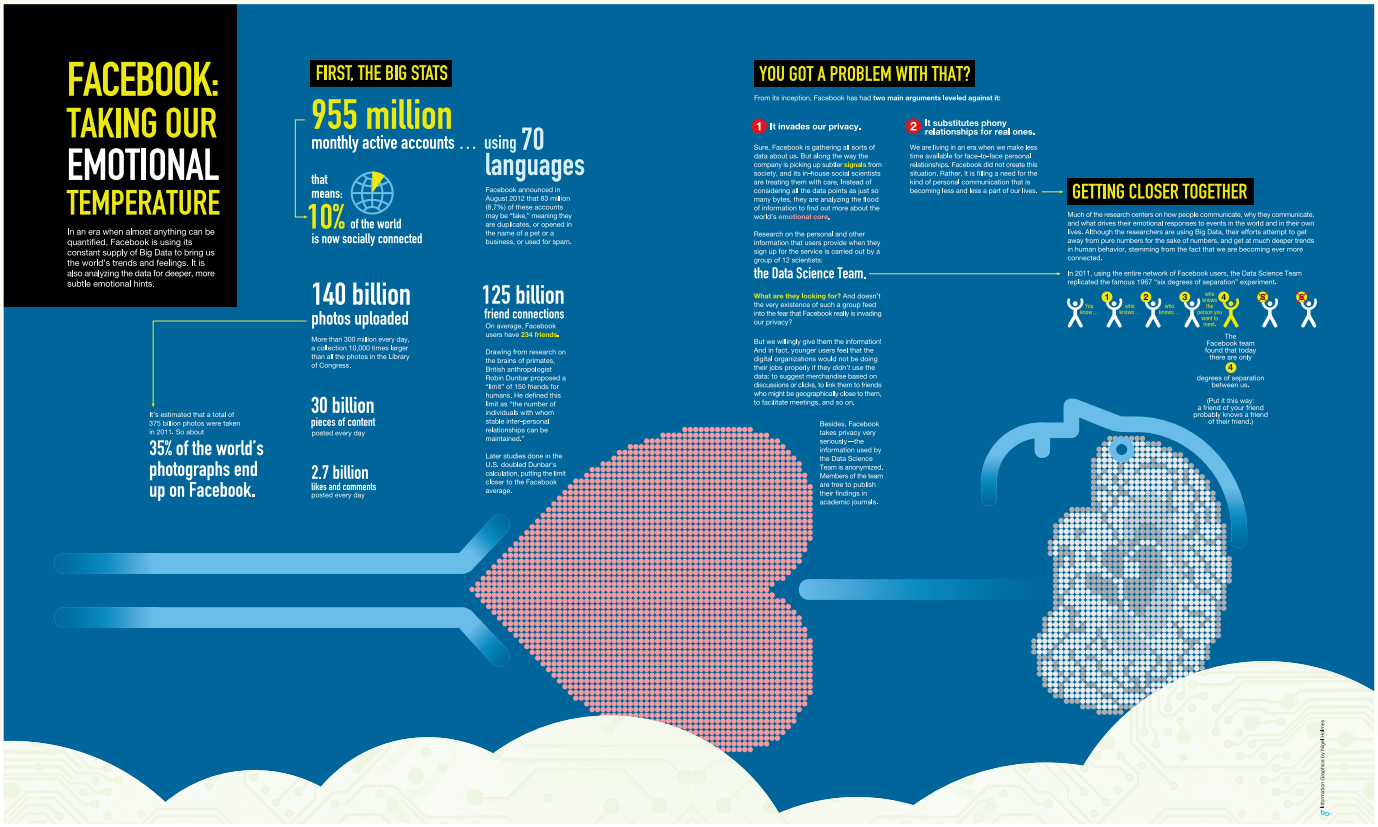
Benjamin Franklin, inventor and one of the founding fathers of the United States, was a self-tracker. He was interested in improving his character and accomplishing his ambitions. In order to accomplish his goal, Franklin developed and committed himself to a personal improvement program that consisted of adhering to 13 virtues. Franklin used a small book filled with charts to track his progress.

While today, most self-trackers are fitness fanatics, most people have at some point in their lives tracked data about themselves. They may have written a list of goals or used a calendar to help them break a bad habit or maintain a good one.

- Working as a class, list both small data and big data examples of self-tracking.

INVESTIGATION: SELF-TRACKING

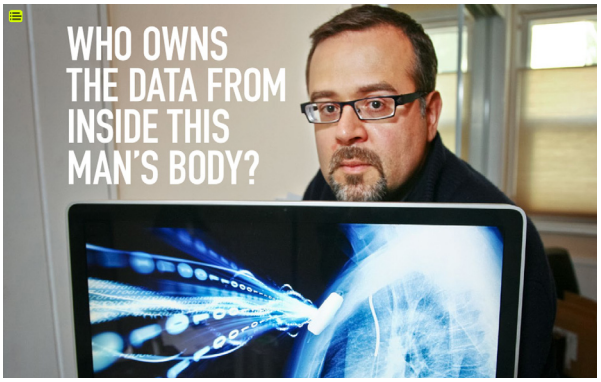
- In his essay 'Quantifying Myself' on pp.54 – 57 of *The Human Face of Big Data* and on the iPad ebook, A J Jacobs argues that studies show that keeping



Above: Illustration graphics by Nigel Holmes. **Below:** Photo by Laura A. Oda.

track of your body's numbers makes you behave in healthier and more productive ways.
Do you agree with Jacobs? Why?

- Are you a self-tracker? How do you self-track? Why do you self-track? What do you do with the data? Has self-tracking helped you to achieve self-improvement and your ambitions? Do you know who owns the data that you collect?
- There's an app for that.
  Is your phone a window into your behaviour?
  Your task is to trial an app that has been designed to improve an individual's health and wellbeing. When you have finished trialing the app, write a review of the app and evaluate the app's impact on your health and wellbeing.
- Why might people not want to use an app to keep track of their lifestyle?
- Read the case studies about self-tracking that are featured on pp.48 – 53, pp.58 – 60 and pp.64 – 67 and pp.72 – 73.
  These case studies provide examples of how Big Data can not only improve the health and wellbeing of individual and society but also save lives.



Working with a partner, prepare a report about a self-tracking device that can help mankind.

- Not all self-tracking devices are about matters of life and death. For most diehard sports fans, sports-tracking has enabled them to become even more knowledgeable about and involved with their team, individual players and the whole sport. Sports-tracking has increased the amount of data that the sports fan has access to.
  Read about how sports-tracking is influencing the sport of baseball on pp.68 – 69 and on the iPad ebook.
  Access 'One second in a major league baseball' using the iPad ebook. Thanks to Big Data, we're getting smarter playing, better coaching and for fledging and diehard baseball fans alike, all over the world, a whole new view of this venerable game.
  What are the benefits of sports tracking for athletes, teams, coaches and sports fans?
  If you or someone you know is part of a sports team ask them if they use sports-tracking to improve their performance? If yes, identify what data is being collected, who has access to the data and what it is used for.
  There are a number of sports-tracking apps available for free. As a class you may like to trial and review some of the apps.
- Data access activists are alarmed by who has legal ownership of the data that an increasing number of sensors are collecting for our bodies.
  On the iPad ebook you can read about e-patient Hugh Campos' and his story of self-tracking. His TEDx talk provides additional information about his experience.
  Discuss the pros and cons of medical practitioners gathering and using data about an individual's health.

DISCUSSION: FACEBOOK: TAKING OUR EMOTIONAL TEMPERATURE

Do you have a Facebook account? Why?

Facebook is using its constant supply of Big Data to inform us about what we are thinking and feeling.

Read the 'Facebook: Taking our emotional temperature' infographic on pp.38 – 39. The infographic is also available on the iPad ebook.

- What is meant by the term 'emotional temperature'?
- Is everybody on Facebook? What do the statistics suggest about Facebook's popularity and the role it plays in its users lives?
- From its inception, Facebook has had two main arguments leveled against it:

1. It invades our privacy
2. It substitutes phony relationships for real ones.
   Fans of Facebook challenge the critics, arguing that it takes privacy very seriously and that it is actually bringing us closer together.
   Hold a class debate about one of the following propositions:
   - 'That Facebook is good for society.'
   - 'That Facebook makes the world smaller.'
   - 'That Facebook is a social evil.'

