



# Current Issues

Digital economy and structural change

## Fintech – The digital (r)evolution in the financial sector

Algorithm-based banking with the human touch

November 11, 2014

### Author

Thomas F. Dapp  
+49 69 910-31752  
thomas-frank.dapp@db.com

### Editor

Lars Slomka

Deutsche Bank AG  
Deutsche Bank Research  
Frankfurt am Main  
Germany  
E-mail: marketing.dbr@db.com  
Fax: +49 69 910-31877

[www.dbresearch.com](http://www.dbresearch.com)

### DB Research Management

Ralf Hoffmann

This report was originally published in German on September 23, 2014 and translated on November 10, 2014.

**Internet firms throwing down the gauntlet to the banking world.** In sections of the financial industry there are many web- and data-based financial products and services that customers cannot obtain from either their bank or a similar provider. This gives rise to a new competitive environment. Non-bank, primarily technology-driven providers are entering the markets for simple financial services. Regulatory differences of course are a major factor.

**The main areas affected are less knowledge-intensive and easily standardisable financial services.** The offerings of the new players already range from digital payment solutions and information services, savings and deposit-taking right through to modern online banking, multi-channel advisory and securities trading services as well as simple financing solutions and the use of compatible financial software.

**The significance of digital structural change in many business segments is, however, frequently underestimated.** Digitisation is impacting not only on certain elements of value-added processes and business models but on them as a whole, and they must also be adapted as a whole to the architecture of the digital age.

**Over the long term an all-encompassing digitisation strategy should be accorded a high priority (not only) by traditional banks.** Despite the massive squeeze on some margins, the fallout from the financial crisis which has still not been cleared up, the changing consumption behaviour of clients and increasingly strict regulatory requirements the banks need to undergo a radical course of innovation therapy during the transformation process. This will tie up considerable resources over the medium term.

**The financial sector has a lot to offer.** Valuable comparative advantages that a traditional bank has to offer include specific financial expertise (risk assessment, evaluation and management), discretion in handling client-specific (digital) data, as well as many years of experience of providing clients with regulatory-driven high levels of operational security. The latter is of less importance (as yet) to the new players in particular.

**This is how modern banking will look.** Modern data analysis methods will be used just as routinely as a seamlessly integrated web of all distribution channels. Flexible digitised infrastructures will in future enable banks to implement modern technologies and appropriate finance-specific internet services efficiently and above all in a timely manner with the aid of (open) programming interfaces. Strengthening one's own brand and identity as well as the obligation to handle client data confidentially will also help to deliver a sustained increase in customer satisfaction and loyalty.

**The culmination of this development is algorithm-based banking** (algo banking), combined with a personalised greeting and individual service.



## Contents

1. For us the digital age has only just begun .....	3
2. The economic forces of digitisation .....	6
2.1 Preconditions for and drivers of digitisation .....	6
2.2 The beginnings of an internet economy .....	8
3. The stages and pattern of digital structural change.....	10
3.1 The music industry is one of the first businesses to be affected by the change .....	13
3.2 The media and publishing sector remains in the throes of structural change .....	14
4. Digital vulnerabilities in the financial sector .....	16
4.1 Efficient use of information and declining transaction costs .....	17
4.2 (Mobile) Payment solutions .....	20
4.3 (Early-stage) Financing of the self-employed and start-ups.....	23
4.4 Modern data analysis methods (using big data in the financial segment).....	25
5. Recommendations for actions (not only) for the financial sector .....	28
5.1 Win (back) trust with more secure web-based financial services.....	29
5.2 Using modern data analysis methods will be a key to success.....	31
5.3 A digitisation strategy in the banking segment is indispensable .....	33
6. Conclusion and outlook .....	36



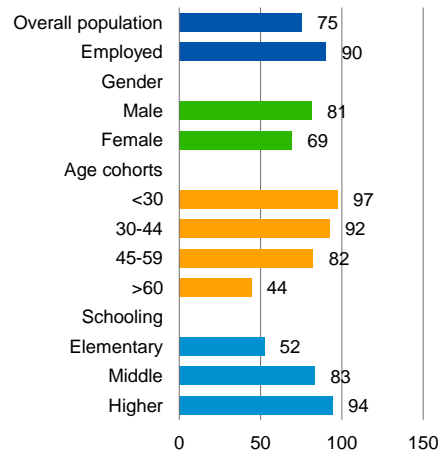
## Fintech – The digital (r)evolution in the financial sector

### 1. For us the digital age has only just begun

Socio-demographic data on internet usage in Germany

1

% of German population aged 16+ (n=1,487), 2013



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

*“Epochal digital change is opening up economic and societal opportunities that had never previously existed. It is truly unstoppable. But it is only we ourselves who decide what we are capable of doing”.*

[Frank Schirrmacher<sup>1</sup> (\* 1959; † 2014)]

Our lives are becoming increasingly digital. The Federal Ministry of Education and Research has declared 2014 as “The digital society” year of science.<sup>2</sup> This is undoubtedly a sign that we are still at a relatively early stage of a digital society that urgently requires further potential analyses and scenario assessments, i.e. academic research.

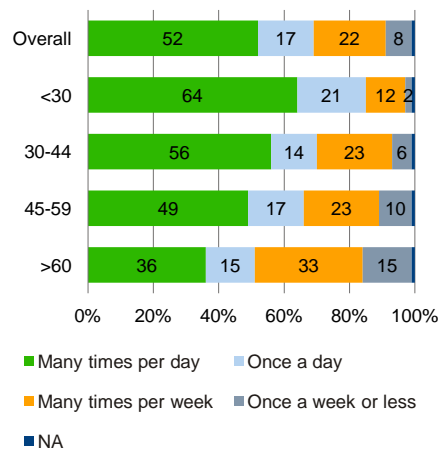
In many areas the mass medium of the internet – comparing it with the theories of Friedrich A. v. Hayek<sup>3</sup> – constitutes a “spontaneous order” and a “discovery process”, because the internet does not pursue any intention to serve a higher, general, societal or common objective, but represents more of a market that is the sum of individual interests. Step by step, we can use trial and error to divine what will be (not only) technologically possible in the future and where opportunities lie, but also where risks are hidden. Unfortunately at this still quite early stage there are several developments which are heading in a worrying direction. The online consumer/personal sovereignty that many people expected or even hoped for at the beginning of the internet age is being undermined by the mass eavesdropping activities of a variety of actors. Some internet users are already behaving more cautiously in the virtual space.

### A new dimension of globalisation

Internet usage intensity

2

% of German population aged 16+ by age cohort (n=1,487), 2013



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

Nevertheless, the digitisation of our working and private lives – just like globalisation – cannot be halted. The pick-up in interconnection is heralding a new dimension of globalisation: a globalisation of products *and* ideas.<sup>4</sup> Digital interconnection is advancing inexorably and in its wake we find modified processes, structures, standards and values that prompt us to adapt, learn and above all think differently. The effects of digital structural change are macro-economic in scale and are certainly comparable with the invention of the printing press. Digitisation is influencing personal freedom of information, providing economic opportunities, harbouring a variety of educational challenges, and driving technology and regulation of the internet in the same way as topical and contentious security questions.<sup>5</sup> Above all, the internet bundles knowledge and information and makes it available to a constantly expanding share of the population permanently and at any location. The penetration of internet and thus data-driven technologies, modern analytical methods and virtual infrastructures extends to every single household, country, sector, value chain and business model.

Today, everyone can participate interactively in digital spaces as long as they have access to the internet. Flexible and varied relationships are formed between people and their diverse identities in the online and offline worlds. Experimental forms of participation and collaboration will become more important in the medium term, which will continually influence the value creation process in many firms. Digitisation is thus changing our social and economic lives as well as the way that we interact with one another and how we (have to learn to) handle (personal) data in future.

Nearly every social and occupational transaction is now linked to modern information technologies and at the same time transaction costs are shrinking.

<sup>1</sup> In memory of a towering German free-thinker of the 21st century.

<sup>2</sup> <http://www.bmbf.de/de/23173.php>.

<sup>3</sup> [http://de.wikipedia.org/wiki/Friedrich\\_Hayek](http://de.wikipedia.org/wiki/Friedrich_Hayek).

<sup>4</sup> Schmidt, E. and Cohen, J. (2013). The New Digital Age. Reshaping the Future of People, Nations and Business. Alfred A. Knopf. New York.

<sup>5</sup> Der digitale Wandel. Magazin für Internet und Gesellschaft. Q1, 2014.

