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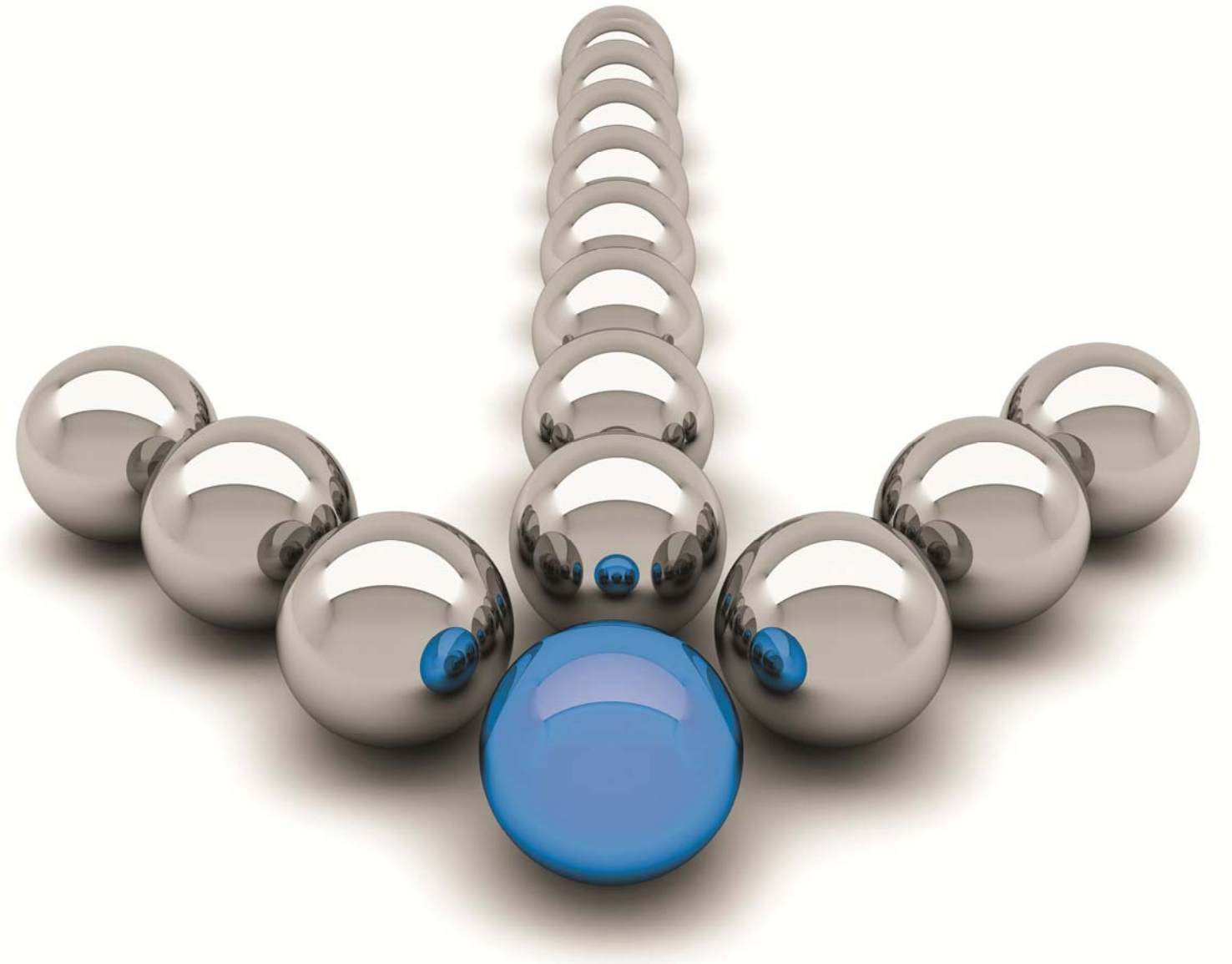

FOUR TECHNOLOGY SUPER TRENDS AND THEIR IMPACT ON BANKING

JUNE 2012

CONTENTS

INTRODUCTION

“These are times of great uncertainty for banks. The industry is facing unprecedented economic and regulatory headwinds that are redefining the banking landscape. Successful banks of the future need to be ever more efficient and look for innovative ways of standing out from the crowd. They will also be more networked and collaborative and work with others to better serve their customers.

We not only need to be solving the problems of today but also to be positioning ourselves for success tomorrow.”

Kevin Hanley, Chief Architect – RBS Group

INTRODUCTION

Four years on from the onset of the financial crisis, it is generally accepted that the business of banking has become fundamentally more difficult. Banks are still caught up in the whirlwind of economic, market, regulatory and technology forces which are shaping a new era.

The economic and regulatory context

Teetering on the point between recession and recovery, the economic environment continues to be challenging with mounting pressure on consumers, companies and governments to manage finances and reduce debts.

It is a time of unprecedented change in banking – most large banks in Europe and the US have faced suppressed demand, significant corporate restructures, changes in leadership, increasing scrutiny and of course, financial bailout.

The impetus to ensure that such a banking crisis can never occur again is driving a new regulatory regime designed to restore the confidence of customers, government and wider society, and also manage risk in the global financial system.

Further tightening of regulation has led to rigorous capital and liquidity management. Competition for deposits has driven an inevitable squeeze on margins.

At the same time, banks are challenged to grow revenues and identify attributes on which to build sustainable competitive advantage.

This is balanced against a renewed focus on cost reduction and operational efficiency.

The growing influence of technology

Further uncertainties and opportunities are introduced when we consider technology change. Across society, willingness to embrace technology has never been higher, fuelled by lower costs of acquisition and new, compelling propositions. Already, this capability is changing the way we live, work, play and learn.

Technology has the power to redefine entire industries. In the music industry, the distribution model of digital downloads has overtaken physical compact discs and resulted in completely new business models for consuming and accessing music. The model of the traditional bookstore has been overtaken by digital competitors, and the internet has transformed the advertising and travel industries, replacing traditional revenue sources and creating opportunities for disruptive new entrants.

Banking and technology are intimately bound together, and the very essence of a bank is for the most part represented by the balances, transactions and customer information that exists in bank data centres.

More than ever, technology is a shaping force in the next evolution of banking. This paper discusses four technology supertrends and offers some insight on the potential implications for the banking industry.

EXECUTIVE SUMMARY

One thing that characterises the field of information technology is a close association with innovation, sometimes observed as a noisy stream of new ideas and products, and often with exaggerated claims about importance and effect.

Many of these developments are short-lived and come to nothing. This can support a view that such things are mostly fads or distractions, and that it will always be possible to catch up if any significant technology transformation does occur.

However it is clear that technology has had a remarkable effect in shaping the last half century. Along the way some changes were so fast and far reaching that catching up was not a feasible option for the unprepared.