SMART VIEWING

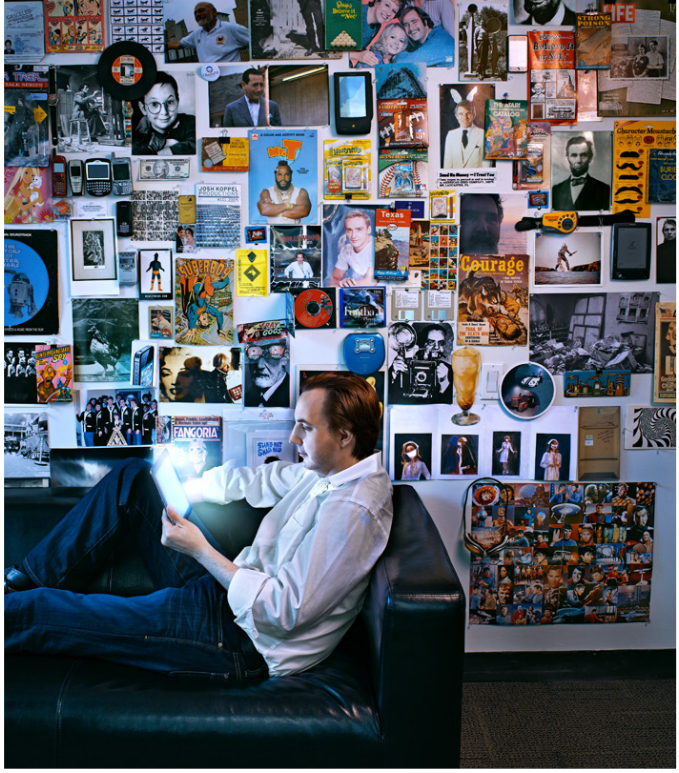
Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:

- 'Fantastic Voyage: A motion picture that crosses a new frontier' p.50
- 'How healthy living almost killed me' p.56
- 'ICD Patient Engagement' p.59
- 'Hold On' p.70

DARK DATA

'BOTH LAW ENFORCEMENT AGENCIES AND CRIMINALS ARE BENEFITING IN DRAMATIC WAYS FROM INFORMATION TECHNOLOGY AFFORDED BY THE BIG DATA REVOLUTION.' – MARC GOODMAN

In the introduction to 'Dark Data' Marc Goodman examines the threats to a techno-utopia. While new and emerging technologies allow law enforcement agencies



Above: Photo by Brad Trent. **Below:** Photo by Gordon Bell.

to fight crime and counter terrorism, digital technologies can aid traditional forms of crime and allow others to perpetrate cybercrimes. Goodman draws on the Sony Playstation hack that compromised more than 100 million accounts to exemplify his case.

How do we protect ourselves from cybercrime? Goodman contends that the tools to fight cybercrime are: crowdsourcing, citizen journalism and investigation, cloud computing and global wireless broadband communications. He offers the example of the Organized Crime and Corruption Reporting Project that is using crowdsourcing to expose what dictators are doing with stolen public funds around the world.

The Big Data revolution holds the promise of empowering all of us with knowledge, products and services that will make our lives measurably better. Yet Big Data also carries the potential for unintended consequences. It is imperative that as individuals and as a society we tread carefully and exercise caution. There is a need to be diligent in our use of Big Data and for us to work together to create the techno-utopia we all hope for.

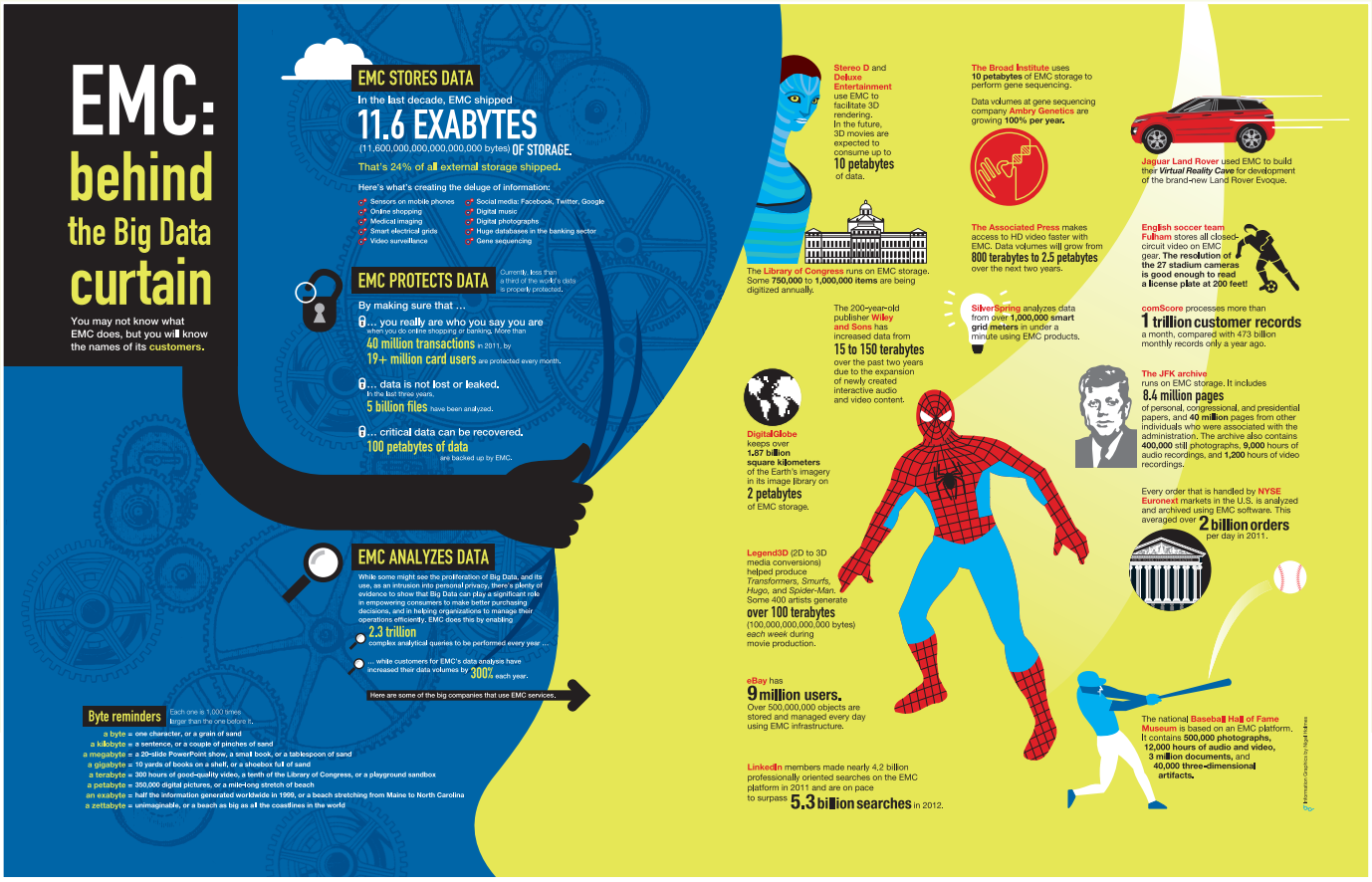
'THE DECISIONS WE MAKE DURING THIS PERIOD WILL FRAME THE KIND OF WORLD WE'LL LEAVE TO FUTURE GENERATIONS.' – JOHN BATELLLE

- Utopia, noun. An imagined place or state of things in which everything is perfect.
  Drawing on the definition of utopia, write a definition of a techno-utopia?

'CRIMINALS, TERRORISTS AND HACKERS UNDERSTAND THE POWER OF OUR CONNECTIVITY: IF YOU CONTROL THE CODE, YOU CONTROL THE WORLD.' – MARC GOODMAN

INVESTIGATION: CREATING A TECHNO-UTOPIA

- Read Mark Goodman's essay 'Dark Data' on pp.74 – 77. The essay is also available on the iPad ebook.