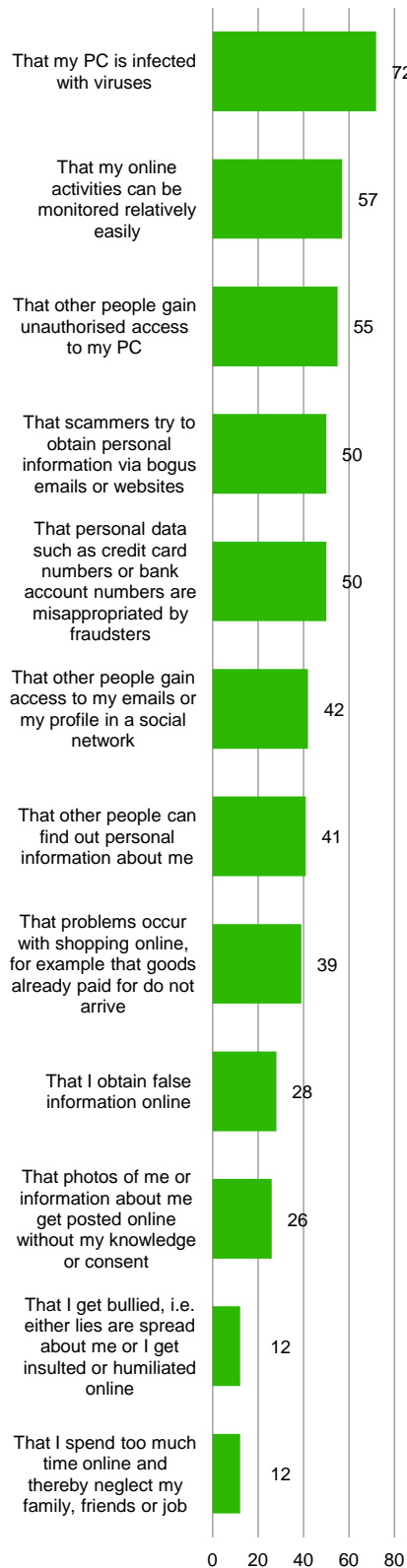
<http://www.collaboratory.de/images/1/10/DerDigitaleWandelQ1-2014-collaboratory.pdf>.



## Fintech – The digital (r)evolution in the financial sector

### Main concerns of internet users 3

% of internet users overall (n=1,485), 2013



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

Even FIFA relied on modern goal-line technology for the first time at this year's football World Cup in Brazil and supplied referees with information that decided the outcome of games. Overall, the relevance of internet technologies is growing in all business segments. Whether it be in the still largely unknown but rapidly expanding world of the internet of things (consumer goods, big data) or in the area of modern industrial web-based technologies (manufactured goods, Industry 4.0).

### Impact of digital structural change

The opportunities provided by digital structural change are undoubtedly multi-faceted and a long-term forecast of where they will lead cannot yet be made. The most serious risk for market participants is by contrast existential in nature: if they fail to adapt to digital structural change then the worst case is the threat that they will be forced out of the market. The road to survival for several traditional actors is thus paved with painful consolidation measures and cost-intensive reforms that are, however, important for holding their own in the new competitive environment of the future.

The growing penetration of modern internet technologies gives rise to new market entry opportunities, especially for technology providers. The lucrative opportunities for the new players in turn ramp up the competitive pressure on the established players. Due to digitisation the established companies find themselves being exposed in some areas that could also develop into Achilles' heels. They provide fast-growing internet firms with the opportunity to occupy certain market niches in order to a) monetarise their digital content and b) make their own range of products more attractive to an even wider public. For some time internet behemoths have been putting out their (digital) feelers across numerous sectors, investing billions of euros, experimenting in a variety of markets, also outside their core business, and offering new business models. For example, the search engine group Google is now active in the home technology segment, in the automotive sector and in (humanoid) robotics.

Many firms have virtually no other alternative but to adapt their traditional business practices to digital structural change. A purely analogue strategy is just as inadequate as offering an additional digital distribution and communication channel alongside the conventional channels. They have to adopt a holistically "digital" mindset and reform programme. Many internet firms as well as start-ups have taken this onboard and are operating successfully in the market. Siloed solutions and/or fragmented, isolated digitisation strategies, as can be observed at many traditional companies, deliver outcomes that are merely suboptimal over the medium to long term. As a rule they do not allow the technologies wanted by customers to be bolted onto their own infrastructure via interfaces.

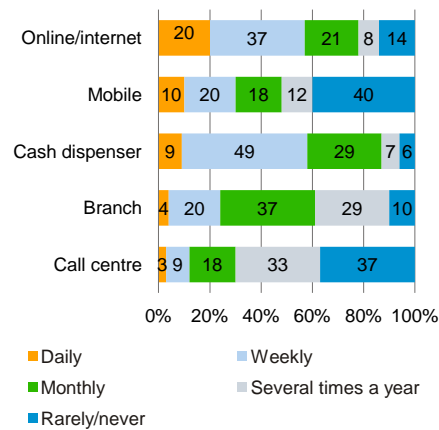
The potential consequences of digital structural change and an inadequate adaptation in individual sectors could be seen clearly over the last twenty years in the music industry. In publishing and the media, too, business processes are being revolutionised by digitisation. For several years the wave of digitisation has also been shaking up the financial sector. It affects – as expected – the area of easily standardisable and non-knowledge-intensive services. These include payment solutions, automated financial services, online banking and simple financing products such as consumer credit or the allocation of venture capital to start-ups. Similar things are happening in the insurance and healthcare markets; other sectors will undoubtedly follow. Everywhere there is catching up to be done with regard to expanding modern information and communications technologies and digital infrastructures.



## Fintech – The digital (r)evolution in the financial sector

### Which channels are used how often? 4

% of customers of international banks  
(n=32,642)



Source: E&Y

### The Fintech movement 5

“Fintech” is the term that has now become established to describe the digitisation of the financial sector. Fintech is a catchall used for advanced, mostly internet-based technologies in the financial sector. The term describes modern technologies for enabling or providing financial services, such as internet-based technologies in the e-commerce field, mobile payments or early-stage crowd-based financing of startups (crowdfunding, crowd-investing).

So while new competitors like Google, Apple, PayPal, Facebook or Amazon and numerous small technology-driven start-ups and niche providers are the dominant online players with their digital business of marketing content, traditional firms are finding it difficult to monetise their still rather modest digital offerings.

The Fintech movement is being buoyed by the accelerating pace of developments in the fields of mobile devices, the modern methods of data analysis (big data), the shifting of data into the virtual “cloud”, the personalisation of services online and the growing convergence of information and communication technologies (ICT).<sup>6</sup>

### Internet firms are throwing down the gauntlet to the banking world

The internet-savvy consumer makes barely any distinction between online and offline distribution/communications channels. Although the majority of bank customers still adhere to traditional consumption patterns, in future an increasing share of the population will be online savvy as a result of demographic change. Bricks-and-mortar branches with fixed opening hours are an increasing annoyance for many customers; there is a growing desire for interaction (among the so-called IKEA generation), regardless of time or place.

Based on the premise that we trust the (digital) channels, we increasingly whip out our smartphones or tablets to compare recommendations, reserve tickets, coordinate travel plans and pay for things. Furthermore, we increasingly surf while on the move, buy online or routinely execute our daily banking transactions by digital means, instead of going to a shopping centre or setting foot inside a bank. For such matters we now have access to clever apps and/or web-based (financial) services that provide us with around-the-clock transparent information on the price movements, risks and opportunities pertaining to the products and services available.

This is where the scale of the squeeze on the financial sector becomes evident, because it is precisely here that the traditional banks have individual digital shortcomings. Especially in the financial industry many of these useful web and data-based financial services cannot be obtained from either the customer's own bank or a similar provider. Such services are now part of the product portfolio provided by so-called non-banks.<sup>7</sup> The financial sector is thus not coming under threat in these areas from financial service providers from within the sector, but increasingly from technology-driven firms that are using digital means to very dynamically force their way into the market for easily standardisable financial products and services in order to win customers and gain market share. This movement is referred to as “fintech” in the online and offline media discourse.

### Let us address the vulnerable areas and the available courses of action

In the following chapter we shall investigate the economic forces/drivers behind digital structural change. Chapter 3 provides a brief, general summary of the stages of digital structural change and illustrates this by looking at selected sectors. In Chapter 4 we focus our attention on the activities in the financial sector that digitisation has opened up to alternative providers and detail those areas where traditional banks are increasingly facing cut-throat competition. From mobile payments and simple financing right through to elaborate big data solutions, a number of technology-driven firms are challenging the established banks and offering their relatively loyal customers attractive financial products and services. Challenges do, however, also provide opportunities. These opportunities for the traditional banking sector are presented in chapter 5 as recommended courses of action. The objectives include winning back trust and placing IT security at the heart of the business model, especially given the topicality of the spying debate. Both these aims should be elements of an all-encompassing digitisation strategy. Chapter 6 is rounded off by a conclusion and a look into the future.

<sup>6</sup> This report shows 50 innovative firms that are tipped to shake up the international financial sector with their new technologies. See <http://www.fintechcity.com/>.