Polaroid illustrates this point perfectly. They were a successful company who brought instant photography to the market in 1948. Unfortunately they did not understand the impact of digital photography advances upon their business until it was too late. The arrival of a completely new model which offered far more flexibility and convenience, with lower ownership costs destroyed the market for Polaroid and they filed for bankruptcy protection in 2001.

Technology trends can disrupt – even re-invent – companies and industries. From a banking perspective, we are now witnessing four technology super trends (see figure 1) that have a significant impact on our business and offer our customers convenience, safety and personalisation.

Figure 1: Four Technology Supertrends

Each of these supertrends:

- captures a number of underlying technology developments and links them in a logical grouping
- is already gaining traction and momentum
- is highly relevant to the banking industry

They can be briefly described as follows:

Trend 1 – Digital Society: “always on, always available”

4G provides the next generation of interactive mobile services with faster data access, enhanced roaming and broadband media.

Source: International Telecommunications Union

This is an era of apps, mobile devices and social media. Technology is now pervasive across all customer segments in society, but particularly for Generation Y – those born since 1980 and for whom information technology has always been there.

Sophisticated smartphone handsets and tablet computers have proven to be incredibly powerful, versatile and popular devices.

As we now look towards high capacity 4G mobile networks, we should reflect that society is “always on and always connected”. Access to information and service will not be bounded by place or time. Face to face interaction is becoming less vital as we can achieve desired outcomes through digital means, often more cheaply, more quickly and with more transparency than traditional assisted service models. As a consequence, we are more inclined to research and self-serve.

The challenge is providing services in the context of our customers’ technology, location and preference. Some other industries such as fashion retailing are exemplars in meeting this challenge. Banks now need to move beyond cost reduction strategies to attract and retain the digitally empowered customer.

Trend 2 – Big Insights: “making use of big data”

Everyone and everything is set to leave a digital trail – a “data exhaust” – that can be gathered and analysed. This will drive whole new areas of business activity as organisations personalise their services based on near perfect customer information. Customers benefit from near perfect market information to identify the best value from any provider at any time.

90% of data in the world has been created in the last two years. This enormous explosion is often referred to as ”Big Data” reflecting not only the scale, but the variety of data that now exists. Everyone and everything is set to leave a data trail, and that data has value if it can be applied in a proper context.

A new generation of technology techniques and sophisticated analytics, often derived from internet scale businesses such as Google, are helping unlock this value. For banks, already the owners of massive amounts of data, some of these techniques will be effective in identifying new patterns and predictors.

The combination of new external data sources and established internal data stores points to a future where a rich understanding of the customer informs our actions, and ensures we stay relevant to them.

Trend 3 –Everything joins up: “quick to deliver; easy to adapt”

The unrelenting drive for efficiency continues. While automation and straight through processing remain important, the focus is changing from one of cost reduction to one of value creation. There is an impetus to connect channels, open up banking function and deliver a seamless experience for customers.

Under the covers, technology solutions will be assembled in a modular way that exploits common process and data. This is a more efficient use of resources, and also ensures consistency of experience and information across all channels. Industry standards and rules are maturing and creating a business model where new services and vendors can easily enter the banking supply chain. This is facilitated in part by new technologies such as Cloud computing which enables on-demand access to compute resources and functionality.

This widespread adoption of technology and connectedness will impact distribution models and supply chains. In some cases, end to end value chains will look radically different - in terms of participants, services and how they are delivered. Increasingly, banks will become ‘orchestrators’ of many integrated suppliers with the overall effect being one of technology commoditisation.

Trend 4 – Integrity & Security: “trust on every level”

Trust is a core element of any bank. Yet it is a fragile commodity, easily eroded when a customer experiences a security incident, or is defrauded, or when a bank is perceived to act unethically. The cost of remedying these situations is significant.

The influence of new technology developments will be felt in many ways:

- **Compliance** levels will improve as process automation and management technology extends, eliminating sources of error such as manual hand-offs. Control points will be harder to circumvent
- **Reporting** cycle times will reduce as new analytics capabilities emerge, and regulators will directly access relevant bank and external data to build transparency and confidence
- The power of integrated data will be used to detect anomalies and automated action will be fast, accurate and appropriate for both fraud prevention and **fraud** detection. eDiscovery tools will assist with remediation and transparency
- Increased calls for **consumer protection**, and the objective to treat customers fairly will be enabled by automated personalised advice, with pricing that explains and reflects individual levels of risk
- The Digital Society will introduce new **digital vulnerabilities**. As cyber criminals target popular new platforms, methods of profiling, detection and interception will adapt and strengthen
- The deliberate or inadvertent loss of data from the organisation will be reduced by new **data** loss prevention techniques, securing, examining and blocking sensitive data assets from traversing organisational boundaries
- Biometrics is gaining traction as an **authentication** method for some banking applications. For example, in Japan and Turkey, many ATMs are now secured by vein pattern technology
- Technology is increasingly helping banks to deliver their **green agenda.** Digital processes reduce paper usage. Virtualisation and cloud computing can help IT consume fewer resources
- This diverse set of factors continues to evolve at speed, reshaping corporate agendas and changing customers’ views on trust and security.

Evolution or revolution?

Each of the supertrends contains elements that are evolutionary and others that have a transformational potential. While predicting the future is never certain, it is highly likely that the future state will not resemble today. In extreme scenarios, the combined effect of these supertrends could be game-changing for banking.

Banks will adopt a range of responses, across a range of technology enabled scenarios – challenging the status quo, forming partnerships, experimenting, preparing, and placing bets according to their desire to follow, lead or shape the industry.

In a future where technology does not stand still, maintaining a degree of preparedness can mitigate against a technological future-shock in banking.

SECTION 1

THE DIGITAL SOCIETY "ALWAYS ON, ALWAYS AVAILABLE"

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THE DIGITAL SOCIETY "ALWAYS ON, ALWAYS AVAILABLE"

Technology adoption is a curious phenomenon. After an initial burst of excitement it settles quite quickly into steady acceptance and almost blends into the background.

It isn't until you focus on how the typical home or workplace has changed, that you appreciate the extent to which technology has become part of our lives – smartphones, tablets, apps and Facebook are all relatively recent introductions yet they are now integral to the way people communicate and share information. More significantly, these technologies are enabling us to do new things, changing our behaviours as individuals and as a society.

Just considering the digital revolution that has occurred in the last 10 years is staggering (see figure 2). 274 million Americans now have internet access (and some 2.5 billion people worldwide)[1] and the revolution is continuing – by 2013, there will be 13 billion mobile devices connected to the internet – more than one for every man, woman and child on the planet.

[1] *Source: International Telecommunications Union*

Figure 2: The Digital Revolution

Source: Nielsen, 2011

Individual device types and platforms are in a state of flux with new products quickly superseded by more powerful replacements. The trend of "always on, always available" is set to increase, and that will drive higher expectations of all services in the Digital Society.

Three key elements of the Digital Society are reshaping individual and organisational behaviour: Mobile, Social and Apps.

