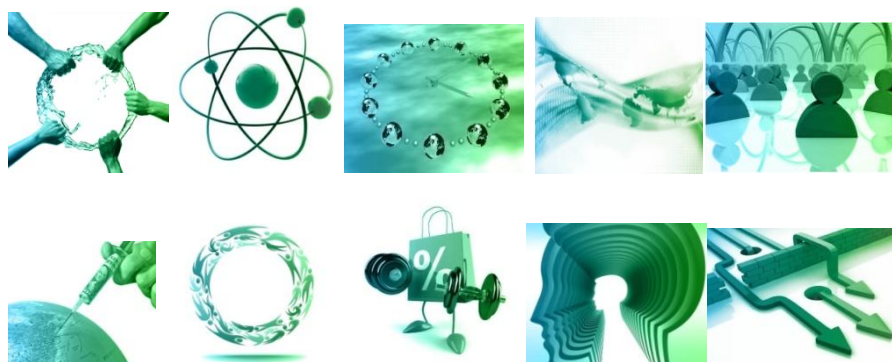**Global Trends**

InfoWars!

April 2011: Information is power. There is no shortage of information in the digital age, which according to an article by Martin Hilbert and Priscilla Lopez in Science magazine age "officially" arrived in 2002 when digital storage capacity overtook analog capacity. Since then the digital data deluge has exploded. By 2007, 94% of information in the world was stored digitally, versus just 25% in 2000. The introduction to the Science special edition on Dealing with Data suggests: "We have recently passed the point where more data is being collected than we can physically store." In a world awash in information, infowars are also exploding. Who is going to create and capture the value from knowledge and information, legally *and* illegally? Who is going to control it – especially as technology advances democratize access to the "global brain" and make information available anywhere, anytime and real-time? Who is going to win in the wars to filter and make information relevant in a world suffering from information overload and attention deficit? What are the implications for economies and societies? In this briefing we look at the increasing fights over information – whether for control, access or share of attention – driven by these questions from the perspectives of nations, organizations and individuals.

The Size of the Information Challenge

To give you some context on the size of the digital deluge, here are a few highlights from the study by Martin Hilbert and Priscilla Lopez and a related interview with Dr. Hilbert on the BBC:

- By 2007 the amount of data stored in the world on 60 core digital and analog technologies was 295 exabytes – one exabyte is a billion gigabytes.
- "If we were to take all that information and store it in books, we would cover the entire area of the US or China in 13 layers of books," Dr. Hilbert told the BBC. If it were stored on CDs, the stack would reach from the earth to the moon and one quarter of the distance beyond.
- The fastest area of growth in information is computation i.e. transformation and manipulation of data. General purpose computing capacity (human-directed) grew at an annual rate of 58% from 1986 to 2007. In the same period, telecommunications capacity grew at 28% per annum, although has been accelerating since 2000 with the spread of broadband technologies. Overall storage capacity grew at 23% per annum, while broadcast capacity showed slowest and most stable growth at 6% per annum. So we are producing information faster through computation and telecoms than our ability to store it – which clearly has implications for the data storage industry.

- Despite the slower growth of broadcast information, which even in 2007 was 75% via analog channels, we broadcast around 1.9 zettabytes of data (one zettabyte = 1000 exabytes) in 2007, the equivalent of 175 newspapers per person, per day, worldwide.
- Discussing the study on the BBC, the scientists also suggest that the digital divide is growing between rich and poor countries in terms of the capacity to process information. People in developed economies in 2002 could communicate 8 times more information than those in developing countries. By 2007, this gap had nearly doubled, with people in the developed world having 15 times more information carrying capacity.
- Putting the study in perspective: The information processing and storage capacity of nature and the universe around us dwarfs our human-made capacity. The DNA of one human can store about 300 times more information than all of our technological devices put together. The number of instructions per second that all humans on the planet can carry out on general purpose computers is about the same as the maximum number of nerve impulses executed by one human brain per second.