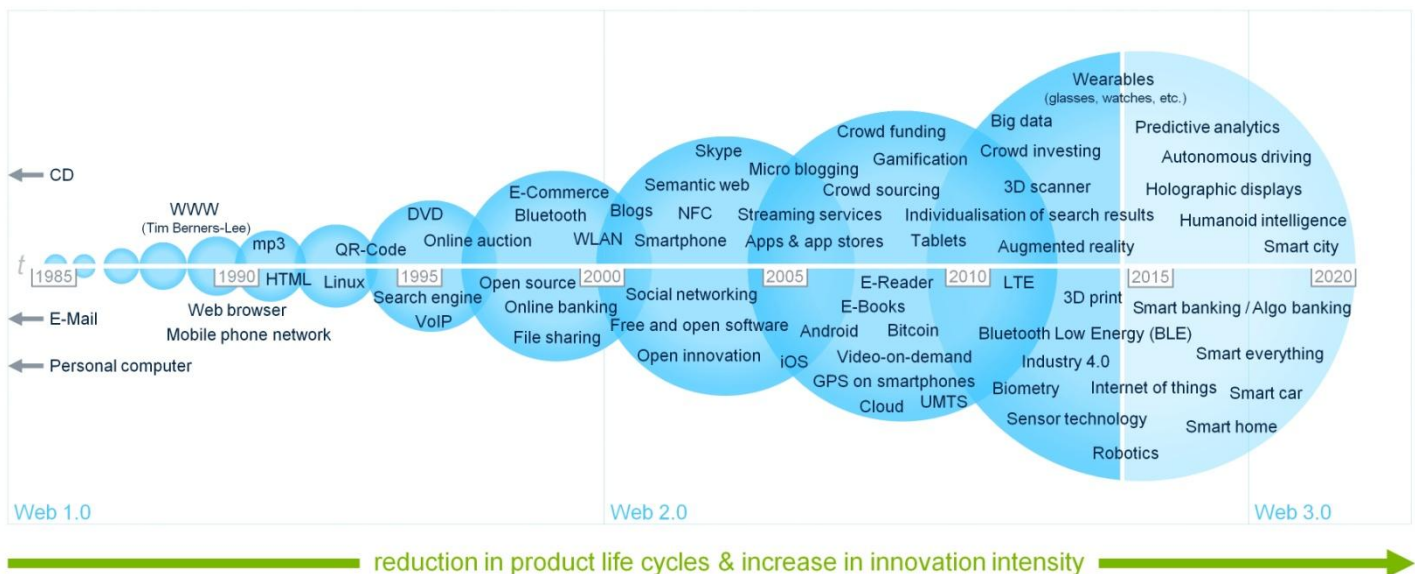
<sup>7</sup> [http://en.wikipedia.org/wiki/Non\\_Bank](http://en.wikipedia.org/wiki/Non_Bank).



## Fintech – The digital (r)evolution in the financial sector

Milestones in the internet age

6

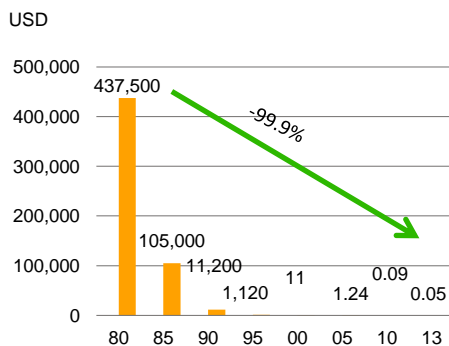


Graph: Oliver Ullmann. Deutsche Bank Research.

Source: Dapp, T. (2014). Fintech – The digital (r)evolution in the financial sector: Algorithm-based banking with the human touch. Deutsche Bank Research. Frankfurt am Main.

Price of 1 gigabyte of hard disk memory

7



Source: Statisticbrain.com

## 2. The economic forces of digitisation

*“Now comes the second machine age. Computers and other digital advances are doing for mental power – the ability to use our brains to understand and shape our environments – what the steam engine and its descendants did for muscle power.”<sup>8</sup>*

[Erik Brynjolfsson, Andrew McAfee]

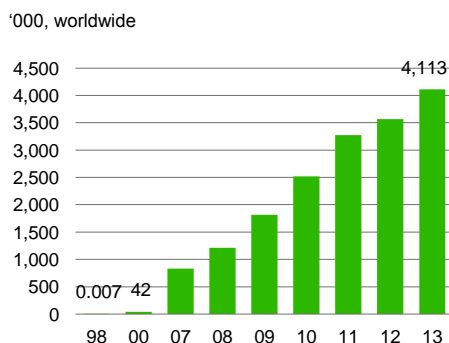
### 2.1 Preconditions for and drivers of digitisation

The precondition for digital structural change is digitisation itself from a technical point of view, i.e. the transformation of analogue signals into digital data. It is primarily a matter of processing analogue information for subsequent processing or storage in digital form. This enables data (e.g. music, films, e-books) to be reproduced as often as required regardless of the storage medium without any appreciable loss of quality and at marginal cost. Over the last 30 years, for example, the price of 1 GB of RAM has fallen by more than 99% to around 5 US cents.

What is being created is a purely digital good – not a physical one. Filesharing, i.e. the facility to swap digital files privately, has permanently altered the distribution of digital content. There is no scarcity, no exclusivity and no rivalry in consumption per se – unless it is introduced artificially (copy protection, digital rights management<sup>9</sup>). The user can thus consume a digital good and at the same time make it available to other users. In the analogue era, the purchase of one vinyl record automatically excluded other users. Every purchase of a physical audio medium signalled scarcity as well as exclusive ownership and utilisation rights. This has been turned upside-down by digitisation.

Google search requests per minute

8



As of January 1, 2014

Source: Google Annual Search Statistics

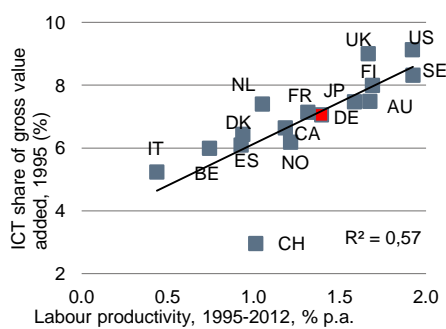
<sup>8</sup> Brynjolfsson, E., McAfee, A. (2014): The second machine age. Work, progress, and prosperity in a time of brilliant technologies. W.W. Norton & Company Ltd. London.

<sup>9</sup> [http://de.wikipedia.org/wiki/Digitale\\_Rechtereverwaltung](http://de.wikipedia.org/wiki/Digitale_Rechtereverwaltung).



## Fintech – The digital (r)evolution in the financial sector

### Productivity & ICT sector 9



Sources: OECD, Deutsche Bank Research

In addition, consumption and media usage behaviour are also changing. Today it is not always about ownership and property, but more often only about access to products and services (e.g. video-on-demand and streaming services). This phenomenon is also discussed under the banner of the “share economy”.<sup>10</sup>

From an economic point of view digitisation and its impact can essentially be attributed to three driving forces:

- i. Increasing storage and usage of intangible (digital) information goods (digitisation effect<sup>11</sup>);
- ii. Viral and exponential global growth of data within virtual networks (network effect);
- iii. Expanding reach of the World Wide Web (penetration effect).

The internet has thereby emerged as a mass medium of publication for everyone and a global and viral distribution network with exponentially expanding volumes of data. Put simply, today everyone can produce digital content and then market and distribute it virally themselves online.

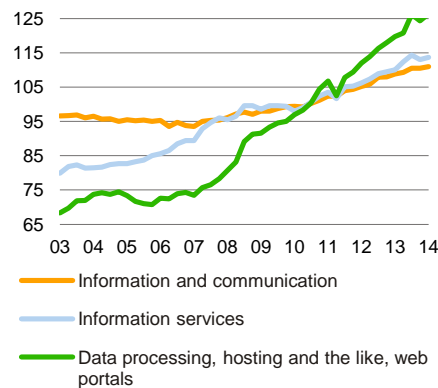
This has of course far-reaching consequences primarily for those sectors that trade in intangible information goods or services. To date the supply and the sales volume could be influenced by the intermediary and/or the artificial scarcity of goods and services. In the digital age these business practices are permanently under attack. The sectors being hit hardest are those that offer easily standardisable goods and services, such as the music business, publishing and the media, the insurance industry and the financial sector. Not only books, music and films, but also simple insurance and financial services have now become completely digitisable and can be automated using modern internet technologies without the need for a physical product. They can also be marketed virally without face-to-face contact being required.

Modern digitisation, network and information & communications technologies are thus not only permanently changing the way that intangible information goods are generally produced, allocated and shared, but also controlled, published and consumed. This enables many processes to be structured more efficiently, synergies to be leveraged and productivity to be boosted. This requires, however, an adjustment to the newly emerging work and organisational structures, new value creation processes and requires new personnel and management qualifications and skills. Without deploying extensive personnel and financial resources such an adjustment is impossible.

Information and communication technologies are seen as key technologies. Across all sectors they ensure the important transfer of knowledge (technology diffusion), they speed up processes, leverage synergies and thereby stimulate innovation and growth, especially in sectors such as automotives, medicine, engineering, automation and logistics. The digitisation-driven increase in labour productivity over the last few decades also made the ICT share of gross value added rise constantly. Huge investments were made in new technologies (innovation-induced investment). The increased demand for ICT products with ancillary services also prompted an increase in employment in this sector. Internet-based innovations are coming to market at ever shorter intervals. As a consequence innovation cycles are accelerating, while manufacturing costs and prices continue to drop. This leads inexorably to stiffer competition and enables new providers to enter the market rapidly.

### Employment in service sector (ICT) 10

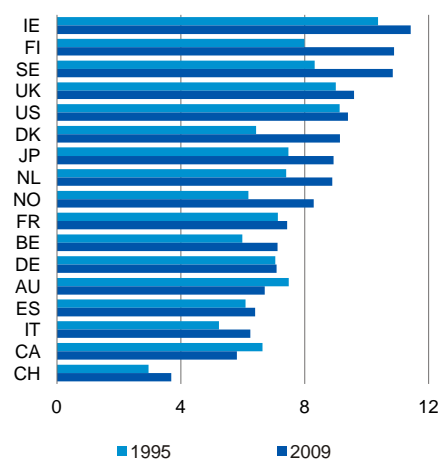
Germany, 2010=100



Source: Federal Statistical Office

### ICT share of gross value added 11

%, selected countries



Source: OECD

<sup>10</sup> See the Deutsche Bank Research Aktueller Kommentar (in German) on the topic of The Share Economy: <http://bit.ly/1zKHxb>.