54.4% of all US mobile subscribers owned smartphones in Q1 2012 – up from 40% in Q2 2011.

Source: Nielsen, May 2012

Mobile, mobile everywhere…

Mobile is becoming a key channel. We are seeing rapid adoption of the mobile device and 4G mobile networks are now rolling out, removing speed and volume constraints. The differential between desk based and mobile computing will re-balance in favour of mobile. There will be little that desk based computing can do that the mobile cannot, but the mobile proposition is much more compelling – including unique features such as geo-location capability to determine exactly where you are, and proactively deliver context sensitive information.

A range of previously distinct technologies are converging into a single mobile device. Smartphones extend far beyond telephony to deliver web browsing, music players, cameras and, most significantly, a platform for many software applications, including a means of payment.

Buyers are attracted by the function and convenience of powerful multi-purpose devices. According to some commentators the "mobility trend is in hyperdrive"[2]. Ownership of tablet devices has grown by 50% in the last year with the key motivation for purchase being that they are more portable than a laptop.

Many people now regard their mobile devices as essential tools – always carried, often used. Consequently they are finding their way into the workplace and organisations will benefit from the "bring-your-own" effect, where corporate systems are made available in secured sessions running on a device funded by the employee.

Smartphone ownership will continue to grow rapidly across Europe and reach 67% of mobile phone owners by the end of 2016.

Source: Forrester Research, December 2011

[2] *Source: Accenture 2012 Consumer Electronics Report*

Next generation mobile goes wearable

Tablets will outsell PCs in the US by 2015.

Source: The Yankee Group, June 2012

There is huge investment in mobile technology innovation – and not simply in evolutionary improvement of the conventional handset.

Touchscreens have become commonplace and by 2016 72% of smartphone shipments will include touchscreen-only interfaces[3]. However, in the future, other more productive interfaces are likely to evolve. Early examples include Apple iPhone Siri using voice control, and Microsoft Kinect using physical gestures.

Google is experimenting with augmented reality glasses that will overlay your current physical environment with digital information – for example, by identifying the person standing in front of you and retrieving information about them. As you subtly navigate using eyegaze you will be extremely well informed for any engagement.

The mobile device of tomorrow may be quite different – a network of sensors incorporated into clothing for example, or Nokia's magnetic tattoo, which vibrates with incoming calls and messages.

The rise of the app culture – "there's an app for that!"

Apple's App Store offers more than 550,000 apps to iPhone, iPad and iPod touch users in 123 countries around the world.

Source: Apple, May 2012

Mobile devices already contain as much computing power as desktop computers did just a few years ago. They are perfectly able to run complex software applications and all of the major platform providers have encouraged development for their devices by creating easy programming environments that simplify underlying complexity.

This enables a wide range of people from all backgrounds and expertise, not only IT professionals, to create "Apps" – small pieces of downloadable software, already optimised to exploit the interface and network characteristics of the target device.

Apps have proven phenomenally successful, and there is already a bewildering array of app solutions for most common requirements. For example, market pricing information is now easily accessed on-the-go.

In the Digital Society, people are content to experiment with low cost or free app offerings until they find the functions they are looking for.

Apps drive the majority of engagement on mobile devices - 4 out of every 5 minutes consuming media on mobile devices are via apps. 80% of time spent using Facebook on mobile devices was via apps; for Twitter, it was almost 97%.

Source: Comscore, May 2012

Although the range of hardware formats might be rationalising, the platforms that support apps are actually proliferating and extending beyond popular mobile platforms such as Apple iOS and Google Android, into browsers (Google Chrome) and even Facebook. As each platform is proprietary, there is additional complexity in maintaining cross-platform coverage.

Over the longer term, this complexity and platform tie-in will lessen as new technologies blend the native appeal of apps with the openness of web platforms and protocols. Some experts believe that apps are a phase in internet evolution, and that in the future simpler software will run across many different platforms that apply the rich user experience specific to that device at run time.

[3] *Source: Juniper Research, July 2011*

Social media connects the world, changes business

If Facebook were a country, it would be the third most populous in the world with over 900 million regular users. The hugely hyped IPO demonstrated the impact and perceived value of social media. As table 1 shows, Facebook is only one example of digital social interaction on a massive scale.

Table 1: Social media sites with user numbers exceeding 100 million

Facebook: Multi-national social media site	900 Million	**Qzone:** Chinese paid-for social media	480 Million
Sina Weibo: Chinese micro blogging site	300 Million	**Habbo Hotel:** Aimed at 13-18 year olds	268 Million
Twitter: Micro blogging	175 Million	**Google+:** Social media plus Google features	170 Million
Renren: Chinese Facebook equivalent	160 Million	**Linkedin:** Business-focused social network	160 Million
Badoo: Dating focused social discovery	125 Million	**Myspace:** Entertainment focused	125 Million
Orkut: Brazilian social media	120 Million	**Bebo:** Roleplay focus	117 Million
VKontakte: Russia Facebook equivalent	110 Million	**Tagged:** Social Discovery	100 Million

Forums and blogs also consolidate interests around particular topics and provide opportunities for personal journalism. It has never been so easy for an individual to promote their views, opinions and biases to a wide audience.

A social media sub culture has emerged with communities of friends often numbered in thousands. It is fundamentally changing how we communicate and share information of all types and this has consequences for business.

One-sided stories of poor customer experience can spread rapidly and cause severe damage to associated brands, without the maligned organisation even being aware.

Social media now plays an increasingly significant role at each step of the customer journey to discover, evaluate, buy, access, use, and get support for products and services. Prospective customers carrying out product research can solicit advice from virtual strangers on forums and review sites rather than simply accepting brand messages contained on a corporate website.

Suppliers are harnessing this increased willingness to connect and share, as in the case of Gaff-Gaff who runs their mobile airtime business with heavy reliance on user support communities provided by their own customers. Other organisations actively monitor sentiment in real-time and intervene where appropriate to deal with issues and present a helpful image.

In terms of innovation, crowdsourcing can provide a larger scale alternative to focus groups by leveraging social networks as a cost-effective means of generating ideas, inviting customer submissions, facilitating discussion and polls on new products and services.

The rise of self-directed, self-service customers

As society goes digital, one behavioural consequence is that people will tend to research and self-serve much more readily. It is simply quicker and more convenient to use the familiar device in your pocket than to arrange and engage in assisted service. This is already apparent at airport check-ins and for simple banking transactions.

Projecting forward, many more customers of all generations will be confident and able to use quite sophisticated technology to achieve desired outcomes.

Internet security specialists AVG surveyed 2,200 mothers globally and found that 81% of children under the age of two currently have some type of digital footprint.

92% of U.S. children have an online presence created for them by the time they are 2 years old.

In many cases, a digital presence is born before the child, with sonograms actively published and shared on social networks and blogs

Source: Businesswire, October 2010

DIGITAL SOCIETY AND THE BANKING INDUSTRY

Service demands upon banks are increasing as the “always on, always available” nature of the Digital Society becomes the norm. There are significant implications for banks and new strategies are required to attract and retain customers in the light of changing demand.