The Country Perspective

Knowledge and information is becoming a source of competitive advantage, not just between organizations competing to serve customers and consumers, but also between nations intent on being at the forefront of economic growth and geopolitical power. Building a generation of knowledge workers and securing R&D leadership are critical fronts in the infowars. Information is also an issue for countries within their borders in their dealings with their citizens. Freedom House suggests the world is getting less free in terms of freedom of speech – but it's a growing challenge for governments to retain their control on information. As internet penetration increases – 2 billion and growing – and social media networks expand, enforcing censorship is becoming much more difficult. The popular revolutions in Tunisia and particularly Egypt have been hailed as social media revolutions – they are not. The underlying grievances of the people against those in power were what drove the revolutions. What social media did is make it much easier for people to organize, communicate and discuss their issues, thus speeding up action and making it more transparent to the wider world.

In Action!

Competing in R&D: Recovery from global recession is finally giving the world's innovators some headwind. The 1,000 companies that spend the most on R&D decreased their total R&D spending from US$ 521 billion in 2008 to US$ 503 billion in 2009, or by 3.5%. R&D cutbacks have been largely concentrated in three sectors: Auto, computing and electronics, and industrials. Spending has gone up, on average, in all other sectors. So where is R&D money being spent? North America and Japan have seen decreased R&D spending while it was flat in Europe; in the rest of the world the rate of spending growth decelerated. The big winners in R&D spending are China and India. (Source: booz&co) But it is not just multinationals who are shifting their R&D towards these countries; R&D spend by companies headquartered in India and China increased over 30% per annum from 2003-08, building on a growing pool of highly educated knowledge workers. A recent report by The Royal Society in the UK suggests China could overtake the United States as the world's dominant publisher of scientific research by 2013.

Educating the next generation of knowledge workers: The rise of China as an economic and political superpower has a familiar sound, but now there's another field in which the Chinese suddenly seems to be emerging as a super power: Education. In the latest Program for International Student Assessment (PISA) comparative survey of the academic performance of 15-year-olds around the world (released every three years) Chinese teenagers from Shanghai surpassed their international peers in all three subjects tested last year: Reading, mathematics and science. Finland and Korea have, in recent years, been at the pinnacle of international education, but were left in the dust with an average scores that were considerably behind those of the Shanghai teenagers.(Source: Time Magazine)

Increased freedom of speech and civil protests: Populations in many countries around the world are being suppressed by regimes that do not want them to access or spread information. Until recently civil society organizations (CSOs) have been the spokespeople for such populations and in some cases still are. However the advent of the Internet and social media has made it easier for citizens to make their voices heard and to organise popular protests against repressive regimes. Credited as one of the driving forces behind the Egyptian revolution, Google employee Wael Ghonim was held, blindfolded, in solitary confinement for a week and a half, after his Facebook page and online activism helped kick-start the Egyptian revolution, which he calls Revolution 2.0 because of the online roots. Myanmar (Burma), believed to be the most suppressed country in the world, is not as lucky. They must still rely on CSO's to take action on their behalf. Here the military government restricts internet access through software-based censorship that limits the material citizens can access and send on-line, making it more difficult to organize civil action.

Look Out For...

More Wikileaks: WikiLeaks has invaded the public consciousness, as well as government databases. This form of whistle blowing has huge implications for the world we live in: When such a vast amount of information can be accessed, downloaded and distributed globally, it is clear we are living in a world of unprecedented transparency – for better or worse. Some will embrace this transparency, particularly the digital generations who are used to sharing information via social media. Others may find it a burden, as information they did not wish to be shared, is shared one way or another. Both camps need to find ways to live with each other and appropriate behaviors to govern information sharing. But it doesn't end with WikiLeaks. The next-generation of leaking 'software,' OpenLeaks, is already here. Started by ex-Wikileaks people, Openleaks supposedly aims to make whistle blowing safer and more widespread.