Above: Illustration graphics by Nigel Holmes.

What does Goodman identify as the dangers of Big Data?
What does Goodman believe will protect us from the dangers of Big Data?
Read the case studies about the role that Big Data can play in law enforcement and action against terrorism that are featured on pp.78 – 91.

- Does Big Data keep you safe?
  Make a list of the ways that Big Data protects you from harm and makes your local community a safer place to live. For example: CCTV and facial recognition software.
- What would happen if you lost your smartphone or your iPad or your laptop?
  Would your privacy be compromised? How can you use the settings on your mobile digital devices and applications to protect yourself and your personal data?
  Do you play it safe when you are online?
- Interview an adult about his/her technology habits and challenges.
  How do you use new (or old) technologies to create and share? How do you manage your devices and online security? How do you manage your personal passwords? How have you overcome the online challenge of people's nastiness? What creative pieces do you share online? What is your publicly viewable digital identity and footprint like? What happens when your name is 'Googled'?
  What do you think? Do the benefits of providing data outweigh the privacy concerns?
- Goodman is hopeful that we will create a future that can be called a techno-utopia but what if we fail? Dystopian fiction from George Orwell's *Big Brother* to Suzanne Collins' *Hunger Games* trilogy provides stories of oppressive and dehumanizing nightmare worlds.
  Your task is to write an imaginative narrative describing a techno-dystopia.

DISCUSSION: SURVEILLANCE

In her essay 'The Sentient Sensor Mesh' on pp.97 - 99 of *The Human Face of Big Data* Susan Karlin examines the television series *Person of Interest* in which former CIA agent John Reese (Jim Caviezel) teams with billionaire software genius Harold Finch (Michael Emerson) to identify future victims of violent crime. Pattern recognition software identifies the anticipated victims, while cutting-edge surveillance technology tracks them down and stops the crime occurring.

Read 'The Sentient Sensor Mesh' and watch the official trailer for *Person of Interest* online at: https://www.youtube.com/watch?v=_xAK3ueOJxE. The essay and video link are available on the iPad ebook.

Karlin claims that *Person of Interest* has touched a cultural nerve about our increasing lack of privacy in a world of Big Data.

- When are you under surveillance?
  Working with a partner, list the advantages and disadvantages of surveillance devices and systems. Share your list with the class.
- Who collects Big Data? What do they use it for? How can we be sure that those who collect Big Data will use it responsibly?

Above: Photo by Timothy Archibald.

Above: Photo by Emily Jacobi.

Can you access data collected about you? What are your rights? What codes of conduct and laws are in place to protect your privacy? Should you have more control of the data that you create and the data that others collect from you and about you?

- Ever heard of Wikileaks? Who is Edward Snowden? Why is Chelsea Manning currently serving a 35-year jail sentence?
  Read pp.94 – 95 of *The Human Face of Big Data*. Why do individuals like Julian Assange the founder of Wikileaks, Edward Snowden and Chelsea Manning advocate for open-information? Are they Big Data outlaws or should we be grateful for whistleblowers like Assange, Snowden and Manning?
- Hold a class forum to share your views on the topic: Can we stop Big Data becoming Big Brother?

SMART VIEWING

Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:

- 'Person of Interest' pp.98 - 99
- 'mPedigree Network: Fighting Counterfeit Drugs' p.100

PULSE OF THE PLANET

'WE NOW LIVE IN A WORLD OF BILLIONS OF INTELLIGENT DEVICES THAT ARE SELF-AWARE, THAT COMMUNICATE AMONG THEMSELVES AS WELL AS WITH COMPUTERS. AND, ULTIMATELY, WITH PEOPLE.' – ESTHER DYSON

With the evolution from the mainframe computer to portable digital devices such as tablets and smartphones, society has moved from the Computer Age to the Information Age and now to the Big Data Age.

Esther Dyson's essay 'Pulse of the Planet' describes the immense change wrought by three things: the Internet and the web; the rise of digital devices; and sensor technology. These innovations are creating an increasingly autonomous data universe and are allowing us to make informed decisions about the world we live.

The undeniable benefit of this Big Data universe as Dyson sees it, is that while we do not have the power to know the future we now have the ability to change it.

Dyson's essay can read on pp.102 – 103 of *The Human Face of Big Data* and on the iPad ebook. The case studies on pp.104 – 133 highlight how Big Data is allowing us to create a better, safer and sustainable world. The case studies can also be found on the iPad ebook.

INVESTIGATION: GPS

- What do the letters GPS stand for?

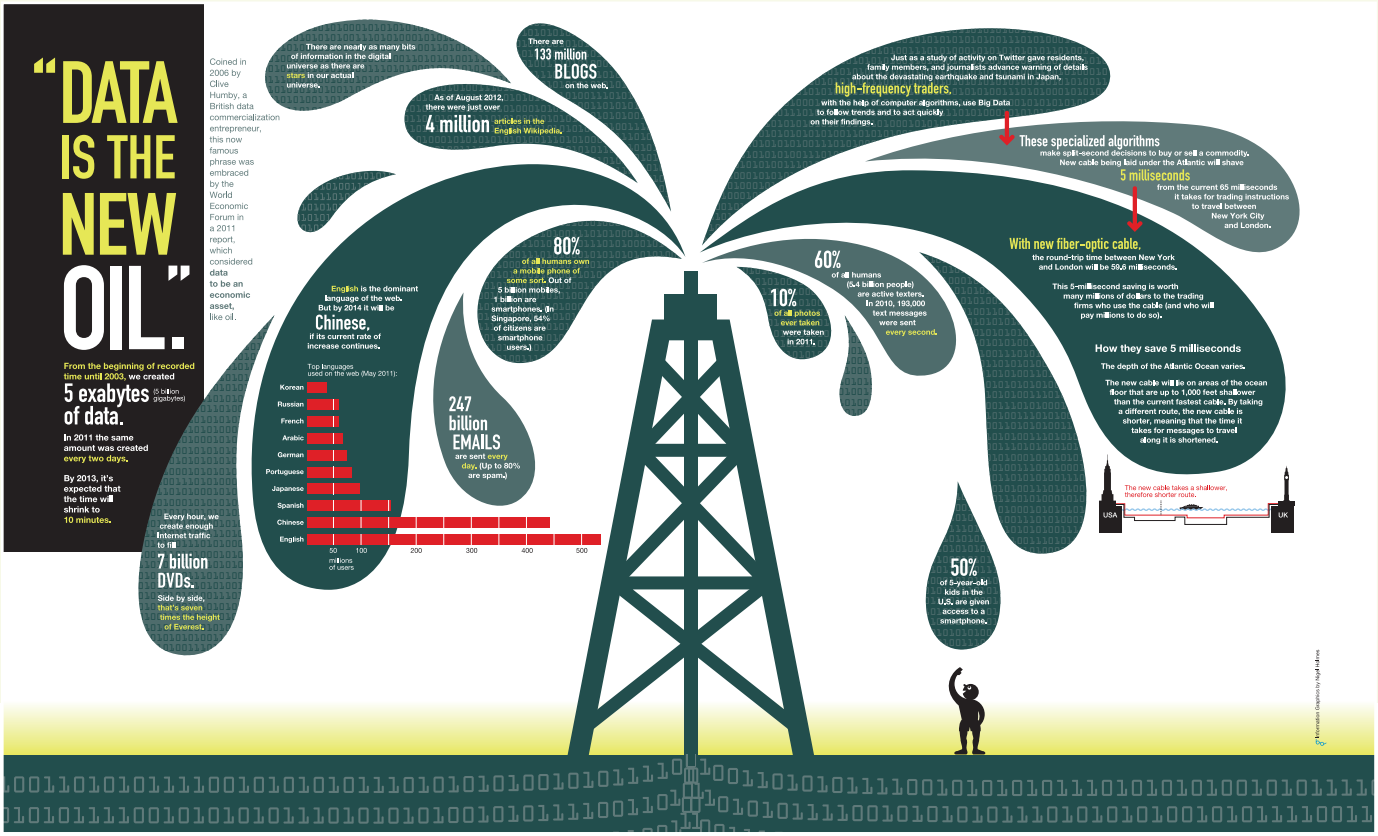
The Global Positioning System (GPS) is a space-based satellite navigation system formed by satellites orbiting the earth and their corresponding receivers on the earth. The GPS provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

GPS now makes it possible to pinpoint a location to anything you do on your mobile phone, whether it's making a call, taking a photo, or searching for something on the Internet. Given the billions of GPS-enabled devices in circulation and the frequency with which they are used, the amount of data generated is huge.