Responding to the Digital customer

Bank customers will favour the convenience and ease of digital channels, and the channel propositions will develop to reflect the broader capability of devices in use. Mobile will become a key channel for all service providers, a core platform for information delivery and service access.

Business and Corporate clients will expect convenient, digitally enabled banking services but many will also judge the banking channel experience by their own digital efforts. There will be increased pressure to deliver quality experiences that exploit the capabilities of the end device.

Retail banking customers will have their expectations shaped by the best digital retail experiences (see figure 3) and this is an area that banks will monitor and emulate.

80.4% of UK households have a broadband connection.

69.7% of the population are frequent internet users (every day or almost every day).

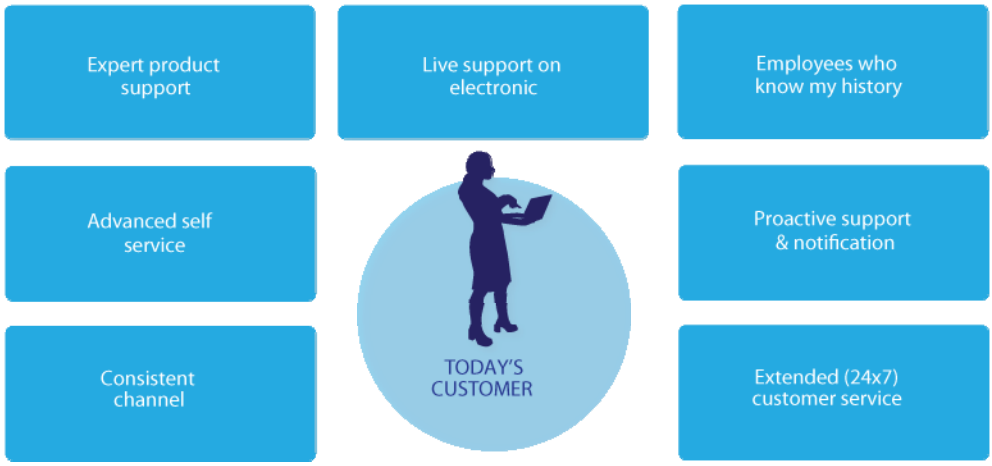
23% of the population accesses the Internet through a mobile phone via 3G.

49% of the population participate in social networks.

52% of companies provide a portable device to some of their employees.

Source: European Commission, 2011

Figure 3: Essential elements of next generation customer experience



Source: Forrester Research, April 2012

Dealing with the informed customer

It will become commonplace for a technology enabled customer to verify and corroborate information on receipt and in real-time. Bank offers will be evaluated taking into account many external facts, opinions and biases before deciding on acceptance. Well informed customers will pose questions and challenges that will demand equally informed customer service agents.

Re-purposing channel propositions

Digital channels will be better equipped to deal with greater complexity and their added convenience will see more people accepting self-service with processing cost benefits for banks. Banks will seek to maximise the effect by incentivising appropriate channel use, ensuring clear strategies are in place for expensive channels such as branch.

Building and retaining customer engagement

Banks will seek ways to strengthen customer engagement in the Digital Society, where face to face interactions are less common. A portfolio of Apps, designed to complement the standard banking service can help build and maintain customer relationships and loyalty. Such a portfolio might include business news, research, financial advice, financial management tools and payment and authorisation applications. It might also include softer topics to drive repeated use such as partner offers to complement current account bundles or sponsorship related sports and arts content.

Banks and social media

Social customer care is becoming one of the most active areas of social media participation by businesses, and it is now rare to find a bank without a Facebook or Twitter presence. Customers will increasingly use tweets, blogs and social networks to publicise their opinions about service and products. In order to manage reputational risk and improve customer service banks will strengthen their monitoring and engaging capabilities, exploiting new forms of analytical support.

Social media strategies will evolve to guide when a response is appropriate, and the form the response should take to be authentic, timely and transparent.

Social media also offers the prospect of more proactive engagement. Digital marketing campaigns will target customers based on their social profiles. Banks can host communities for business customers on topics of business interest. However, the acceptable role of banks in what is essentially still a “social” environment may take time to establish, at least until commercial motivations for social media sites are more widely understood and accepted.

Digital Society - accelerating change

Go back just 20 years and corporate bankers relied heavily on information from printed matter such as financial newspapers and reports. Research was difficult and time consuming. Their network of direct contacts was relatively small. Now they can simultaneously search numerous sources of information from thousands of contacts online in real time. Less than a decade ago mobile banking referred to a van that drove from remote village to remote village offering a basic range of banking services. Now people can bank 24x7 from any location using virtually any mobile device. The internet and its accessibility over mobile devices, coupled with rich user friendly interfaces which are now the norm, has created the Digital Society – and the future belongs to those banks that can truly exploit it and stay ahead of the game.

SECTION 2

BIG INSIGHTS “MAKING USE OF BIG DATA”

40% - the projected annual growth in global data generated.

5% - the projected annual growth in IT spending.

Source: McKinsey, May 2011

SECTION 2

BIG INSIGHTS "MAKING USE OF BIG DATA"

The digital world is generating data at an ever increasing rate – 90% of the world's data was created in the last two years, according to research by IBM. The sheer volume, variety and speed with which data flows are becoming an overwhelming challenge for organisations to manage. This 'Big Data' is today viewed as an asset containing significant value, able to confer competitive advantage upon organisations who master it. Sophisticated analytics can help unlock value, granting insight into our customers and their relationship with the world around them. For banks, the ability to combine and integrate new and existing sources of data allows us to create a more holistic picture of our customers and ensures we stay relevant to them.

Defining "Big Data"

While Big Data lacks a single universal definition, it generally refers to extremely large data sets which are too complex, diverse or fast-moving to deal with using conventional data analysis techniques. Although "data mining" has existed as a discipline for many years, Big Data analysis is orders of magnitude larger. The phenomenon affects many industries and sectors including retail, financial services, healthcare, meteorology, informatics, environmental sciences and more. The most accomplished exponents come from the world of digital advertising, most notably Google.

As shown in figure 4, huge volumes of data are already being generated, with exponential growth forecast. Every day, data is generated by manual and automatic activities the world over, not only by businesses but in people's personal lives and daily activities. However, the enormous size of data being produced is not the most significant challenge or opportunity. Besides volume, there are three further characteristics of Big Data – velocity, variety and variability.

Velocity of data reflects the speed with which data changes and the period of time during which it is actually relevant and contains value. The value of information decays with time, and data increasingly has a shorter shelf-life. For example, knowing that a customer is considering buying a new car is only relevant until they have done so, and once they have done so the information has very little value – the opportunity to offer a loan or insurance might be lost.