<sup>11</sup> One example of a viral network effect, see #IceBucketChallenge: <http://bit.ly/1vvuc4w>.

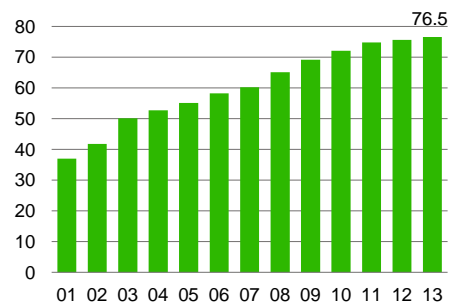


## Fintech – The digital (r)evolution in the financial sector

Germans online

12

As % of population (aged 14 and over)

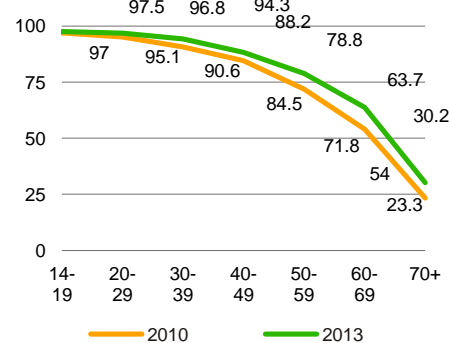


Sources: (N)Onliner Atlas 2012

Internet use by age

13

As % of population (aged 14 and over), DE



Sources: (N)Onliner Atlas 2012

### 2.2 The beginnings of an internet economy

In Germany there are now more than 55 million people over the age of 14 online regularly, and all age cohorts are involved. They constitute more than 75% of the population (aged 14 and over) – and this proportion is rising. The ratio of firms with internet access also jumped from 74% in 2003 to 87% last year.<sup>12</sup> Experts believe that some 3 billion people worldwide regularly access the World Wide Web.<sup>13</sup> Worldwide, however, it is not only the number of internet users that is rising, but also the associated volume of information, communications and transaction offerings. But first and foremost the internet is home to a treasure trove of knowledge portfolios and information. It is becoming increasingly important to learn how to use this knowledge and information professionally and effectively.

At the centre of our internet economy is (digital) information/data that can be traded as economic goods. Personal data in particular has an economic value. An extensive network of actors and infrastructures is being created that guarantees inexpensive production, processing and transmission of digital information goods (data). Examples of digital goods are application software, digital TV programmes, music, films, securities prices, electronic marketplaces, online banking, telecommunications services and special information services that have only become necessary because of the internet (e.g. search engine services).

Furthermore, knowledge and information are increasingly acquiring the characteristics of public goods. Wikipedia is undoubtedly the best-known example. Besides this, however, there are also many public-sector administrative bodies (open data) and universities (open science) that now offer information or complete courses of lectures online.<sup>14</sup> The resulting spillover effects have a positive impact on innovations and thus on a country's economic growth.<sup>15</sup>

#### Economies of scale, network and lock-in effects of digital ecosystems

Network effects and economies of scale are supplementary economic drivers in the digitisation process. In an internet economy there is not only bound to be direct competition between individual digital goods and services, but also competition between the individual systems that are marketed especially by internet platforms. They are also described as digital ecosystems.

For example, an operating system does not provide any special benefit to an individual internet user if that user does not at least have compatible hardware and applications software. This means operating systems, hardware and software are often components from one package in the range of products offered by many platform operators. Within this package there are numerous bundles of complementary and mutually compatible goods and services. This must in turn be taken into consideration by the consumer when making their purchasing decision, since the products and services of different internet platforms are usually incompatible with one another. Some of the application software within the platform is proprietary, i.e. manufacturer-specific standards are set that do not provide for any compatibility with other vendors (e.g. Android

<sup>12</sup> [www.destatis.de](http://www.destatis.de) (Informations- und Kommunikationstechnologien).

<sup>13</sup> [http://www.itu.int/net/pressoffice/press\\_releases/2014/23.aspx#\\_U2yhIvI\\_t8F](http://www.itu.int/net/pressoffice/press_releases/2014/23.aspx#_U2yhIvI_t8F).

<sup>14</sup> For example, the Massachusetts Institute of Technology [MIT] online platform MITOpenCourseware. <http://ocw.mit.edu/index.htm>.

<sup>15</sup> Companies are increasingly appreciating that they can exploit this potential for themselves and are gradually opening (as a supplementary innovation strategy) parts of their value chain in order to render their company services more appealing via the input of human knowledge, ideas, capabilities and skills. The same thing is also happening outside the business sector, for example in the public sector and in the academic and cultural segments.





## Fintech – The digital (r)evolution in the financial sector

vs. iOS). Although the result for the consumer is thus efficiency-boosting and attractive products as well as complementary services, they are fenced in behind high barriers (in a so-called walled garden), so switching to another digital ecosystem can only be achieved after expending considerable resources (lock-in effect).

Explanatory note: Walled garden strategies<sup>16</sup> – digital ecosystems dominate the internet

14

The digital ecosystems currently operating online belong to a relatively small number of firms, but they have a relatively strong hold on the market. The large US firms, which can (currently) be counted on a single hand, dominate the internet business and thus have a big say concerning marketable online innovations. European and even German vendors are becoming less influential and important in the marketplace for digital products, services and processes due to the dominance of US providers. In addition, there are, however, lots of small start-ups and niche operators experimenting with web-based financial services, for example, and bringing a lot of vitality to the market and already proving their marketability. The platform operators can extend their lead using successful monetisation strategies (walled garden), while small vendors as well as many established firms with inferior or less widely used (digital) systems are becoming less important.

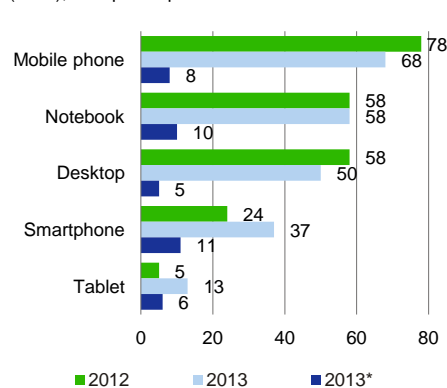
A large number of users makes a platform appealing to third-party providers of goods and services that bolt on to the platforms and their varied offerings in turn make the platform itself more appealing to existing and new user groups. The dependency between platform operators, third-party suppliers and end consumers is basically reciprocal. “However, this reciprocity by no means implies symmetry: in the beginning when the aim is acquiring a critical mass of users, platform operators rely heavily on cooperative relationships with third-party providers. Once a large user base has been established platform providers can control the type of access to the ecosystem – depending on the interface policy – to a differing degree and in so doing also monetise this to a greater extent.”<sup>17</sup> The platforms provide via their respective application programming interfaces (APIs) the facility for new market entrants to collaborate with the established players, but the influence and thus also management opportunities for the big internet platforms are very pronounced depending on their reach and market position.

Experts therefore criticise the walled garden strategies of big internet platforms for also having an impact on innovation, because many of the online innovations are now only driven by the few big internet players who serve the mass market. Strong consumer sovereignty, as forecast at the beginning of the internet age, remains something of an unfulfilled wish. The same applies to the idea of fostering competition. The structures that can be observed online tend to be oligopolistic, and in individual cases almost monopolistic.

### Market penetration in DE

15

% of population, n=1,005 (2012); n=1,005 (2013), multiple responses allowed



\*Planned purchases in coming 12 months

Source: TNS Infratest

The actual network effect materialises when the utility of a digital good or a digital service depends on how many other individuals or actors use these goods and services.<sup>18</sup> This effect materialises both on the demand and the supply side. The more individuals use a particular digital system, the more compatible and complementary offerings there will be in future (positive feedback). This maximises both the customer benefit, as the product range becomes more appealing to the consumer, as well as the revenues of the provider, as more digital content can be sold to more people. Depending on this the producer also decides about expanding his product range, i.e. the network effect influences the propensity to invest and the innovation rate of the vendor and thus the speed at which innovations reach the mass market. The positive feedback is now so extensive at some platform operators that some digital services only attain higher quality levels by making supplementary use of personal data and its evaluation. The speech recognition software from Apple and Google only delivers optimum long-term benefits if more people make frequent use of this software on their devices. Computers are still light years away from understanding what we say or what the spoken words mean.

<sup>16</sup> The walled garden is a business model in which the manufacturer attempts to use exclusive distribution models to retain control over software, hardware and digital content, which are only made accessible to a specific group of customers. For the customer this primarily means convenience, because everything is available from a “single source”, as well as providing time savings, security and a manageable degree of technological complexity. The firms benefit relatively handsomely from walled garden strategies, not least because they can monetise products and services more easily from inside their walled gardens.

<sup>17</sup> See Bahr, F. et al. (2012). *Schönes neues Internet? Chancen und Risiken für Innovation in digitalen Ökosystemen*. Policy Brief 05/12. Stiftung neue Verantwortung. Berlin.