- Working with a partner make a list of the civilian applications of GPS. Share your list with the class.
- How can the data created by GPS technology improve human existence?
- How can the data created by GPS technology help us to help the planet?

DISCUSSION: DATA IS THE NEW OIL

The phrase 'Data is the new oil' was coined in 2006 by Clive Humby, a British data commercialization entrepreneur. In 2011, a World Economic Forum report considered data to be an economic asset like oil.



Above: Illustration graphics by Nigel Holmes. **Below:** Both images from MIT Senseable City Lab.

Read the 'Data is the new oil' infographic on pp.134 – 135 or on the iPad ebook.

- Why is data called the 'new oil'?
- If data is the new oil, how can we prevent a big data spill? Can we really trust those companies that drill for data?
- 50% of 5-year-old kids in the US have access to a smartphone. 80% of all humans own a mobile phone of some sort. Out of 5 billion mobiles, 1 billion are smartphones.
  When were you given or did you buy your first mobile phone? Did you need a mobile phone or did you want one? Do you own a smartphone? What type of data do you send? What type of data do you receive? What type of data do you access? What type of data do others gather when you use your smartphone?
- What other devices do you own?
  Think about the following questions. When was the last time you jotted a note on a piece of paper or wrote a handwritten letter? Have you ever taken a photograph using a film camera? Are family photograph albums a relic of the past? Do you use a diary to keep track of the times of your life?
  Undertake an audit of the devices that you have in your household. What are they used for? What did you use before you had these devices?
  Ask your parents to tell you about the devices that they had when they were your age. Ask your grandparents or someone from that generation about the devices that they had when they were your age.
  Prepare a report based on your findings.

SMART VIEWING

Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:

- 'WAZE the Map that Constantly Redraws Itself' p.170
- 'TRASH|TRACK' p.110

Above: Photo from Kyodo News. **Right:** Graphic from Against All Odds Productions.

HOW CROWDSOURCING IS CHANGING SCIENCE

In his essay 'How Crowdsourcing is Changing Science' Gareth Cook describes the power of crowdsourcing. Drawing on the work of Ancient Lives, Cook establishes the new approach to the conduct of modern scholarship – citizen science. By tapping the time and enthusiasm of the general public, research projects once considered too onerous or too ambitious can be realized. Citizen science has accelerated research in a diversity of fields and is offering an imaginative answer to the central problem of 21st century science; that there is too much information. Scientific research, once a closed shop, has moved on, democratizing discovery and allowing the emergence of a new type of scientist who is adept at recognizing problems and can design and lead projects.

Read 'How Crowdsourcing is Changing Science' on pp.136 – 139. The essay is also available on the iPad ebook.

INVESTIGATION: CROWDSOURCING SCIENCE

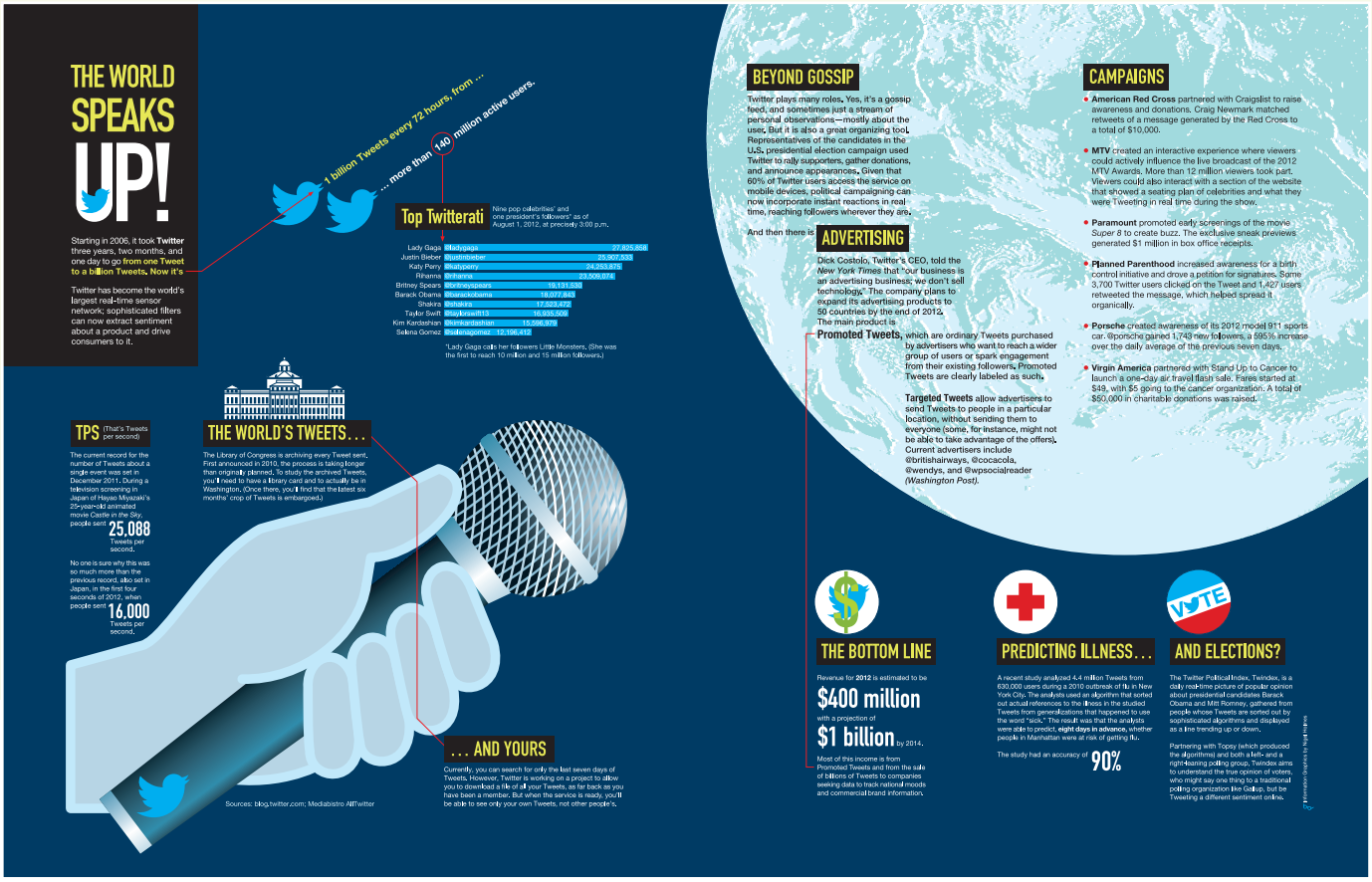
- Write your own definition of the term crowdsourcing. Write your own definition of the term citizen scientist. Write you own definition of the term citizen journalist.

Read the case studies about crowdsourcing on pp.140 – 149 and pp.152 – 157. Case studies are also available on the iPad ebook.

- Drawing on these case studies, list the advantages of crowdsourcing science. Are their any limitations to crowdsourcing science?
- Use the Internet to learn more about a citizen science project. Prepare a multimedia report about the project to present to the class.
  Your presentation should:
  - Describe the project and the origins of the project
  - Identify the purpose of the project
  - Explain the importance of the project
  - Name the organisers of the project
  - Describe the citizen scientists who became involved in the project
  - Explain the role of the citizen scientists
  - Describe the outcomes of the project
  - Evaluate the project's success
- Think about a recent natural disaster or a current environmental issue.
  What information is available about it? How was this information collected and distributed and by whom? What role did citizen scientist play in this event or is playing in this issue? What role did citizen journalist play in this event or is playing in this issue?
- Applications for smartphones and tablets mean that we can all be citizen scientists. Investigate the citizen science apps that are crowdsourcing science. If it is possible trial one of the citizen science apps and then share your experience with the class.