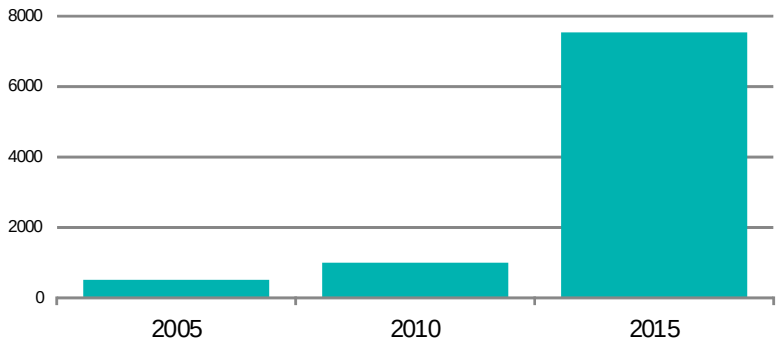
The variety of data is created by a bewildering range of activities by humans and automated systems the world over, both intentionally and as a by-product of our daily activities.

- In our personal lives, we generate a huge range of formats including email, documents, browsing history, social media contributions and the products of more creative endeavours such as music, photos and videos.
- Corporate data often has very structured, but proprietary formats.
- Yet more data is generated as we go shopping on the high street or on the internet, from CCTV cameras, from the utility meters in our homes, from embedded sensors, the location data from our phones, and many more.

The crucial point is that the number of data formats in existence is rising, not falling.

Figure 4: Predicted Global Data Growth

A Decade of Digital Universe Growth: Storage in Exabytes



Source: IDC Digital Universe Study, June 2011

Finally, variability describes how data can have different interpretations depending on context, or how its meaning can change over time. The increasing importance of natural language brings a complexity of nuance, grammar, slang, tone (e.g. sarcasm) and so on, which computing technology has traditionally not been adept at understanding. As a simple example, something being 'cool' on a social media chat would indicate positive sentiment. Someone going 'cool' on something would indicate a move towards negative sentiment or lack of interest.

Structured versus unstructured data – a sea change

One of the key trends is that an increasing proportion of the world's digital data is now "unstructured". Structured data tends to be carefully designed, deliberately captured, and validated to some extent, being stored in databases or other mechanisms according to a set of rules. It was therefore easy for computer systems to search, analyse, and extract meaning from the data. However, this structured information will form an increasingly smaller proportion of the total data available to organisations.

The majority of new data is unstructured; such as video, voice, social media comments, blogs, articles and other sources of natural language. This information is easy for humans to understand, but hard for computer systems. Unstructured data is very hard to search, but is potentially very valuable because it references complex and subtle concepts, dealing with speech, sentiment and opinion. Unstructured data presents a major challenge in the field of analytics.

Tools and techniques to handle the Big Data opportunity

Driven by client organisations who seek to make sense of Big Data, technology vendors are starting to offer new analytics tools, technologies and techniques.

Some specific examples include:

- In-memory data platforms, which allow real-time decisioning across huge data sets, processing hundreds of billions of data items in seconds
- Hadoop, which is a significant technology designed to solve problems where massive amounts of data are involved – usually a mixture of complex and structured data - and which doesn't fit neatly into table

Disney seeks to boost customer engagement and spending by making recommendations based on sources including pattern analysis of their online behaviour, in-store purchasing, theme park bookings, and analysis of social influence.

Source: PwC, 2010

Broadly, the Big Data technique is to screen new data for usefulness and quality, join up disparate sources, explore it, analyse it, and exploit it. New tools and techniques add value by uncovering relationships within data, structured or unstructured, internally or externally sourced – use cases might include fraud detection, ensuring compliance and uncovering new business insights and opportunities.

If more data can be more effectively exploited it promises a fuller understanding of customer interactions and value, more timely and accurate reporting of business performance, better insight into market opportunities and competitive threats, reduced fraud and smoother regulatory compliance.

Ultimately, new and sustainable competitive advantage is the goal, based upon the unique combination of data available to the organisation.

Forward-thinking organisations must constantly scan their environment for new sources of information which may be relevant and which could add value, and seek to integrate these. The market for purchased external data, such as that provided by credit reference agencies, is changing as the range of information which they offer through their services is augmented by Big Data.

Big Data vendors are offering increasingly specialised tools and techniques to specific applied situations such as building a picture of the social, economic, geographic and transactional networks to which customers belong. Once discovered, these networks can be analysed to determine influential customers, sentiment analysis from social networks, and prediction of future events.

For instance, by combining and analysing diverse data sets such as transactions, addresses, social network commentary and so on, it is possible to identify influential individuals whose actions have a disproportionate effect on those 'close' to them. If an influential individual can be sold a particular service that is of value to them, it is much more likely that people in their circle of influence will also buy that service. Similarly, new techniques enable prediction of customer life events and outcomes based on knowledge of actions gleaned from external data feeds.

Hadoop will be disruptive not just for existing systems, but it will enable you to do things you couldn't do before. Because whether you are a Bank of America, a Wal*Mart or a Verizon, nowadays they are all data companies.

Source: Abhishek Mehta, Managing Director, Analytics, Bank of America, 2010

Big Data – can I use it, should I use it?

There are considerations and implications, naturally. Data quality is a major unknown when so many sources of data are external to the organisation and cannot be verified, such as comments on social media. Questions abound over the legal ownership of much of data in the 'digital universe', the sharing, selling or publicising of which was not necessarily expected by the people that generated it. Breaches of privacy are a concern when identifiable data is used, but if data is too anonymised then its usefulness may be lessened.

Future Developments – more data, more tools

Further out, advances in machine learning are starting to explore real-world use-cases through initiatives such as the **IBM Watson project**, which specialises in understanding the meaning and content of human language, and in generating evidence-based answers at speed. Watson is actually an ecosystem of technologies such as semantic processing, artificial intelligence and hypothesis ranking, which can work together to process complex data and approximate to something like "judgement" where there is no single correct answer. There may be significant first-mover advantage if the correct use-cases can be identified.

With the meteoric rise of the smartphone, **geo-location** data now features as an important source in many Big Data scenarios. Telecom companies are well aware that they own a potentially high-value set of data about where their customers (or at least, their mobile phones) are located, giving an extremely detailed picture of the owner's activities. However, the data is not always confined to the telco, since social media and other apps can also harvest this data. In the simplest sense, this could be leveraged to supply adverts or offers to customers based on their current location. Within financial services, applications are likely to be more sophisticated, with many opportunities within the fraud arena for example.

Augmented reality is a developing area which neatly illustrates how data from multiple sources can be combined to offer new services. For example, Commonwealth Bank of Australia provides a smartphone app which, when used to view a for-sale property, combines its knowledge of the user, the location and target property, and various financial data to offer the user provisional terms for a loan to buy the property – all overlaid in an augmented reality style. It also has a number of other useful features to support customers through the home-buying process – including insight on the local area.