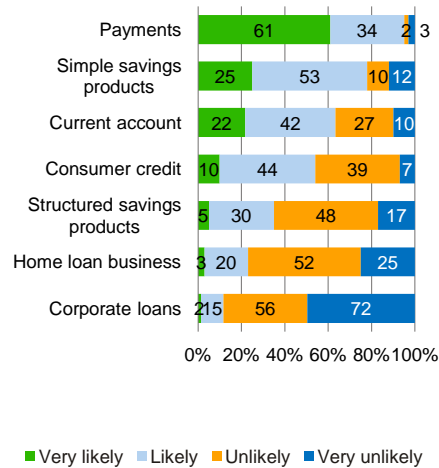
<sup>18</sup> Shapiro, C.; Varian, H. R. 1999. *Information Rules: A Strategic Guide to the Network Economy*. Harvard Business School Press, Boston, Massachusetts.



## Fintech – The digital (r)evolution in the financial sector

### Threat to retail banking from new market participants in the next 3 years 16

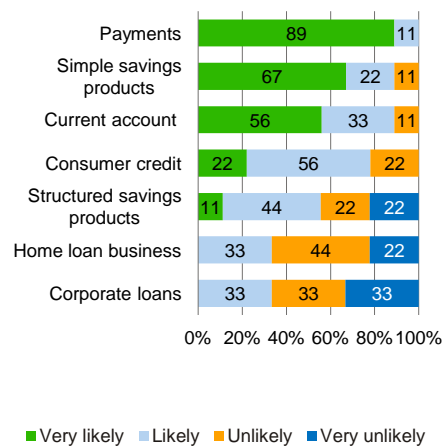
% of those surveyed, by product, international, n=60 banks from 15 countries



Source: Roland Berger

### Threat to retail banking from new market participants in the next 3 years 17

% of respondents, by product, Germany, n=60 banks from 15 countries



Source: Roland Berger

However, with an increasing selection or an adequate collection of speech recordings the underlying algorithm can teach itself while executing calculations that provide internet users with usable voice services and/or answers to their questions.

### Structural change, market consolidation and virtual markets

Existing structures have to be adapted to the new conditions at the cost of huge resources in some cases. Some of the established business models that enjoyed resounding success during the analogue era are thus doomed to fail. Market consolidation measures in particular are implemented a great deal faster in the digital world of big internet groups and many small dynamic start-ups than is the case for example in more established or more unionised markets, such as the automotive or banking sectors.

Digital change is also altering the structure of existing business sectors, i.e. traditional market structures are disintegrating, sector boundaries are shifting and new market entrants are appearing. Virtual marketplaces are being formed with new business models, revenue and cost structures. Sector boundaries that hitherto existed are thereby increasingly being whittled away, because new cross-sector competition conditions are emerging. This is not making macroeconomic analysis any easier.

Many established business models are being unhinged and are being challenged in their core business by firms from other sectors that have specialised in products and services using web-based information and communications technologies and/or data analysis (think “big data”). A widening of scope can be seen particularly at start-ups and niche suppliers that specialise in evaluating and analysing diverse and partially public data and creating products and services from this. For example, an application for web-based devices that measures and analyses people's individual media use and reading habits can then in short order forecast reader preferences more accurately than could be done by a publishing house or a bookshop with many years of customer service experience.<sup>19</sup> This means that expert knowledge gained laboriously and over a long period of time within established business areas will be called into question more quickly in future.

## 3. The stages and pattern of digital structural change

The forces driving digital structural change are complex, and “predatory competition” is certainly an inadequate description of the impact it is having on established sectors and structures in its entirety. Of course there is also a whole series of other contributory factors. These include the penetration of web-based devices, popular familiarity with the internet, network effects and economies of scale, broadband expansion, the potential for automation and standardisation, the readiness to adapt and flexibility of established providers, changes in demand and consumption patterns as well as regulation.

However, in principal there are lots of sectors that can suffer the same fate. Competitors are forced out of the market by the use of new (internet) technologies and changing demand and consumption behaviour. In the current digital transformation process a decisive role is being played especially by modern analysis methods, digital business models, virtual value creation processes as well as digital products and services.

Regardless of the chicken-and-egg debate of whether consumer needs or the early-to-market offering of internet technologies were the trigger for digital

<sup>19</sup> Dapp, T. (2014). Big Data – the untamed force. Deutsche Bank Research. Frankfurt am Main.



change, there are nevertheless some general stages of (digital) structural change that can be described as a recurring pattern:

**Stage 1:** Technological progress generates new internet-based consumption, media usage and communications requirements among consumers. Consumers adapt the new technologies and integrate them into their daily lives.

**Stage 2:** Internet firms from outside the sector along with tech-driven start-ups and niche suppliers stoke competition with their digital business models, products and complementary services. Modern ICT replaces established longstanding (analogue) processes and personal experience with intelligent software solutions with the aid of modern data analysis<sup>20</sup> and intelligent algorithms.

**Stage 3:** Traditional business models feel the squeeze as a result; sales and profits are shrinking. The established revenue sources of traditional firms can only be compensated for inadequately by other business areas.

**Stage 4:** Market share of the incumbents shrinks; new players are growing their market share; competition becomes increasingly dog-eat-dog. Painful adjustment processes and cost-intensive reforms are introduced by the incumbents.

**Stage 5:** Market consolidation occurs; some firms disappear from the market. New, mainly non-financial players enter the market, establish themselves and book their first profits.

#### The cycle of structural change

These stages of digital structural change can be observed occurring at different junctures in various sectors and are even repeated within a sector according to certain time cycles. The outcome is a cycle. Depending on how trailblazing the technological progress is and which strategies are deployed by the incumbents the impact of the individual stages do of course have differing degrees of impact. All the same, “change is the only constant”<sup>21</sup>, i.e. in principle we find ourselves permanently experiencing structural change, but not every innovation is capable of bringing about a paradigm shift. A large proportion of innovations occur between trailblazing events. They are no less valuable, but they are more incremental in nature and are embellished or marginally improved versions of existing products, services and processes.<sup>22</sup> There are opportunities above all for those firms that swiftly succeed in embedding their internal and external processes, services and products as flexibly as possible into a digital company infrastructure (IT architecture) in order to be able to quickly anticipate new technologies. This not only opens up the prospect of survival, but depending on the strategy also of lucrative growth opportunities.

<sup>20</sup> Risks can be derived from the data analyses and can be calculated with the aid of decision theory approaches and differing probabilities; there are however also uncertain factors that are not foreseeable, so-called black swans. The need to recognise uncertainties and to factor them in as realistically as possible is another feature of data and a permanent challenge, for which even big data is not a panacea.

<sup>21</sup> Heraklit, \* ~ 520 BC; † ~ 460 BC.

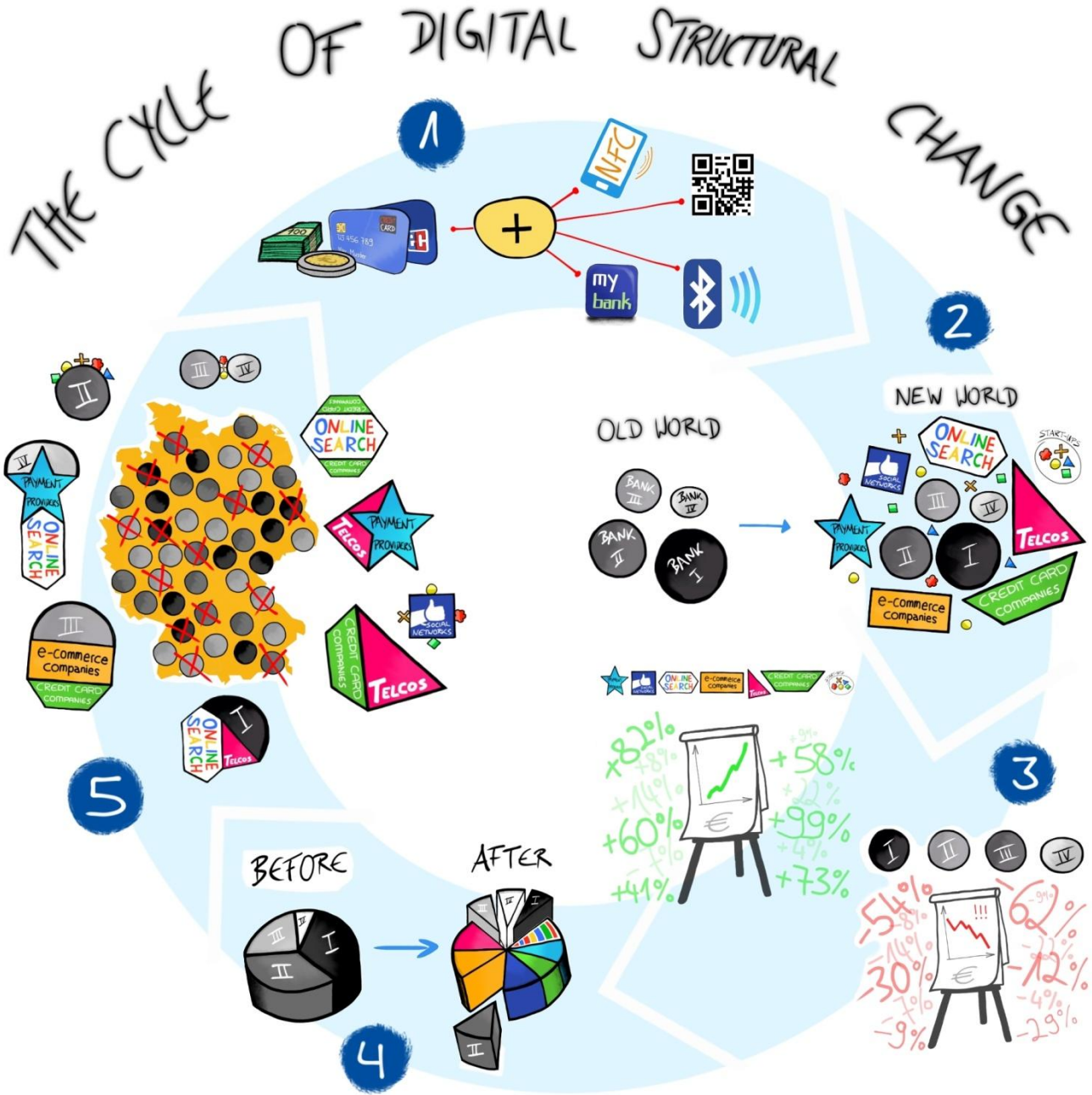
<sup>22</sup> More information provided by the cyclical economic development theory (theory of long waves) developed by Nikolai Kondratiev. In his 1939 work on economic cycles Joseph Schumpeter called these long cycles Kondratiev waves and established that the basis for these long waves is fundamental technical innovations which lead to upheaval in production and organisation (basic innovations).