DISCUSSION: THE WORLD SPEAKS UP!

Twitter is a powerful form of communication. The microblogging site launched by Jack Dorsey on March 21, 2006 is responsible for making the flow of information faster and is regarded as the world's largest real-time sensor network. News spreads fast but so do rumours. Our heroes are only a tweet away and celebrities are



Above: Illustration graphics by Nigel Holmes.

all too willing to share. Thanks to Twitter we now have 'thought leaders', people with opinions that have the capacity to set and reset the agenda.

Read the 'The World Speaks Up!' infographic on pp.150 – 151. The infographic is also available on the iPad ebook. Share your thoughts with the class.

- What is the first official tweet?
- Do you have a Twitter account? Why?
  Do you tweet? Are you a retweeter?
  Who do you follow? Why? Do you follow any of the people listed in the Top Twitterati? Who follows you?
- Working with a partner, make a list of the advantages of Twitter. Share your list with the class.
- Can one hundred and forty characters change the world? Is Twitter a means to achieve democracy? Source another example of the power of Twitter to do good. Share your example with the class.
- What's wrong with Twitter?

SMART VIEWING

Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:

- 'Japan's Early earthquake Warning Service' p.140 (A real time seismograph is available of the iPad ebook.)
- 'The Revolutionary Optimists' pp.152 – 153
- 'Massive-scale Online Collaboration' pp.156 – 157

A DEMOGRAPH OF ONE

'BIG DATA IS TRULY REVOLUTIONARY BECAUSE IT FUNDAMENTALLY CHANGES MANKIND'S RELATIONSHIP WITH INFORMATION.' – MICHAEL S MALONE

In the introduction to 'A Demograph of One', Michael S Malone argues that 'the history of mankind has always been influenced by a shortage of knowledge'. Now the opposite appears to be the case; an information surplus may soon define our lives. Malone believes that the Big Data revolution will shift mankind's relationship with information, initiating a cultural transformation. We can know everything about everyone.

'TODAY A STREET STALL IN MUMBAI CAN ACCESS MORE INFORMATION, MAPS, STATISTICS, ACADEMIC PAPERS, PRICE TRENDS, FUTURE MARKETS, AND DATA THAN A U.S. PRESIDENT COULD ONLY A FEW DECADES AGO.' – JUAN ENRIQUEZ

Malone believes that we now have the chance to become the centre of our own knowledge universe one that constantly reconfigures itself to match our needs. Big Data is revolutionizing demand from mass customization to mass specialization. That is every product and service will be offered to us in exactly the way we need it, not how manufacturers want to deliver it.

Read 'A Demograph of One' on pp.158 – 159 of *The Human Face of Big Data*. The essay is also available on the iPad ebook.

'EVERY CENTURY, A NEW TECHNOLOGY – STEAM POWER, ELECTRICITY, ATOMIC ENERGY, OR MICROPROCESSORS – HAS

SWEPT AWAY THE OLD WORLD WITH THE VISION FOR A NEW ONE. TODAY, WE SEEM TO BE ENTERING THE ERA OF BIG DATA.' – MICHAEL COREN

DISCUSSION: A DEMOGRAPH OF ONE

- Drawing on the case studies featured on pp.162 – 171, pp.174 – 178 and p.182 – 183 in the book and the case studies available on the iPad ebook discuss the ways that Big Data is allowing us to take charge of our lives.
  What is the meaning of the term 'empowerment'? Can you think of other examples of the empowering nature of Big Data?
- Malone argues that Big Data promotes equality. Some critics of Big Data would challenge that Big Data does not promote a democratic and level playing ground. What do you think? Is Big Data the great equalizer? What evidence exists to support your stance? Be prepared to share your views in a class forum.

INVESTIGATION: IN THE CLOUDS

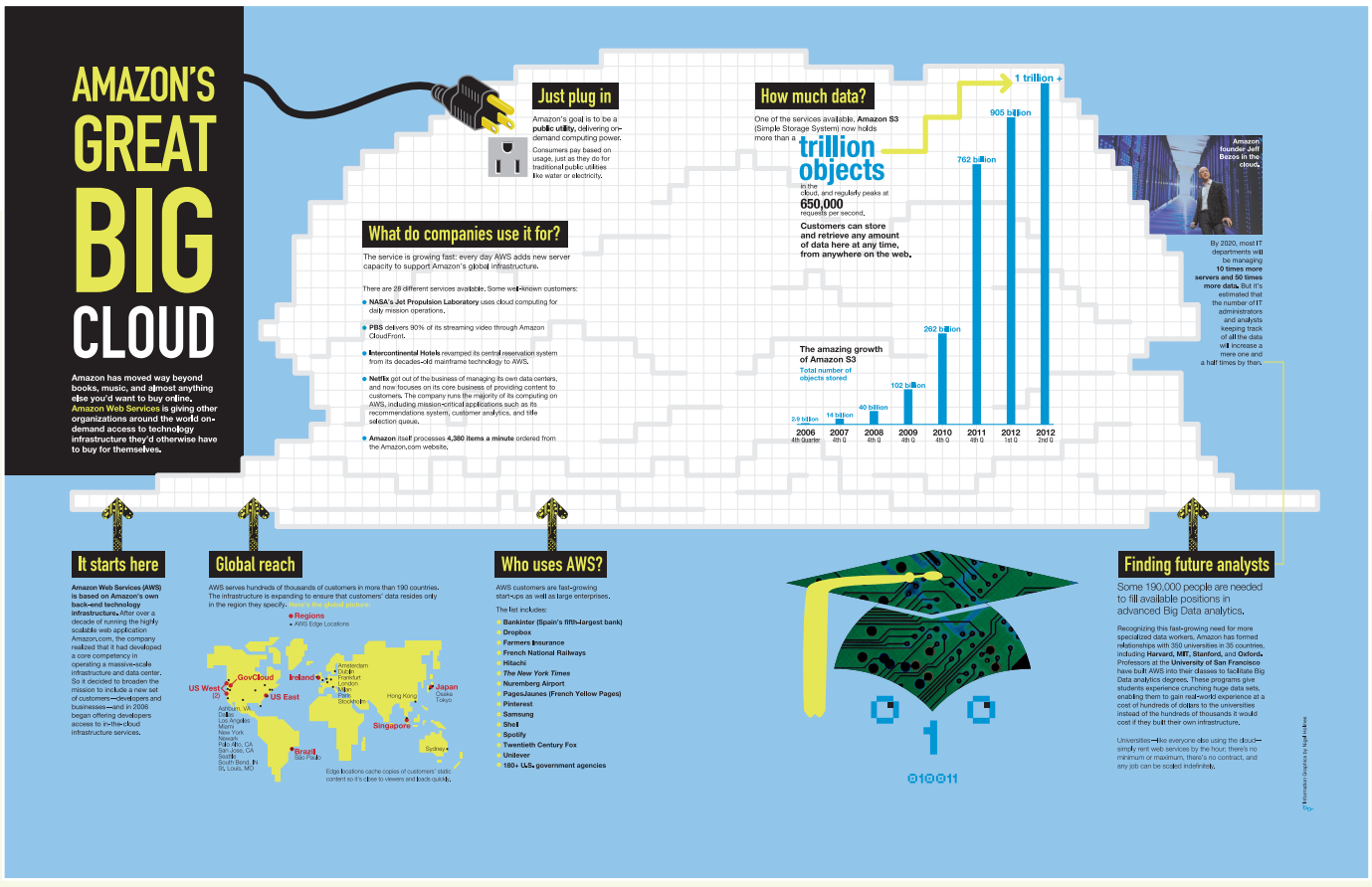
- What is cloud computing?
  Look online and you will find definitions like this: 'Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.' – National Institute of Standards and Technology