International espionage and cyber attacks: Worldwide, around 50,000 companies a day are thought to come under cyber attack around the world, with China alleged to be the source of many of these attacks. In July 2009, German espionage agents complained of internet spying operations by Russia and China with the objective of stealing vital information on critical infrastructure and defense plans. (Source: Guardian) But it goes beyond espionage. In 2010 the Iranian government complained that it has been hit by "electronic warfare" infecting more than 30,000 computers in the country, thought to be caused by the Stuxnet virus primarily targeted at Iran's nuclear programme. Computer experts seem convinced that something as complex as Stuxnet could only have been designed by a state, with speculation centering around Israel. (Source: FT)

Increased freedom of speech – the backlash and censorship: So who controls the Internet? It seems that authorities in many countries block the service as it suits them. This year has been the big "shut down the internet year" to prevent civil unrest spreading. Shut downs have happened repeatedly in the Middle East and North Africa to attempt to halt popular uprisings. On 27 January Egypt was effectively disconnected from web. On 19 February Libya went completely offline. In Bahrain reduced web traffic flow was reported between 14 and 16 February. In March the Yemen offices of popular Arab satellite news channel Al-Jazeera were closed down by the authorities there. China is also well known for trying to control the Internet: Yahoo suggests Chinese authorities have shut down 130,000 so-called 'illegal' Internet cafes in the country during the last 6 years. In February reports came in that LinkedIn is now behind the Great Firewall of China. The social networking site for working professionals can no longer be accessed within the country, reportedly to shut down the potential 'Jasmine Revolution.' (Source: Techland).

Information to relieve poverty: For the first time, affordable connectivity is becoming a reality even for people and enterprises located in remote areas of low-income countries. Information and communication technologies (ICTs) are seen by UNCTAD seen as a new tool in the fight against poverty. While there is little evidence to support the case as yet, poverty does have an critical information dimension. Poor people often lack access to information that is vital to their lives and livelihoods, including weather reports, market prices and income-earning opportunities. Such lack of information adds to the vulnerability of the people concerned. (Source: UNCTAD) A key question will be whether governments in some of the poorest countries that lack democratic freedoms will cooperate with the UNCTAD efforts, or seek to retain information control as a form of power.

The Organization Perspective

Managing the data deluge is a huge challenge for every organization. Companies are creating huge amounts of information as they try to connect more closely with customers, suppliers and all forms of stakeholders. As the "Internet of Things" gains ground, sensors everywhere will deluge us with yet more data. In 2009 Technorati suggested: The world's data will increase sixfold in each of the next two years, while corporate data will grow fiftyfold. By 2015, we will create the equivalent of 92.5 million (US) Libraries of Congress in one year, added the Human Productivity Lab. What do we do with all of this data, particularly if we don't have room to store it all? How do we figure out what is useful and what is not? How do we avoid our people getting swamped by it? Information overload, particularly now we are increasingly mobile and always on, is a huge problem with different information providers competing for attention. On the negative side, cybercrime is growing, taking advantage of technology advances.

In Action!

Cybercrime: In less than two decades, the Internet has grown from a curiosity to an essential element of modern life for billions of people and in doing so opened the way for new types of crime. Every new technology opens the door to a new criminal approach. The number of company focused internet attacks has been doubling each year, potentially costing companies billions of pounds through piracy, spying, sabotage and blackmail. Experts say that industrial espionage is particularly prevalent in the defense, energy and pharmaceuticals sectors. In February this year Chinese hackers attacked five multinational oil and gas companies, accessing sensitive information including bidding contracts, proprietary industrial processes and other financial documents. Reportedly the hackers infiltrated the computer systems through public websites or infected e-mails sent to executives in the companies, using company intranets and obtaining access to sensitive desktops and servers. (Source: Reuters) In the last week, online marketer Epsilon's customers, including Citibank, JP Morgan Chase, drugstore Walgreens and supermarket Kroger, have seen a massive breach of data as a hacker accessed huge numbers of email addresses and names.