There will be increasing privacy concerns as more people and organisations develop an awareness of Big Data. As well as specific legislation, there will be reputational risks if use is not perceived to be appropriate. Developing these opportunities will require careful attention to what information is held about customers for what purpose, reaction to how competitor organisations gather and use data, and when data is disposed of. Government and regulators are increasingly scrutinising the purposes for which data is given and used.

BIG INSIGHT IN THE BANKING CONTEXT

Data permeates all of banking. Most banking operations are comprised of the data held in data centres and the things that banks do with it, and to it. Advances in data-processing are naturally very significant for banks.

Acting with propriety (or "first do no evil")

Perhaps more so than any other organisation, banks must be seen to act with integrity not just with their own customer data, but in relation to the sources of data which they are seen to be utilising. Not least for legal and regulatory reasons, protecting customer privacy is vital, but more importantly may become a key battleground for competitive advantage. If trust is a currency in modern financial services, organisations must consider carefully how they are seen to behave.

Improving customer service

Customer expectations of banking are being raised through their experience of other service suppliers. They increasingly expect greater personalisation, and tangible evidence that their suppliers apply knowledge of them to give personal service. Not only does Big Data improve opportunities to extensively personalise products and services, but it also presents a major sales opportunity to offer the right product to the right customer at the right time.

More than 40% of all tier 1 banking and capital market firms are gearing up to execute big data/analytics business and technology strategies now. This suggests that a rather large 60% are not doing so, yet.

Source: IDC Insights, Dec 2011

The consequence of these customer trends is likely to be a lessening of brand loyalty, and a reduction in margins in a competitive market. As a result, financial services firms will strive to exploit their data to develop innovative services to reignite customer advocacy and loyalty. They can achieve this by exploiting the wealth of data available to create services which are hard for other organisations to replicate. Similarly, the data will be exploited to reduce the costs of services and increase profits and customer service.

The informed customer

Customers have access to more data than at any time, through the accessibility of the internet and the emergence of third-party data providers. As a result they are becoming increasingly self-directed in financial affairs. Price comparison sites, ready information on stocks and shares, and financial planning calculators are some examples of how the internet is becoming a perfect market helping consumers to organise their financial affairs.

Data as a product

Banks may consider providing new services to customers by making relevant data a service in itself. For example, retail customers could get a “people like you” guide to help with their financial management. Banks could give corporate customers access to targeted data to help them run their business. Data held can also shape the type of identification and authentication services they offer to their customers.

Banks may also choose to provide new services based on their data storage capability and their position of trust. Such services could include offering safe custody to include all data that a bank holds on a customer – not just banking data – and helping customers to manage their identity and privacy, perhaps as a “digital vault”. The buying and selling of data as a commodity in its own right will increase, and data is potentially most valuable when it has good liquidity, namely that it can be bought and sold easily.

Keeping the business informed

Financial services firms have a greater interest in automating compliance and lowering costs, in order to respond to regulatory pressures and the desire to be profitable. Driven not least by the outcomes from the financial crises, advanced analytics will lead to better understanding of internal operations and ultimately to better quality reporting and accountability. With the increasing trend to view basic financial services as a utility, banks recognise that it is vital to make this utility as efficient as possible. Business process management tools and methodologies can couple with Big Data to both improve process efficiency and achieve the goal of meeting customer “needs and wants”.

Big Insight - just gets bigger

Privacy continues to be a watchword in considering the use of new data sources, but there is no indication that the growth in data and the development of tools to exploit that data is set to lessen in the future. The potential for near perfect information for banks, and their customers, could define a new basis of competition – one where data capability drives success.

SECTION 3

EVERYTHING JOINS UP “QUICK TO DELIVER; EASY TO ASAPT”

SECTION 3

EVERYTHING JOINS UP "QUICK TO DELIVER; EASY TO ADAPT"

Growing customer expectations, coupled with pressure on margins, demand agile and efficient operations.

However, the legacy platforms used by typical large organisations have their origins in custom-built solutions designed around perceived unique requirements, augmented over the years by a collection of third-party systems, also tailored for the organisation. The resulting platform often proves challenging when required to integrate quickly with new solutions.

Technology is increasingly focused upon speed of delivery and ease of adaptation. A combination of design approaches, standards and deployment are now converging to bring agility and interoperability across many variously sourced systems. Integration is becoming easier and non-invasive.

There are three technology areas which come together to drive the supertrend "Everything Joins Up":

- Automation
- Standards
- Cloud

Automation – the scope of what can be automated extends

The search for efficiencies will continue and will benefit from enhanced business process management toolsets and standard process frameworks. This will enable more agile operations, combining an accelerated change capability with increased control. These technologies will increasingly join up functions and organisations to remove break points and hand-offs, providing a more seamless experience for customers and more efficient processes for banks.

It is more challenging to drive efficiencies for low volume, non-standard or one-off activities, making it difficult to track and evidence activities and outcomes. But these are often high value activities, with material consequences involving specialised knowledge from many experts. As business process management technologies mature they are extending into these specialised areas bringing easy auditability and tracking for this style of work. They can also generate models for similar future work items by capturing and documenting the routing and activity that has taken place.

Plug-and-Play - standardisation at all levels

Financial Institutions the world over could not have built globally interoperable card payment systems without ISO security and related standards.

Source: ISO, 2012

Standards are important – they are key to unlocking lower operational costs and interoperability between functions and organisations. Consider the efficiency revolution that standardised shipping containers brought to the freight industry in the second half of the 20th century. Goods that are packed at origin are not handled again through sea, rail and road journeys. In every major country in the world, ports, ships, lorry trailers and railway wagons are optimised for the size and shape of ISO intermodal containers.

In banking, standards are now converging to be more effective and usable. Industry-specific standards are developing to enable plug and play modularity across systems, platforms and even organisations.

Banks will need to adapt in order to take advantage of new standardised technology from the market. Proven legacy functionality will require investment or selective replacement to deliver the required levels of agility. It is likely that banks will more fully engage technology vendors and standards bodies in the definition and evolution of industry-wide standards. Where a bank can actively shape standards and consequently apply them quickly to their platform, it will leverage the market more effectively than passive rivals.

Forecast: Cloudy

Cloud computing offers on-demand resources and applications from third parties in a virtual model, where peak capacity is only supplied when required. A pay-per-use business model matches system cost to business need. New cloud delivered services can integrate with internal systems, and hybrid models of system deployment are set to become more common. The new paradigm looks to be rent, buy, and maybe build.

Cloud provides the scalability and agility required to quickly adapt to changing customer needs. To mitigate against many of the risks inherent in public cloud services, large banks may opt for private or hybrid cloud models. Consortiums such as Open Data Centre Alliance are already shaping technical requirements for data centre and cloud infrastructure based on open, interoperable solutions.