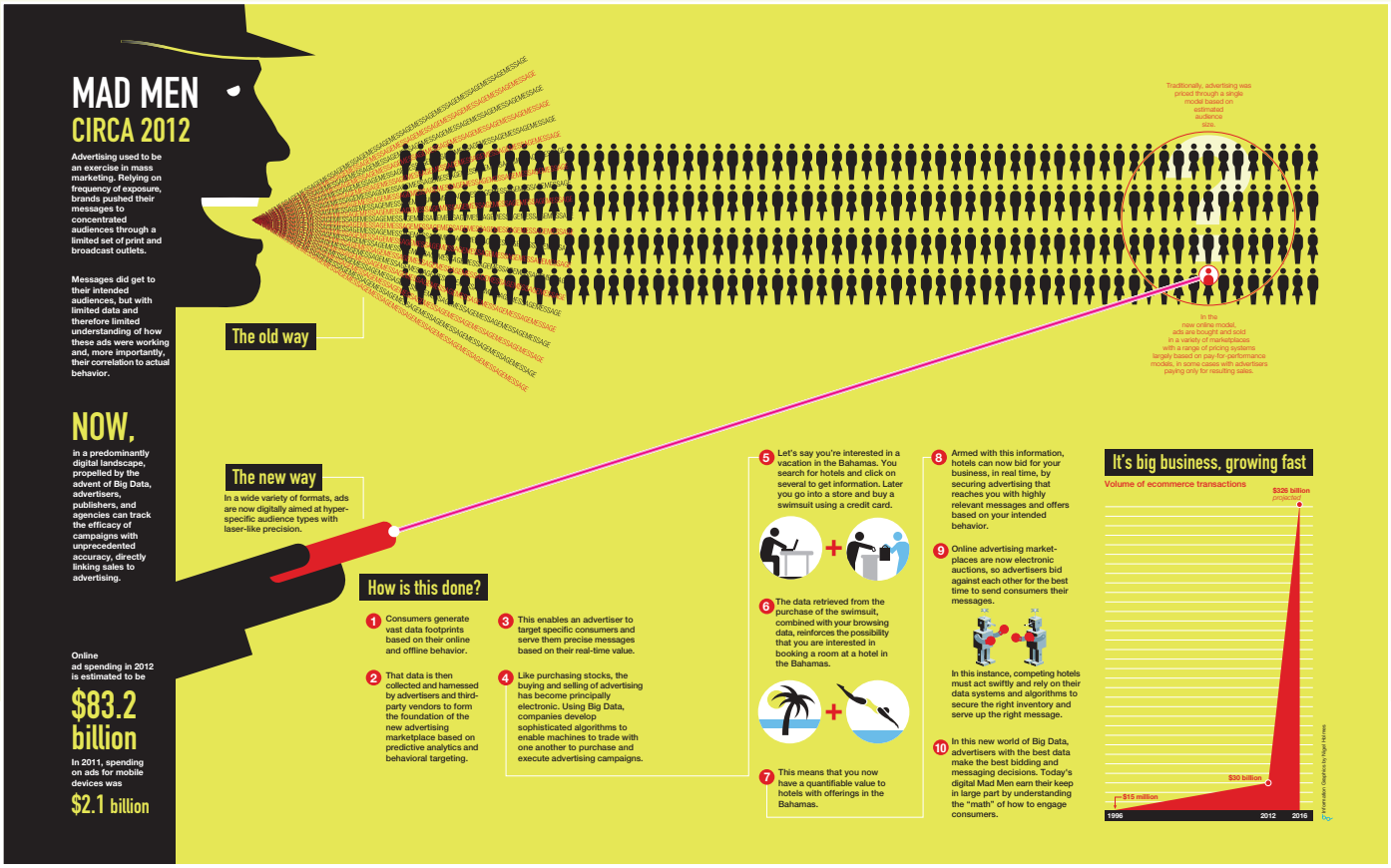
Above: Photo by Peter Menzel.

'The two-word explanation is that cloud is the internet.' – Zach Nelson, CEO of cloud software vendor NetSuite
Write your own definition of cloud computing.

- Amazon is more than just an online bookstore. Amazon Web Services is giving other organizations around the world on-demand access to technology infrastructure that they would otherwise have to buy for themselves.
  Read the infographic 'Amazon's Great Big Clouds on pp.172 – 173 also available on the iPad ebook.
  Amazon Web Services customers include Dropbox, Pininterest, Spotify and Netflix.
  Why do these companies rely on Amazon Web Services?
- Amazon S3 (Simple Storage System) allows its

Below: Illustration graphics by Nigel Holmes.





Above: Illustration graphics by Nigel Holmes.

customers to store and retrieve any amount of data at any time from anywhere on the web. Amazon S3 holds more than a trillion objects in the cloud.
Do you have a Dropbox? Do you use Gmail, Hotmail, Apple's iCloud or Google Docs?
What are the benefits of cloud computing?
What are the potential problems of cloud computing?

- On demand services such as Netflix, and Spotify offer users the technology to shape how, when and what they consume. What on demand services do you use? Why do you use these on demand services?
- Using free online software such as infogr.am (http://infogr.am/) or visual.ly (http://visual.ly/) to compile a class infographic that shows the class' use of cloud computing services.

DISCUSSION: MAD MEN CIRCA 2012

Big Data has changed the nature of marketing. The traditional notion of mass marketing has been superseded by more savvy campaigns that are dependent on the features of a digital and data driven landscape.

Read the 'Mad Men circa 2012' infographic on pp.180 – 181.

- Thinking about your time online, when are you most conscious of advertisements?
  Can you recall times when you realized that companies keen to help you spend your money were following your data footprints? Share your thoughts about and experiences of online advertising with the class.

SMART VIEWING

Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:

- 'The Nielsen Rating System of the 21st Century' pp.170 –171
- 'Pizza and the City' pp.174 – 175
- 'Let the Inventory walk and Talk' pp.182 – 183

THE ART OF DATA

'AT ITS BEST, DATA ART TELLS THE VIEWER SOMETHING NEW ABOUT OUR CULTURE, HOW WE LIVE OUR LIVES, AND HOW WE SEE THE WORLD.' – AARON KOBLIN

Digital art is an artistic work or practice that uses digital technology as an essential part of the creative or presentation process. Digital technology has redefined our understanding of traditional art forms and has allowed new forms to emerge.

Big Data offers unlimited creative possibilities. In his essay 'The Art of Data' artist and designer Aaron Koblin explains that data analysis and visualization have become indispensible tools in the hands of a new generation of artists – data artists, who are inspired to work with real world data and create new types of creativity.

INVESTIGATION: DATA ART

- Learn about Aaron Koblin and his works online at http://www.aaronkoblin.com/.
  View some of Koblin's project sites. Write a review of

Above: Photo from Dimension Films / Everett Collection.

the work featured on one of the project sites.

- View the work of the data artists featured in *The Human Face of Big Data* on pp.185 - 199. Share your opinions of the artists' work with your peers.
- Prepare a multimedia presentation on the data artist of your choice.
  Use the search term 'data artist' to locate information about data artists and their artworks. Having visited the websites of several data artists, choose a data artist as the focus of your presentation.
  Your presentation should include:
  - A brief biography of the data artist.
  - Information about the type of data that they collect and how they collect this data.
  - Information about the process or materials they use to create their artworks.
  - Descriptions of at least 3 artworks
  - A description of the way the data artists exhibits their artworks.
  - Your personal response to the data artist's artworks.

  When looking at new artwork use the phrases: I see; I think; I wonder.
  - I see – describe what you see
  - I think – I think that this is what the artwork means
  - I wonder – I wonder why the artist chose this material; why they exhibited in this space; etc.

  Use these questions to guide your responses to the data artist's artworks.
- An infographic is a graphic visual representation of information, data or knowledge intended to present complex information quickly and clearly.
  Just for fun: curate a class exhibition of your favourite infographics.
- Nic Felton is a data artist featured in *The Human Face of Big Data*. Learn about Felton online at http://feltron.com/.
  Watch the Nic Felton video 'Tell me a little bit about yourself' on the iPad ebook.
  If you have a Facebook account, use the Timeline feature to produce your own visual representation of the path your life has taken.