Quiet time: Is 24/7 communications friend or foe? There's a growing awareness that technological tools can distract us from our work and fill our days with interruptions which prevent us from thinking carefully for an unbroken stretch of time. An international survey from LexisNexis of white-collar workers shows that information overload is widespread and a growing problem, taking heavy toll in terms of productivity and employee morale. On average 51% of all those surveyed said that if the amount of information they receive continues to increase, they will soon reach a "breaking point" and be unable to handle any more. In each country, more than eight in ten workers said their employer had taken at least one action to address this challenge, such as investing in technology, offering training and establishing "email-free" times. Companies such as Loblaw, Intel Corp. and U.S. Cellular Corp. have already enforced e-mail-free days, or restricted BlackBerry use in the office. To allow time for creative thinking Google has a 20% rule allowing engineers to spend one day a week working on ideas that aren't in their job description. Gmail and Google News both grew out of ideas conceived during this time. (Source: Theglobeandmail)

Competition for information attention: Technology today has brought us many great improvements in information availability: The internet is an information treasure trove – if you know where to find it and can filter out the noise. The problem is we can only consume a certain amount of information so there is increasing competition to win consumers' and customers' attention among organizations. A deluge of advertisements, news channels, blogs and social media are craving our attention, with more sites popping up every day. The social media and m-commerce spaces are the latest battleground, with many companies making forays into these growing channels to try to capture both the attention and influence of such communities. For example eBay is experimenting with much more interactive, social network-linked apps, such as the "pocket closet" fashion app which offers suggestions for stylish looks and allows shoppers to store their finds from across eBay's many stores as they build an outfit.

The Internet of Things: Also known as the Internet of Everything or the Internet of Objects, it is described as a self-configuring wireless network of sensors whose purpose is to interconnect all things. What does

this mean in reality? More and more objects are becoming embedded with sensors and gaining the ability to communicate, suggesting the communications revolution is now extending to objects as well as people. While the widespread adoption of the internet of things will take time, it could help solve some of world's biggest problems, including energy consumption and health care. Already smart meters and energy grids are helping to optimize energy use across networks, matching loads and generation capacity in order to lower costs and consumption. Looking ahead, try envisioning sensors discreetly attached to your body so you constantly are informed about how your vital functions are doing. Or pill bottles that tell you when to take your medicines; wine glasses that let you know when you have had enough to drink; sugar bowls warning you about your sugar intake. Or what about presence-based advertising and payments based on locations of consumers, inventory and supply chain monitoring. Everything seems possible! (McKinsey Quarterly and The Economist)

Look Out For...

Business leaks: According to the 2011 Cybersecurity Watch survey the most common insider e-crimes are unauthorized access to /use of corporate information (63%); unintentional exposure of private or sensitive data (57%): virus, worms, or other malicious code (37%); and theft of intellectual property (32%). 46% of the responding businesses also believe that damage caused by insider attacks is much greater than that caused outsider attacks. Business leaks are not unusual, but are set to become more widespread, again aided by technology and new forms of whistle blowing such as Wikileaks. For example Renault sacked three employees over suspicions that they had leaked highly sensitive information about its electric vehicle programme, potentially to foreign powers, while a FTSE 100 company recently had its entire e-mail system taken down for two weeks after a targeted attack in January. (Source: Financial Times)

Cloud wars: The rise of cloud computing has already proven to be an incredibly disruptive force in the world of enterprise software. It is no longer difficult to image a world where big and small companies only use computers as a utility, with the back end (storage, applications, etc.) outsourced. The potential business benefits using cloud computing are agility and flexibility in infrastructure, improved services and scalability, lower costs (capex becomes opex, pay is for use, and maintenance costs fall), improved reliability and potentially security, and the potential to build new business capabilities, e.g. in collaboration, in R&D. The problem is developing global standards and formats, to make cloud computing easy to use. So who is winning the cloud war? The current key players on the market based on overall potential, service offerings and indicative growth potential are Amazon, Rackspace, Salesforce.com, Google and Microsoft. (Source: Technology Trendz) But look out for the war to hot up.