Fintech – The digital (r)evolution in the financial sector

The cycle of digital structural change

18



Graph: Oliver Ullmann. Deutsche Bank Research.

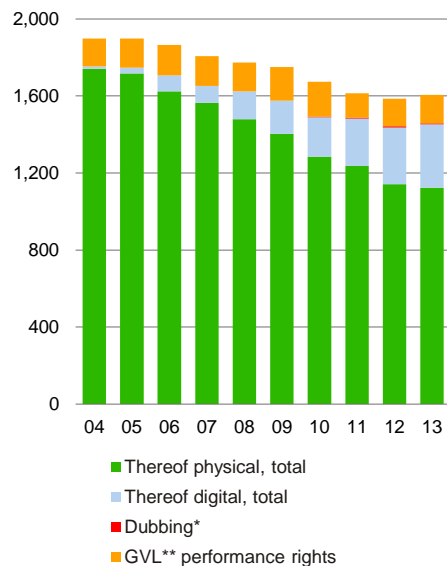
Source: Dapp, T. (2014). Fintech – The digital (r)evolution in the financial sector: Algorithm-based banking with the human touch. Deutsche Bank Research. Frankfurt am Main.



## Fintech – The digital (r)evolution in the financial sector

### German music industry revenues 19

EUR million, by revenue type



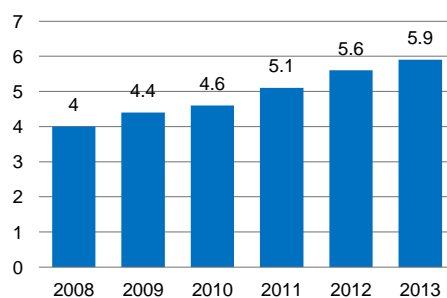
\*Licence revenues of firms for the use of music in TV, films, games or advertising

\*\*Gesellschaft zur Verwertung von Leistungsschutzrechten (German Society for Performing Rights)

Source: Bundesverband Musikindustrie e.V.

### Digital music revenues 20

USD billion, worldwide



Source: IFPI (International Federation of the Phonographic Industry)

### 3.1 The music industry is one of the first businesses to be affected by the change

In the late-1990s when students at Boston's Northeastern University wrote a small program called Napster for sharing MP3 files the music industry came under pressure virtually overnight.<sup>23</sup> Existing business models based on physical recordings that had long been successful were suddenly called into question and were facing existential challenges that, however, in hindsight also opened up many opportunities.

The new peer-to-peer (P2P) software enabled music files compressed into the MP3 format to be exchanged (free of charge) via the internet without using a physical storage medium and without any significant deterioration in quality. Since this technological development was made the music industry has tried to adapt its established business model in order to limit the damage – whose scale could at that time only be guessed at. The question of whether and to what degree the much-discussed “music piracy” has actually done economic harm to the music industry as a whole has been analysed many times and the findings can be interpreted in a variety of ways. P2P networks and filesharing undoubtedly do influence media usage and consumption behaviour. However, it is open to discussion whether their impact has been negative, as the music industry contends, or has been more of a positive factor in the further development of new internet technologies and new business models. True, the revenues of the established music industry (sales of physical recordings) have declined, yet the new digital business models have, however, been generating sharply rising profits for years. Evidently total revenues in the music business have been rising again since 2013.

In order to arrest the decline in music industry revenues the back catalogues of the major labels have gradually been digitised and licensed for digital distribution in order to continually expand the now extensive online offering. Experimental digital sales models have been used to try and persuade consumers spoilt by filesharing to pay for legal downloads or where necessary legal action has been taken to dissuade them from such activity. Given the importance and size of the music market many new (tech-driven) players relished the prospect of lucrative sales opportunities and thus boldly entered the market with various online offerings. Furthermore, in recent years it could be observed that the entire way that music is consumed, produced and distributed has altered radically (sales of physical recordings declining; increasing importance of live concerts etc.). This process is definitely not over yet.

The music industry and the established music labels and rights holders have learned during this painful transformation process that it is not sufficient in the long term to only integrate the internet into their own company strategy as an additional distribution channel. In order to properly account for the increased complexity and dynamism of the market fundamental changes needed to be made to the business models, which differed from the concept pursued up until that time and primarily pertained to their handling of intangible goods. The artificial scarcity of the music offering was and is virtually impossible to maintain. The advent of digitisation meant that business models needed to satisfy the contemporary desires of consumers. Business models have to be created that first and foremost address the central issue of whether consumers will in future be prepared to pay for something that had long been available for free in well-frequented, and in some cases illegal, filesharing exchanges.

Over time some players disappeared from the market. Many new (technology-driven) players are now successfully offering digital and internet-based business

<sup>23</sup> Napster was a music-sharing exchange founded by Shawn Fanning, John Fanning and Sean Parker that went online in 1999. Its purpose was to allow MP3 music files to be shared easily via the internet.

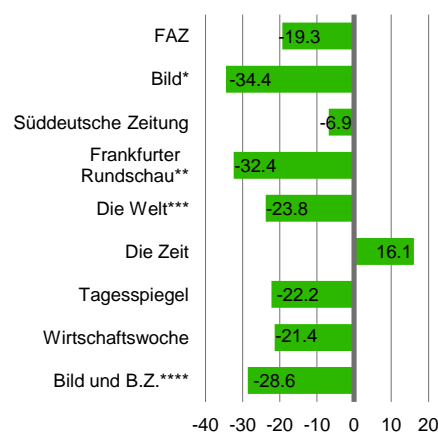


## Fintech – The digital (r)evolution in the financial sector

### Internet displacing print

21

% change in circulation figures, 2000-2013



\*From 1/2013 data collection combined with B.Z (Berliner Zeitung)

\*\* Insolvency 11/2012

\*\*\*Data from 2005

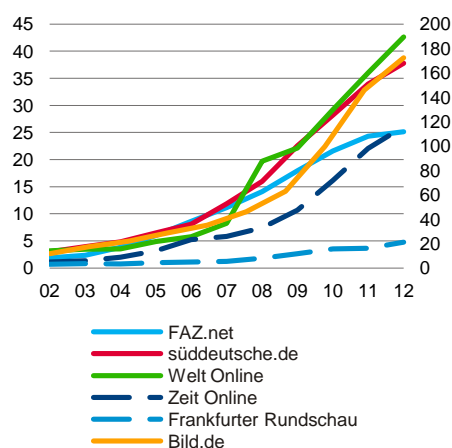
\*\*\*\* Data from 7/2005

Sources: IVW, Deutsche Bank Research

### Click rates on publishers' portals

22

Million, annualised average, webpage visits, (Bild.de = right hand scale)



Source: IVW

models (streaming services) and have established themselves in the market. In addition to the music file and the increasing range of streaming services, modern music consumers are being offered attractive value added products such as music databases in the cloud, digital covers, up-to-date music news about the artists, lyrics and related/similar music – with convenient digital payment methods. Although sales of physical recordings have declined and despite a variety of digital music offerings, subscriptions and streaming services, the music CD and (in some niches) the vinyl record have held on until now. This also illustrates that several market solutions are possible within the transformation phases.

### 3.2 The media and publishing sector remains in the throes of structural change

Since the development of internet technologies the media and publishing sectors have undergone transformation processes that have been painful in parts. Again and again the incumbents are challenged by the introduction to the market of new players' innovative technology or business models. The traditional revenue model in the publishing business, which was familiar from the analogue age, was for a long time based on two foundations: firstly, on revenues from sales and/or subscriptions, and secondly, on advertising. The higher the circulation, the more lucrative the advertising business. Subscription numbers, circulation figures and the advertising business of daily newspapers, general interest magazines and trade journals has been shrinking for many years, though. During the same period the click rates in the new online portals of the traditional publishing houses did increase, but the key difference was that barely any profit could be earned (initially) with the digital channels. There was virtually no willingness to pay for journalistic content and the share of online advertising was still modest at that time. To this day there has been barely any change in the willingness of customers to pay for digital, editorial content. This, however, does not apply to the business models of the established players. Step by step they have been adapted to the challenges of digital structural change. A number of established providers have disappeared from the market while other strategic alliances have been agreed with new or old players.