PRESENTATION: YOUR DATA ART

'TO BECOME A DATA ARTIST, ALL YOU NEED IS A LITTLE BIT OF PRACTICAL KNOWLEDGE AND A WHOLE HEAP OF IMAGINATION. THE WORLD IS WAITING TO WITNESS WHAT YOU CREATE.' – AARON KOBLIN

- Drawing on the inspiration of Nick Felton, create your own profile of your use of technology and produce it as a piece of art. It could be simply a series of graphics or you may want to express yourself as Felton does by using both graphics and text.

SMART VIEWING

Use the *Human Face of Big Data* interactive viewer app to access the following linked video content:
- 'Artfully visualizing our humanity' pp.186 – 187

DATA DRIVEN

'BIG DATA IS POWERFUL, BUT IT IS ETHICALLY NEUTRAL, WE HAVE TO CHOOSE HOW TO USE IT' – JONATHAN HARRIS

In the introduction to 'Data Driven' Jonathan Harris claims that software engineers through the software they design and deliver are transforming the daily lives of hundreds of millions of people. Harris invites us to think of software as a new kind of medicine. Unlike medicine that acts on a single human individual, software acts on the behavioural patterns of entire societies.

- Read "Data Driven' by Jonathan Harris. The essay can be accessed on pp.200 – 203 of *The Human Face of Big Data* and on the iPad ebook.

Harris acknowledges that software caters to human urges and is often designed to be addictive. Companies whether they are marketplaces like Etsy or attention economies like Facebook want the users of their products to keep coming back and so they look for ways to make their products 'sticky' and 'viral'.

Below left: Photo from Rob Harcourt / Macquarie University.
Below right: Photo from Chris Oosthuizen / University of Pretoria.

What Harris sees as essential is that tools should be used by their users rather than the other way around. While it is imperative that computer hardware and software companies behave ethically, it is essential that we play our part in shaping a Big Data future that benefits humanity.

INVESTIGATION: THE DATA DRIVERS

'WE'LL SEE THIS AS THE TIME IN HISTORY WHEN THE WORLD'S INFORMATION WAS TRANSFORMED FROM AN INERT, PASSIVE STATE, AND PUT INTO A UNIFIED SYSTEM THAT BRINGS THAT INFORMATIVE ALIVE.' – MICHAEL NIELSEN

- Working as a class list as many examples as you can of marketplaces and attention economies.
  Choose a company from each list. Compile a profile of each of the companies that you have selected. Follow each profile with a statement that explains the way that you use each company's product. To conclude, write an evaluation that judges whether you use the product or whether the company uses you.
- Drawing on Harris' essay, list the reasons why it is important for software companies to make ethical decisions.
- *The Human Face of Big Data* introduces its audience to the 'data drivers', those men and women who have driven and are driving change. Read the profiles of the data drivers on pp.204 – 217. Read the profile of Hilary Mason, Ambassador of Big Data on the iPad ebook.
  Adopting the format of the profiles featured in *The Human Face of Big Data*, compile a profile of another 'data driver'.
- Read 'Hip to be Square' on the iPad ebook. Square is a company that has created Pay with Square app that enables customers to pay for products using their phones rather than cash or a credit card. Discuss the advantages and disadvantages of this software.
- 'Not everything that can be counted counts, and not everything that counts can be counted.' – Albert Einstein
  Discuss the meaning of Einstein's statement. Why do you think the creators of *The Human Face of Big Data* have brought this claim to their audience's attention?

Above: Photo from Against All Odds Productions. **Below:** Illustration by Northrop Grumman.

PRESENTATION: A BIG DATA FUTURE

Having explored the ways that Big Data is shaping your existence, how do you think it will shape the lives of future generations? What kind of data will be collected? How will the data be collected? Think about new devices that might exist. What will companies do with the data? How will our lives change? Will the change be positive or negative?

Your task is to prepare a statement that offers your description of a Big Data future.

Draw on the knowledge and understanding that you have gained during your study of *The Human Face of Big Data* project.

Students should complete this work as a class vlog so that all students in the class can view and respond to one another's work. This approach will further the discussion of possible technological change and of the likely impacts of such changes.

THE HUMAN FACE OF BIG DATA – THE DOCUMENTARY

‘In the near future every object on earth will be generating data including our homes, our cars and even our bodies. Our devices are turning each of us into human sensors and we’re leaving a trail of digital exhaust; a perpetual stream of texts, location data and other information that will live on forever. We’re being exposed to as much data in a single day as our 15th century ancestors were exposed to in an entire lifetime. But also in this ocean of data there’s a frighteningly complete picture of us: where we live; where we go; what we buy; what we say; it’s all there. This is the story of an extraordinary revolution that is sweeping almost invisibly through our daily lives and how our planet is beginning to develop a nervous system, one that each of us is a part of. This is the human face of Big Data.’ – Narrator

In *The Human Face of Big Data* (Sandy Smolan, 2014), experts from a diversity of fields offer their view of the impact of Big Data. The titled sequences of the documentary can be viewed in conjunction with the study of associated information from the book, interactive viewer app and iPad ebook. Teachers are encouraged to use print and electronic resources that provide students with current local, national and global case studies.

- Watch the opening sequence of *The Human Face of Big Data* as a class.
  Drawing on the opening sequence, define the term ‘Big Data’.
  Spend time as a class discussing and defining what is mean by the phrase ‘human face’.
  How does the opening sequence portray ‘Big Data’ and ‘the human face of Big Data’?

Above: Photo by Catherine Balet.

DOCUMENTARY DATA CHART

As you watch the documentary use the PMI (Plus, Minus and Interesting) chart to identify the advantages and disadvantages of Big Data. ***See Table on page 22.*** Use the Interesting section of the chart to record information about Big Data. Provide examples from both the documentary (Evidence 1) and your own knowledge of the world of Big Data (Evidence 2) to explain the advantages and disadvantages that you have listed.

Having gathered data about Big Data, the outcome of your investigation is a multimedia response that offers your informed view of Big Data. You should draw on the knowledge and understanding that you have gained from completing activities linked to the book, interactive viewer app and iPad ebook. Your presentation will become part of a class installation about Big Data.

BIG DATA:

DATA: REVEALING INVISIBLE WORLDS

Data: Revealing invisible worlds examines the impact of the data sets collected by early astronomers such as Copernicus and how advances in the analysis of scientific data such as the microscope changed the way we see the world. Jay Walker from TEDMED claims that Big Data is just like a microscope letting us see what we would never see before.

DATA: KNOWLEDGE INVERTED

Data: Knowledge inverted identifies the transition from a time before Big Data existed to today’s after Big Data world. Joi Ito from MIT Media Lab explains the difference between data then and now:

‘Before what we did, we thought of things and then we wrote it down and that became knowledge. Big Data is kind of the opposite. You have a pile of data that isn’t knowledge really until you start looking at it and noticing wait maybe if you shift it this way and shift it this way this turns into this interesting piece of information.’ John Battelle from Federated Media labels the invention of ‘Search’ as the moment that shifted society from the BD (Before Data) to the AD (After Data) era.

DATA: EVERYTHING IS QUANTIFIABLE

Data: Everything is quantifiable proposes that

almost everything is measurable and quantifiable. Technology now allows us to store and process mass quantities of data and access the power of large data sets. Visualizing that data allows us to see how complex systems function; to identify patterns; and to extract meaning in ways that were previously impossible.

DATA: SEARCHING THE SEARCHES

Data: Searching the searches shows how researchers are able use data from online searches to predict flue epidemics. Rick Smolan, one of the creators of *The Human Face of Big Data* explains that searching isn't a one way street but rather a real time feedback loop that allows us to discover patterns and respond appropriately.

DATA: LEARNING REVEALED

In **Data: Learning revealed** the research completed by Deb Roy from Blue Fin Labs highlights the power of Big Data to improve our understanding of human learning and in turn improve human learning. Roy spent two years collecting data about how children acquire language using his own child as the subject of his research. His findings challenge accepted understandings about language acquisition.