Increased competition to control real-time information: Google and Yahoo have transformed how we find information in the last decade – and become key aggregators and filters of what we see. Now social media is changing the game, by providing real-time information flows. For example, both Google and Bing depend on Twitter feeds and trends to provide real-time searches. Real-time search is a hot buzzword-type phrase in the online world right now, but the application of the technology – and the viability of the business model – is still in its infancy. Independent companies like OneRiot and Collecta were among the largest real-time web search engines but have recently shut down and changed product direction even though both companies said, "there is a huge need for real-time information"! (Source: Mashable). The new kid on the block competing with Google and Yahoo in real-time search is TrendSpottr. It's suggested advantage versus these giants: Filtered and curated real-time search results showing the top trending headlines, videos, images, and so on, instead of a deluge of content. (Source: VentureBeat)

Idea competition: In an era of information abundance and rapid communications, organizations are increasingly turning to open source and collaborative networks to find, create and leverage knowledge and expertise, faster and at lower cost – creating new markets and sources of competition for ideas. For example, InnoCentive allows organizations ('Seekers') to publish their research and development problems as 'challenges' for anyone to solve. Redesignme is a website that get paid by product manufacturers to establish 'RDM Challenges', presenting a new product concept and asking the site's 3,000 or so active members to respond. TED (Technology Entertainment and Design) is a non-profit formed to disseminate globally "ideas worth spreading."

New types of institutions: Just as the rise of the internet has revolutionized the way we communicate,

shop, share and find information, it will also impact the future shape of institutions. Pew Research asked technology experts and stakeholders how the internet would impact institutions in future. A significant majority (72%) believed that innovative forms of online cooperation could result in more efficient and responsive for-profit firms, non-profit organizations, and government agencies by the year 2020. However, many also believed that powerful bureaucratic forces would fight such transformation and probably draw out the timeline. (Source: Pew Research Center)

The Individual Perspective

Given people are creating and receiving an exponentially growing amount of information per day and time is not expanding, author Adrian Ott on Fast Company suggests we are in an "attention arms race." Despite the massive information processing power of the human brain, the senior executives we work with confirm this challenge. Even with faster computers and an ever-expanding array of mobile devices to receive and process information anytime, anywhere, people struggle to keep up. Often we try to multitask, but according to McKinsey on information overload, multitasking is neither productive nor creative. One front of the individual information war is choosing our providers – Hilary Clinton famously remarked recently that Al Jazeera provides better news than the US channels.   Another is the device: e-readers are gaining ground as paper-based formats decline. Yet another is security of personal information, as the younger generation in particular shares more and more personal information via social networks.

In Action!

Competing media channels: Rival advertising campaigns are not uncommon amongst FMCG companies and now the media industry is at it, as news becomes increasingly commoditized. In 2010 an ad from business news channel Bloomberg UTV took a dig at a rival channel, CNBC TV18, and it's not the first time the two rivals have exchanged blows. Earlier Bloomberg UTV had threatened to initiate legal proceedings against the managing editor of CNBC TV 18 for making defamatory comments about the channel (Source: Rediff Business). The politicians are also fuelling competition, with Hillary Clinton recently quoted as saying: "Viewership of Al Jazeera is going up in the United States because it's real news. You may not agree with it, but you feel like you're getting real news around the clock instead of a million commercials and, you know, arguments between talking heads and the kind of stuff that we do on our news which, you know, is not particularly informative to us, let alone foreigners." (Source: ABC News)

The reading device war: In July 2010, online bookseller Amazon.com reported sales of eBooks for its proprietary Kindle outnumbered sales of hardcover books for the first time ever during the second quarter of 2010. It sold 140 e-books for every 100 hardcover books, including hardcovers for which there was no digital edition. By January 2011, eBook sales at Amazon had surpassed its paperback sales. Figures for January 2011 show that eBook net sales increased by 115.8% versus January 2010 (from US$32.4 to US$69.9 million). eBook sales have increased annually and significantly in all nine years of tracking the eBook category, with the American Publishing Association has estimated e-books represented 8.5% of sales as of mid-2010. The reading device war, already moving from paper to digital mediums, is likely to accelerate as the tablet market takes off following the success of the iPad.