Thanks to the internet the days are gone when reports about current events appeared exclusively in the traditional media such as TV, newspapers or radio. The internet spawned numerous news portals, blogs and social network platforms which provide free information for viral distribution and consumption. Many traditional news agencies and publishers quickly encountered competition. In addition, millions of people (mostly non-professional, but authentic) became amateur news correspondents, who disseminated and commented on news and images from around the globe on a decentralised and unmanaged basis and largely without monetary incentives. Of course for all those who want to control the flows of information in order to mould public opinion this was and is a problem.<sup>24</sup>

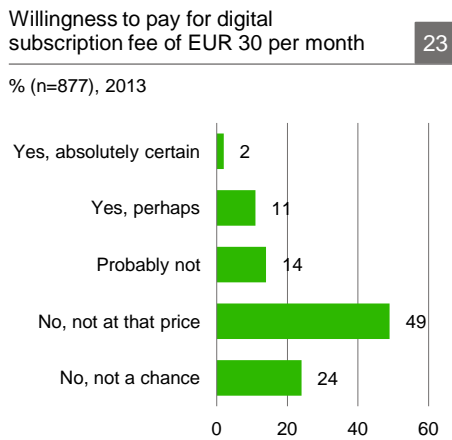
Here, too, the drivers of this development are the high penetration and the high speed of adaptation of the internet-based technologies and the changes in media usage and consumption behaviour. Mobile, web-based devices then came along in subsequent phases of the transformation process. Innovative devices, such as smartphones, tablets or e-readers are becoming more and more appealing (across all age cohorts) and will become more established going forward.

<sup>24</sup> Dapp, T. (2011). The digital society. New ways to more transparency, participation and innovation. Deutsche Bank Research. Frankfurt am Main.

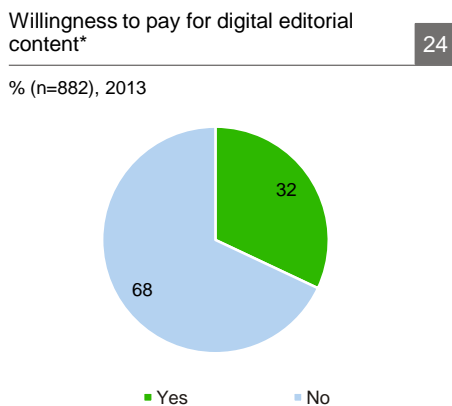


## Fintech – The digital (r)evolution in the financial sector

### Recent changes in consumption and media usage behaviour

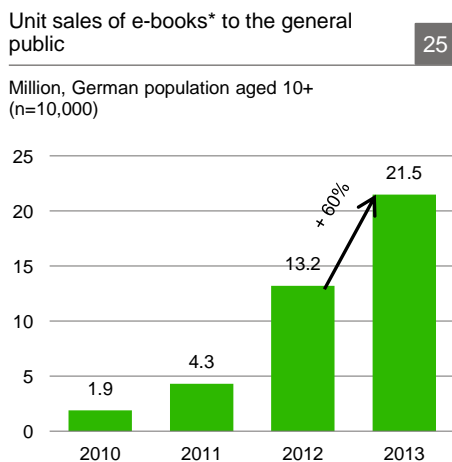


Sources: ibi research / Internet World Messe 2013



\*Blog posts, news stories, comparable digital content

Sources: ibi research / Internet World Messe 2013



\*Excluding school books and reference books

Source: GfK Consumer Panel

When in 2007 for example the first mass-market e-reader was launched in the US by Amazon, reading on digital devices was still relatively unpopular. Today, by contrast, a wide selection of mobile e-readers are available. The acceptance of digital books is of course highly dependent on the availability of user-friendly and inexpensive devices and the openness of the underlying operating system (compatibility of data formats). A majority of internet users would like for example a data format that can be read on the various devices of different vendors. This drives manufacturers to take rapid action and makes the market for mobile devices additionally dynamic. The functional further development of devices will in the coming years thus be heavily influenced by new consumer desires and by their further market penetration. Those providers – including the established players – who with respect to the integrability of multimedia-enriched content succeed in incorporating interactive and audio elements and the installation of apps into their business activities have quite lucrative growth prospects. Some major online platforms have already succeeded in doing this, while some incumbents are emulating these new business models.

In the context of observing the major internet platforms the question that arises is whether the established market participants will continue to play a part in the new digital market. So, are publishers or booksellers in a position to compete in the digital content business, or must they cede their role as sellers and advisors to the big platform operators? The German Booksellers Club (Börsenverein des Deutschen Buchhandels) forecasts an e-book share of the book market (excluding the science segment) of roughly 15-20% (2013: 3.9%) in the medium to long term.<sup>25</sup> If the bricks-and-mortar bookshops were to lose this share of the market, they would not die out, but the number of small independent bookstores in particular would probably continue to decline sharply.<sup>26</sup> True, some publishers are already offering their own mobile e-readers in cooperation with telecommunications providers (strategic alliance). However, in order to position themselves early in the expanding market as providers of an attractive value-for-money proposition further technical developments need to be made to the devices (extending the battery life, compatibility, special screen technologies, etc.) and falling prices are decisive. Those providers that are represented along the entire value chain enjoy comparative competitive advantages. Of the new players it is above all Amazon, but also Google and Apple which have successfully positioned themselves both as providers of a variety of services (music, videos, apps, e-books) and as suppliers of devices.

### Business practices of the new players constitute a successful model

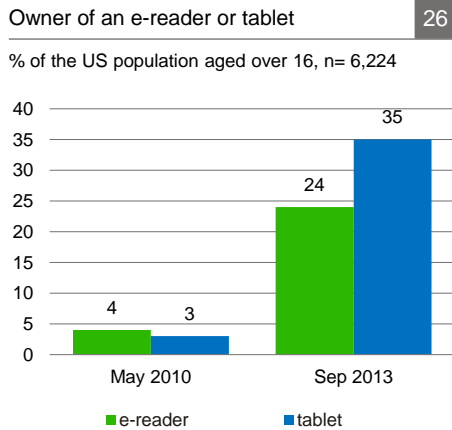
One of the truly successful walled-garden management strategies adopted by the platform operators is the use of cross-subsidisation. Cross-subsidisation means that individual business or product areas are subsidised by others. Providers offer purchase incentives by squeezing the prices of mobile devices for example down to their cost price. Many digital ecosystems have access to sufficient liquidity that enables them to experiment. If one project fails, another one or a parallel project is picked from the pipeline and funded. (Cross) subsidisation is such an experiment. Many products are sold particularly cheaply to gain as many customers as possible and thereby further increase market share or to undercut the prices of competitors. Smaller, established providers cannot afford to do this (permanently).

<sup>25</sup> [http://www.boersenverein.de/sixcms/media.php/976/E-Book-Studie%202012%20PRESSEMAPPE\\_print.pdf](http://www.boersenverein.de/sixcms/media.php/976/E-Book-Studie%202012%20PRESSEMAPPE_print.pdf).

<sup>26</sup> <http://thebusinessweb.de/2013/02/26/thesen-zu-e-book-okosystemen-5-chancen-fur-den-stationaren-buchhandel/#more-878>.



## Fintech – The digital (r)evolution in the financial sector

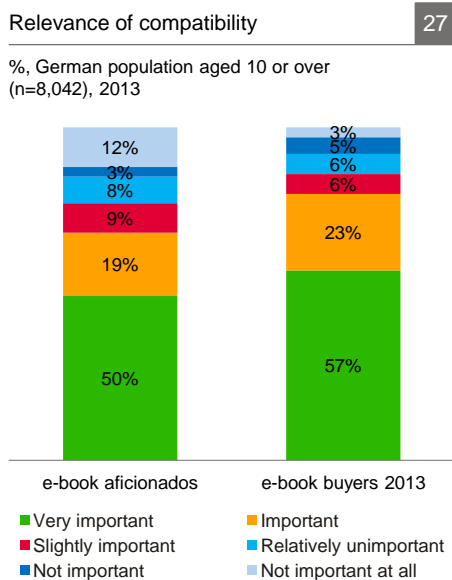


Source: PewResearchCenter

The example of the Kindle Fire shows how Amazon is speculating that internet users who own a mobile device will purchase more digital content (books, music, films, e-books etc.) via its own platform. Jeff Bezos, the CEO of Amazon, said in this connection: “We are not building devices for technology freaks. We are building devices for people who like to consume and use media. We don't want to make money on the devices, we sell them at cost price and hope that we then make money from the Amazon offering that is linked to the devices. That is films, books, newspapers, games and apps.”<sup>27</sup>

Selling the device at cost price or even slightly less proved to be lucrative relatively quickly. The profit is thus not made directly from the sale of the tablet, but from boosting online sales via the new device in its own content store. Given the variety of products, exclusive services and (billing) processes in the Amazon offering this strategy is bearing fruit. The principle of cross-subsidisation is not really a new one and is seen as a strategic competitive tool in many industries.

### The latest (digital) challenges to the incumbents



How important is the openness of systems?