DATA: WATCHING OVER US

In **Data: Watching over us** Dr Carolyn McGregor from the University of Ontario establishes how collecting data about premature babies can improve neonatal care and save lives.

DATA: DIGITIZING OURSELVES

Data: Digitizing ourselves examines the process and consequences of digitizing the medical essence of a human being. Big Data can support the work of health professionals, improve human health and provide preventative health care. In this sequence geneticist Linda Avey explains, 'We are definitely moving into a world where the patient, or the person, is at the centre of things and hopefully also at the controls. People will have access to the data that is informative around the type of disease they have and then that data can point much more directly to proper treatment.'

DATA: BUILDING A GLOBAL BRAIN

Data: Building a global brain considers how Big Data can shape the decisions we make and the systems that we are a part of. Rick Smolan, co-creator of *The Human Face of Big Data* project suggests that we are all 'nodes on the network' contributing information that has the potential to improve our and human existence.

DATA: CREATING INTELLIGENT SYSTEMS

In **Data: Creating Intelligent Systems** Jennifer Pahlka from Code for America describes how Big Data gives ordinary people greater control. Pahlka draws on the example of the city of Chicago to show how Big Data can be used to improve urban infrastructure and the lives of the residents.

DATA: MAPPING THE COST OF JUSTICE

Data: Mapping the cost of justice draws on incarceration statistics in Brooklyn and the idea of Justice Reinvestment to argue that what makes Big Data big is not just the volume of data that can be generated but the stories that emerge from the tonnes of data. Looking for and responding to these stories can improve human existence.

DATA: UNRAVELLING EPIDEMICS

Data: Unraveling epidemics acknowledges the humanitarian role that Big Data can play in promoting better standards of living in developing countries. John Battelle claims that, 'Understanding on the ground; information on the ground; data on the ground can change the way people apply resources which are intended to try to help'.

DATA: EMPOWERING THE CROWD

Data: Empowering the crowd examines the phenomenon of social media and its ability to help people during times of natural and man-made crisis and to galvanize those people who want to help by drawing on the example of crowd mapping during the Haiti earthquake and Hurricane Sandy.

DATA: THE FUTURE OF REVOLUTION

In **Data: The Future of Revolution** Jack Dorsey, Twitter founder acknowledges that today's technology 'allows an idea to be spread instantly'. It is the instant nature of Big Data that allows individuals to challenge injustice and find themselves part of a digital collective.

DATA: TARGETING YOU

Data: Targeting You uses the example of tracking the retail behaviour of customers at Target to examine the way data sets can be used to track and shape consumer behaviour.

DATA: THE DARK SIDE

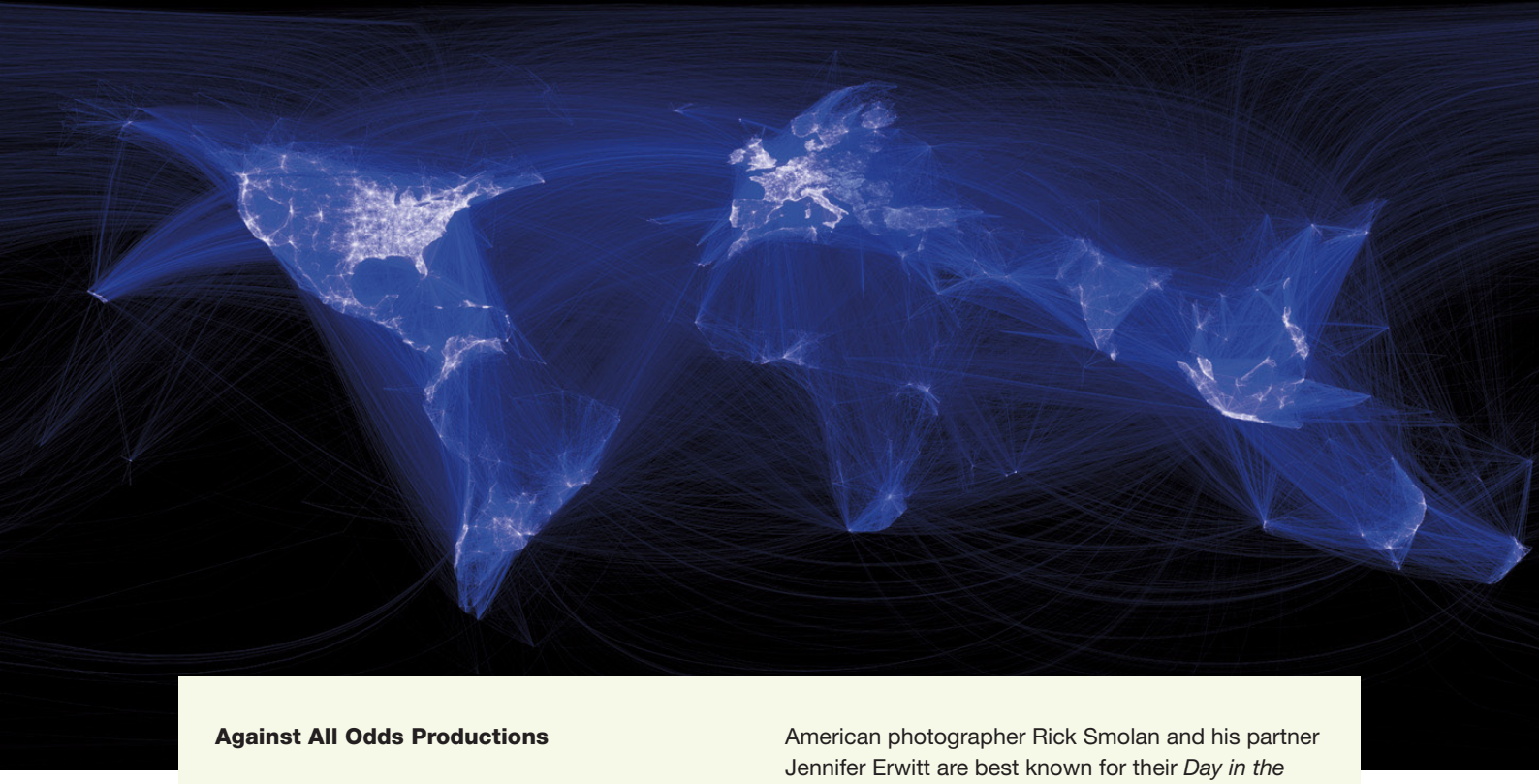
Data: The Dark Side invites the audience to question the threats and dangers of the Big Data revolution. Do we ever stop to think about what information we willingly give away? Does privacy still exist? Are we always under surveillance? Is it possible to live anonymously? Is Big Data a violation of our rights? Can democracy exist in a society governed by information gathering?

DATA: CONNECTING THE WORLD

Data: Connecting the World asks whether or not Big Data can improve the quality of life? Futurist Tim O'Reilly and other Big Data experts believe that the phone is the on ramp to the information network and that once you are on the information network you're in.

BIG DATA

PLUS	MINUS	EVIDENCE 1	EVIDENCE 2



Against All Odds Productions

For almost two decades, Rick Smolan and Jennifer Erwitt, cofounders of Against All Odds Productions, have produced a series of ambitious global projects in collaboration with hundreds of the world's leading photographers, writers, and graphic designers. Combining compelling storytelling with state-of-the art technology, Against All Odds Productions has produced illustrated books, TV specials, apps, exhibits and hundreds of millions of media impressions.

American photographer Rick Smolan and his partner Jennifer Erwitt are best known for their *Day in the Life* book series. Many of their books have appeared on the *New York Times* best-seller lists and have been featured on the covers of *Time*, *Newsweek* and *Fortune*. Their projects include *America atHome*, *Blue Planet Run*, *The Obama Time Capsule*, *America 24/7*, *One Digital Day*, *24 Hours in Cyberspace*, *Passage to Vietnam*, *The Power to Heal*, and *From Alice to Ocean*.

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EMC²

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SAP CISCO intel

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ATOM
AUSTRALIAN TEACHERS OF MEDIA

Above: Image by Paul Butler.