Outsourced providers are also leveraging the Cloud business models to offer new services with use based pricing. In essence, many of the activities that currently reside within the boundary of an organisation are set to be commoditised and provided by third parties. There will be an increasing shift towards renting or buying standard solutions. This could result in an increased appetite for extreme forms of outsourcing. The lowering of technology barriers could open the way for entirely new business models where a bank is simply an orchestrator of multiple third parties, all enabled by technology standards.

Standards based interfaces have already enabled banks in Japan to reduce costs, diversify IT sourcing and reduce time to market.

Using standards more than 80% of Japanese financial institutions have adopted shared systems where banks share core banking applications, branch office systems.

Source: Celent, January 20121

Everything joins up in banking

With the introduction and mass adoption of new digital channels such as mobile, it will become increasingly obvious to customers if functions and information are not consistent across multiple bank touch points. This will provide fresh impetus for more agile methods of design, enabling separate channel silos to converge around common back end process and data.

The search for efficiency is a hallmark of the evolution of banking technology and associated operating models. Reduced margins, regulatory change and increased pressure to manage cost to deliver are leading to an even greater focus on efficiency. Over the last decade, we have seen gradual improvement in how banks manage their processes. However, these macroeconomic factors are driving more radical approaches in delivering efficiency.

We are starting to see vendors offering “off-the-shelf” solutions on many levels – entire services, processes, logic components – all standards-based and easily incorporated into a standard platform. Alliances and partnerships with third parties can reduce time-to-market for new goods and services and will appeal in a climate of capital constraint. The market is evolving. Outsourcing is maturing from offering generic business functions such as HR and document management, to offering much more granular specialised functions such as auditing compliance to policy, e.g. for Sarbanes Oxley.

Until now, iterations of change have been based upon the incremental improvement of proprietary systems, but the cost of this approach is not sustainable. The development and mass adoption of new technologies in automation, interoperability and cloud will lead banks to be far more agile and ultimately more customer centric.

Barclays and Sentenial, the specialist provider of payment solutions, announced a partnership to provide Pan-European mandate management solutions for the bank's SEPA Direct Debit corporate customers.

Source: Association of Financial Professionals, March 2012

Diverse banking systems will join up as:

Channels converge to use common services

Channels which were developed independently (in order that each could have the shortest possible time to market) are now converging such that each uses common process and data. Channel differences are focused on exploiting specific channel attributes. Customers will still be offered appropriate channel choices but the experience and information (and much of the back end technology) will be consistent.

Technology functions become more accessible through standard interfaces

Older program logic was often constructed in a self-contained monolithic style, with the intention that the entire program would always be executed in accordance with the original design. It was difficult to re-use the program, or parts of it, in ways for which it had not been designed, leading to multiple ways of doing essentially the same thing.

Application Program Interfaces (APIs) are a way of isolating and standardising the way that common functionality is invoked. Their effect is set to increase when used with modern architecture design concepts, joining up a wide range of internal and customer systems. Functionality which was previously inaccessible can be unlocked for use in different ways.

Personal and corporate customers are already heavily invested in "their" technology and they now expect seamless integration with their banks. The extent to which a banking service supports customer technology could emerge as a differentiator.

Standards lead to compatible modular solutions from the market

The combined effect of standards-based technology change could lead to an industrialisation of banking, similar to that seen in manufacturing, where many elements of the supply chain are provided by external specialists, but crucially they can be added or replaced with minimal disruption. Banks are likely to integrate internal capabilities with a much wider range of specialist third parties to improve service offerings and reduce time-to-market.

Service oriented architecture (SOA) is a modern approach for building systems that reuse common underlying elements. Many third-party systems are now based on SOA principles offering the prospect of rapid deployment of heterogeneous functionality with architectural integrity.

SECTION 4

INTEGRITY & SECURITY “TRUST ON EVERY LEVEL”

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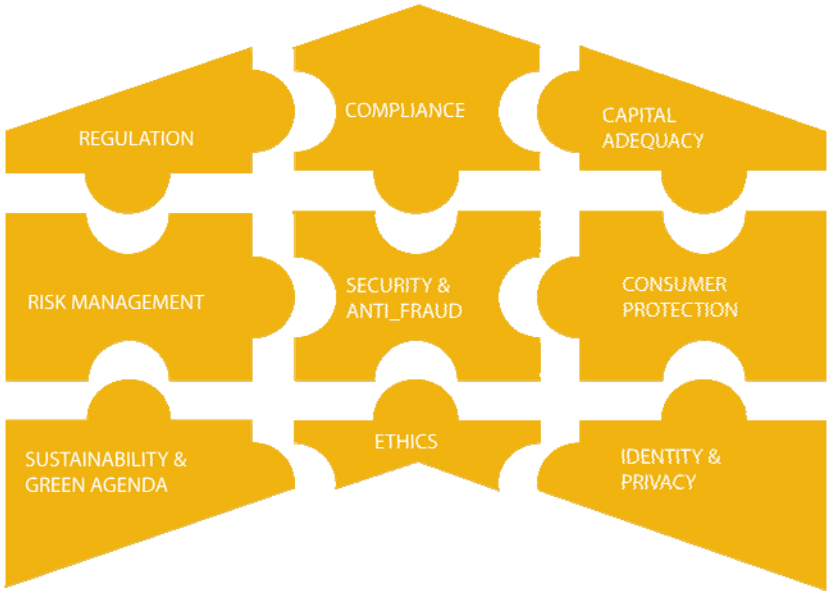
INTEGRITY & SECURITY "TRUST ON EVERY LEVEL"

Technology developments enable and underpin critical elements of trust in the financial system. As shown in figure 5, these impacts span many areas, ranging from the protection afforded to a corporate or personal customer when engaging with their bank, to the frequency and accuracy of compliance information necessary to maintain confidence in the banking system.

Figure 5: Components of integrity and security in banking



Trust and protection

Cyber security issues now top the list of risks, ahead of weapons of mass destruction and resource security.

Source: World Economic Forum, 2011

Trust sits at the core of any banking relationship – with customers, regulators and wider society. Although these relationships are essential to the continued prosperity and sustainability of a bank, they can be easily eroded if a bank is perceived to be acting unethically or providing poor customer service. Trust is also eroded if customers experience security or fraud incidents and when financial stability is called into question.

Technology, on its own, does not deliver trust but it can eliminate potential reasons why trust breaks down. It can be used as a safeguard to protect the integrity of a bank, but also as a weapon to exploit security weaknesses in bank systems and infrastructure. The technological tools used to attack banks are readily available across the world and relatively cheap to acquire. Attacks are increasingly originating from organised criminal gangs and even rogue states - they are not limited to amateurs acting alone. The threats are global, yet there is little prospect of strong inter-governmental action.

Banks will require to manage increased threats associated with new technologies and supplier partnerships, and their potential for negative impact. These may include threats of data loss, fraud or reputational damage.

The management of issues involving ethical and sustainability considerations will be subject to increased scrutiny as technology also presents a new media channel to convey the experiences and opinions of individuals, whether justified or not, to a huge audience. Increased awareness of “green” issues, including the impact of banking activity on the environment and customers, will feature in the way banks are perceived and promoted.