Control of personal information: FaceBook now has 600 million users and growth shows no signs of slowing. But, explosive growth usually comes at a cost. Relatively inexperienced and trusting users are sharing huge amounts of personal information on social networking systems that are evolving quickly and with unknown consequences. This has implications both for the users and the businesses that access the personal content posted. While users may think that the only way their information will be found or used is if they tell someone about it, once data is posted, it generally cannot be erased. Identifying information such as an address, phone number, or membership of clubs ceases to be under the full control of an individual – look out for increasing disputes over how such information is managed and controlled, e.g. through privacy standards.

Look Out For…

Cyber identity theft and fraud: In 2010 the US Internet Crime Complaint Center (IC3) received more than 300,000 complaints. The referred top 5 crime types were non-delivery of payment/merchandise (21.1%), identity theft (16.6%), auction fraud (10.1%), credit card fraud (9.3%), and miscellaneous fraud (7.7%). The most common types of identity theft include phishing (pretending to be a financial institution and asking for personal information), changing an address (filing a change of address form to receive billing statements), pretexting (obtaining personal information from banks and telephone companies) and dumpster diving. The 2011 Identity Fraud Survey Report reveals that in 2010 the number of identity fraud victims decreased by 28% to 8.1 million adults in the US and the total annual cost decreased from US$56 billion to US$37 billion. Despite the overall declines, consumer out-of pocket costs rose significantly, mainly due to the types of fraud that were successfully perpetrated, and increases in "friendly fraud."

Enhanced humanity: Ultimately, technology advances may allow us to enhance human capacities and intelligence to deal with radical change, exploding information and complexity, through new human-machine interfaces, which will dramatically impact how we live and work in future. The term "singularity" has been used to refer to a future time of rapid and accelerating development of various sciences and technologies including biotechnology, nanotechnology, artificial intelligence, robotics and genetics, and when machine intelligence surpasses that of humans, irreversibly altering human existence. There are several areas worth watching for developments: 1. Advances that amplify existing which is human intelligence, e.g. through bio- and genetic engineering, brain implants, or nootropic drugs; 2. Advances in artificial intelligence, which would allow machines to perform mental and physical tasks to the same or superior levels than humans; 3. The very controversial notion of "superintelligent" entities which can design and build more intelligent machines than themselves.

Contagious sharing/Collaborative Consumption: [Time Magazine](#) has named contagious sharing/ collaborative consumption to be one of the 10 Ideas that will change the world in 2011. As the next generation grows up sharing file, photos, knowledge and what is on their minds minute to minute this behavior is moving into other areas of our life. Today the smart choice is sharing – not owning. And it's the young who are leading the way toward a different form of consumption, underpinned by information exchange and technology. "Old" market behaviors including bartering, swapping, trading, renting, lending, and sharing to are being reinvented in ways and on a scale never possible before. It can be seen in the rise of big businesses like [Netflix](#), whose more than 20 million subscribers pay a fee to essentially share media content, or [Zipcar](#), which gives more than 500,000 members the chance to share cars part-time. (Source: [Time Magazine](#) and [Good Infographics](#)) Look out for increasing competition to provide such services – and the information to drive them.

Hyperconnectivity and competing multi-tasking: Global IP traffic will quintuple from 2008 to 2013 and overall IP traffic will grow at a compound annual growth rate (CAGR) of 40%. One of the primary forces underlying this growth is visual networking which is often used concurrently with other applications. We are now entering the hyperconnected age. Many of us are compulsive multi-taskers: When we are writing we are listening to music and several programs are open on the computer. We are actively multitasking and passive networking at the same time and according to Cisco that gives us a 36 hour "network day" which by 2013 will be a 48 hour "network day." Academic research indicates that one-fifth of all waking hours are spent multitasking and for information workers, one-half of work hours are multitasked. The big question is are we able to do more than one or two things at the same time and what does it do to our minds? Competition for share of our brains and attention looks set to continue to increase – and choices will become increasingly important.
(Source: [Cisco](#))

In May: Look out for trends in action on the digital generation.