For these reasons, it is important that we understand the ways that technology change will impact our ability to secure our business and sustain trust.

Security & anti-fraud – new challenges and countermeasures

The Digital Society has created new vulnerabilities. Cybercrime, including malware, targeted trojans and phishing activities, is an increasing economic threat to financial services, but will be under-reported in the public domain due to the potential impact on customer confidence. Malware sophistication is growing and the code itself leaves no consistent “signature” to detect. The default position will be to assume some degree of infection and the focus will be to intercept and inhibit the actions of malware rather than to detect and eliminate its presence. Such an approach will demand multilayered profiling of system events and attributes.

Advances in technology are fast-paced, as are fraudsters.

It is now essential to ensure that cyber and information security issues have the standing they warrant on an organisation’s risk register.

Source: PwC, November 2011

The source and co-ordination of attacks is evolving and growing in sophistication and a “market” is emerging for those capable of mounting attacks.

The rising popularity of the mobile channel has created a new set of end point device targets. Risk can increase as many people also use their mobile devices to store security credentials, undermining the mobile-based two factor authentication models used by many banks. In order to mitigate the theft and cloning of mobiles, device and application registration will feature alongside user registration. More unique methods of identification and authentication using biometrics and voice recognition are maturing. An increasing number of mobile devices are starting to support some forms of biometric validation.

The balance of fraud attempts across different channels may alter as new channels such as mobile strengthen. IVR channels and social engineering through the contact centre also become relatively more attractive opportunities for fraudsters.

Link analytics will combine with new sources and types of data, joining information about people and events to build rich profiles of suspicious activity and automatically generating risk scores for combinations of circumstances.

New technologies - helping to manage down risk

As the value of data increases in line with the Big Insights trend, so data itself becomes a key target for misappropriation. Attacks aimed at unauthorised data acquisition are likely to increase in sophistication, often targeting human vulnerabilities inside the organisation and in the supply chain. As a consequence there will be more emphasis on protecting data internally and while in the care of partners. Profiling techniques will determine the appropriate entitlement to data access, as well as systems. The overprovision of rights will be identified and addressed.

New techniques such as behaviour pattern monitoring will be used to determine out of line activities for employees in real time, across a wide range of resources used by employees – devices, systems, data access, building access controls etc.

Data leakage prevention is set to expand in scope and sophistication. The introduction of employee owned devices to the workplace will require tailored lock down solutions, and web and email monitoring will change to block sensitive transmission in real-time. The use of digital watermarks will assist in tracking distribution and preventing document leakage.

Technology for control and compliance

One general effect of information technology over the past 50 years has been to codify and automate business rules. Providing the rules in force are sufficiently complete and correct, then the desired outputs should be completely predictable and to designed standards.

However, as organisations have changed and developed, many business processes now consist of automated fragments, sometimes involving multiple systems, combined with intervening manual steps to compensate. Complex processes with high rates of manual activity are sources of error, and opportunities for business rules to be broken or abused.

As banking continues to extend automation efforts (see section 2) the manual activity currently undertaken will significantly reduce. Aside from the efficiency benefits, one other desirable consequence is that business rules become much more transparent and maintainable. Records Management solutions will formalise the application of policy across business data. The opportunity for individual error or non-compliance will be significantly reduced as control points are harder to circumvent.

As well as prevention, technology developments are enabling much better detection of policy breaches. EDiscovery is one technology area that will extend across many systems and data formats (email, voice, transactions, and documents) to quickly return case information, and determine spread of information where a policy breach is suspected. This will also simplify remediation situations where an audit trail of activity is required.

Consumer protection measures are becoming more stringent as regulators ensure that customers receive appropriate information, advice and products. From a technology perspective decision engines are increasingly using consistent rule sets to provide evidenced, automated advice. The degree of sophistication of these systems facilities will increase, incorporating many more variables in the criteria. Pricing will reflect risk and potentially multiple ranked recommendations. Such technologies will help banks to fulfil their regulatory requirements at a viable cost.

There will also be increasing regulatory demands to manage customer personal data with increased focus on data loss and associated implications for banks affected.

Technology supercharges ethical banking debates

The effect of technology is that any individual or group can disseminate perceived or real ethical concerns across a much wider audience than previously possible. Social media interactions, both internally and externally, can be used to strengthen a bank brand and improve reputation but they are also placing the actions of banks under increased scrutiny. One individual can share their concerns over social networks with hundreds and thousands of people, causing significant damage to a bank's brand and impacting customer attrition rates.

Stronger, more direct, forms of protest are finding digital parallels in so-called "hactivism". Activists are using technology to make their point by defacing websites or taking them out of action (denial of service). These attacks are motivated differently from criminal gangs – more aimed at causing disruption and embarrassment, but this form of threat is set to increase and become more advanced.

Developments in technology will also reinforce the green credentials of banks. The ability to evidence a sustainable approach to business will be supported by more green technology initiatives. Next generation infrastructure will contribute to a lower carbon footprint, and new deployment models such as cloud or virtualisation will match peak demands more efficiently, with reduced data centre requirements. Increasing levels of process automation and the ability to deliver digital service will substantially reduce the requirement to produce paper.

Technology and trust – two sides of a coin

Safety and trust have always been paramount for the banking industry. But the challenges that banks face are set to increase as a consequence of technological advances. Fortunately, technology will also be an ally in countering new dangers and delivering a sustainable future – a future where the entire environment can be actively monitored, attention automatically directed to risk areas and information comprehensively protected against new threats. Although these multilayered security advances are significant, they will remain unpublicised to make it difficult for cybercriminals to circumvent.

SECTION 5

EVOLUTION OR REVOLUTION

SECTION 5

EVOLUTION OR REVOLUTION

Technology can be a powerful force for change in most industries and banking is no exception.

Over the last 50 years, technology has transformed the banking experience from being paper-based, branch-focused and time-bounded into a much more automated service, which provides channel choice and is available for use 24 hours.

The technology trends described in this paper have the potential to shape the next generation of banking.

In the past, banks have been more in control of their technology destiny – generally they were positioned ahead of the technology capability in broader society. That position is now reversing. Technology enabled customers are set to drive new product and service demands from banks based on sophisticated devices, vast data resources and best practices experienced across all industry sectors.

Opinion varies on the likelihood of a near term technology led transformation in the banking industry, but it is clear that there is a greater than zero per cent probability of radical disruption. Evidence can already be seen in areas such as payments where significant parts of the value chain have been disrupted by agile new entrants such as Paypal, Square and Mint – and the true impact of developments such as Google Wallet are yet to play out.

The future is never easy to predict, but the successful bank of the future is likely to monitor these trends closely, placing bets, building partnerships and experimenting in order to be well positioned for possible scenarios that extend beyond a gradual evolution of what we know today.

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