Source: GfK Consumer Panel, commissioned by Börsenverein des Deutschen Buchhandels

Something similar to the business model of offering video-on-demand at a flat rate that has become established in the market could also be introduced in the existing digital books segment.<sup>28</sup> In return for a monthly fee the consumer would be granted access to numerous different e-books on a single platform. Of course in the book market there are a number of regulatory hurdles, like Germany's fixed book price agreement<sup>29</sup> or licensing aspects that for example make it impossible for the US model to be replicated in full. However, with the aid of corresponding rental models, i.e. various e-books do not have to be bought but can be conveniently rented temporarily for a fee, the fixed price agreement can be circumvented. However, the agreement of the rights holder is required for a corresponding rental model and this has to be obtained by the provider/platform operator. The examples show that the publishing and media sector is still in the transformation phase and is constantly being challenged by new digital offerings.

On grounds of competitive intensity, innovation capability and the variety in the music business and in the media and publishing we welcome the efforts of the incumbents to address digital structural change with their own innovative business models. The new offerings are thereby not only concentrated on a few individual major internet heavyweights, but on many providers with diverse, versatile products and services..

## 4. Digital vulnerabilities in the financial sector

Having taken a look at the different stages and economic drivers of digital structural change in general as well as in particular, in this chapter we shall now discuss the digital vulnerabilities of the financial sector. We will show that digital structural change – as in other sectors – mainly applies to the products and services that can be easily standardised and automated. Time will tell which other effects modern internet technologies will have on the broad spectrum of services offered by traditional banks. For the moment, however, we consider the following to be digital vulnerabilities in the financial sector that should not be ignored:

<sup>27</sup> <http://www.berliner-zeitung.de/magazin/amazon-gruender-jeff-bezos-gedruckte-zeitungen-lese-ich-nicht-mehr,10809156,20945666.html>.

<sup>28</sup> <http://www.spiegel.de/netzwelt/web/kindle-unlimited-informationen-zu-amazon-buchflatrate-fuer-9-99-dollar-a-981854.html>.

<sup>29</sup> <http://de.wikipedia.org/wiki/Preisbindung>.



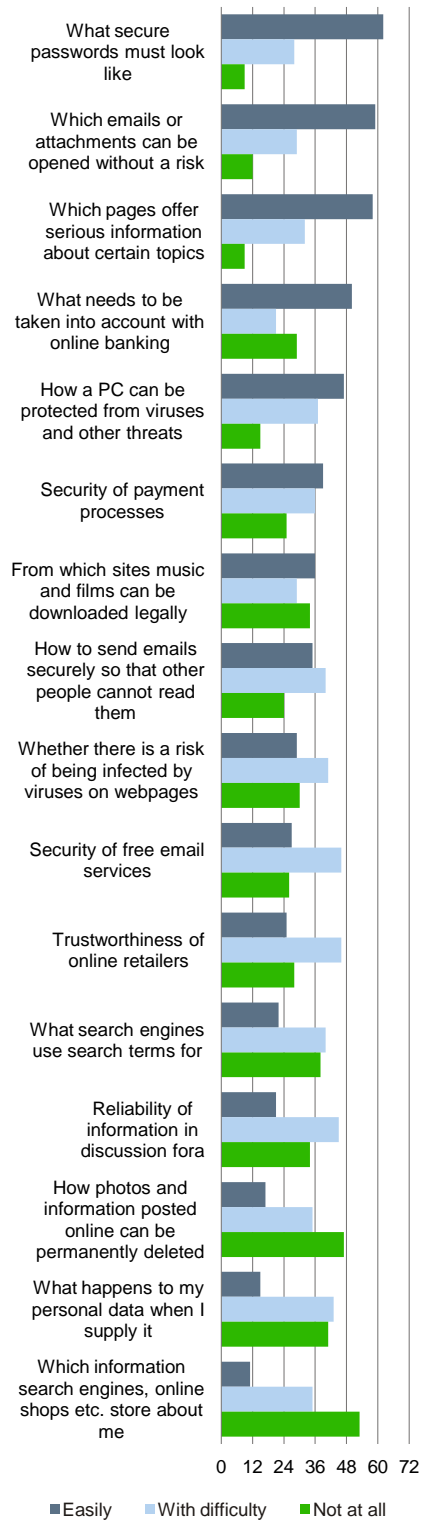


## Fintech – The digital (r)evolution in the financial sector

Danger online  
"I can gauge..."

28

% of German population aged 16+ by age cohort (n=1,487), 2013



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

### 4.1 Efficient use of information and declining transaction costs

#### Some efficiency gains at established banks ...

In their function as macroeconomic financial intermediaries, banks are – among other things – intermediaries of information. A major part of their core business is to bring about the efficient allocation of funds, in contrast to direct barter trade between companies (investors) and households (savers or creditors). A bank can realise efficiency gains by transforming diverse asset classes and providing the risk management necessary to do so. To perform these services, banks do charge a price (e.g. in the shape of fees), but via information resources they help both the company (investor) and the household (saver/creditor) to obtain and/or invest funds more efficiently. The utility that banks generate for the market in doing so lies in the transformation of the information gathered and the knowledge derived from it into products and services for the customer.

#### ... being eroded by the competition in the new, technology-driven environment

The increasing spread of efficient web-based technologies and the adaptation rates at which people integrate these technologies into different parts of their lives have eroded some of the efficiency gains accruing to traditional banks. The example of digital wallets shows that new players are able to make certain services and products available to customers more rapidly and more efficiently thanks to modern technologies, lowering transaction costs, in particular, on both the supply side and the demand side.

Moreover, nowadays many (internet-savvy) customers are able to search for fundamental information on the internet themselves. Large amounts of financial industry information are available in internet fora, on comparison portals and in direct exchanges with experts on social media platforms – usually free of charge. Some information can also be called up in real time, with the consequence that many customers now expect more highly personalised information and higher-quality advisory services from their bank than they used to. No doubt this applies to all standardised and non-knowledge-intensive bank products and services (i.e. ones requiring little advisory). However, this also applies in particular to simple financial services which expose the entrepreneur and households to only a low level of risk. It follows that the internet also plays a significant role in the financial sector in terms of the efficient and rapid use of information, because as a mass medium it is increasingly available to many people and relatively easy to use. However, not only the banking industry is confronted with increased competition, efficiency and transparency issues on simple products and services. These vulnerabilities are also found in many other sectors.

So, all in all, these considerations (also outside the banking sector) lead to the interesting question as to what extent modern web technologies (operating systems, software or algorithms) can be offered with falling transaction costs in future by players from other sectors. After all, the use of these technologies also enables consumers or third parties to evaluate the information collected on the internet and conduct corresponding financial business themselves (e.g. as operator of or investor in a crowdfunding platform or as provider of a financial advisory platform), of course as long as the required regulatory rules are observed.<sup>30</sup> The related consequence is that the efficiency-enhancing possibilities of the internet will have an impact in future, further changing the

<sup>30</sup> For example, purchases made on a crowdinvesting platform are subject to fewer regulatory conditions than, say, the purchase of shares by a customer at a bank.

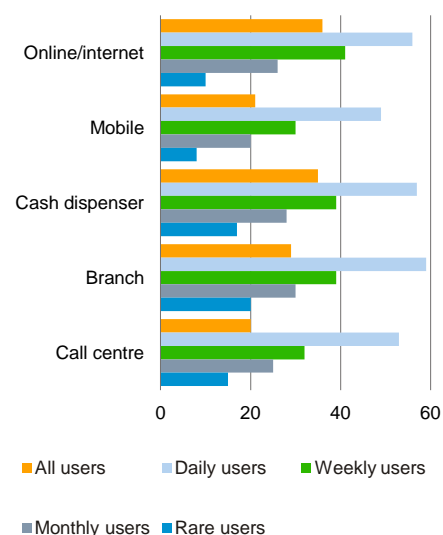


## Fintech – The digital (r)evolution in the financial sector

Bank customer satisfaction with different channels

29

% of customers of international banks (n=32,642)



Source: E&Y

face of interaction between the bank and its customers and, quite generally, between providers and users.

The efficient use of information and falling transaction costs thanks to web-based technologies are paving the way for many new players (e.g. digital ecosystems or start-ups) to enter the market. Given their, in some cases, immense customer reach, their digital infrastructure and their convenient “one-stop shopping offer”, they can woo away many customers from established banks with simple digital financial services in the shape of apps or web-based services. The range of products and services offered by new players is (still) limited, though. If, moreover, the financial products for companies and households prove to require more intensive advisory services, the established players may regain some of their competitive advantage, because for the time being it will not be easy to offer complex financial products, such as international trade finance (letters of credit) or an initial public offering, in a standardised or fully automated format over the internet. In such cases, complex structures and individual customer needs are more in the foreground, and these can only be satisfied with bespoke advisory measures. What is more, many bank products and services must comply with regulatory standards, which are linked with costs and expertise, and this may act as a deterrent to many new (small) players. For this reason, the new players in the financial sector tend to concentrate on offering products and services that are not subject to regulatory oversight or do not require any licences. The regulatory stipulations are not only tantamount to cost disadvantages for the banks. Rather, they certainly also enjoy competitive advantages in the shape of market entry barriers for new players. Note, though, that some of the new players already have a banking licence (e.g. Bergfürst) or an e-money licence (e.g. Google, Facebook) enabling them to broaden their supply of fintech services.

### Banking and e-money licences overview

30

	Banking licence	E-money licence
Law governing authorisation	§ 32 KWG*	§ 8a ZAG**
Licensing authority	BaFin	BaFin
Law governing eligibility requirements	§ 33 KWG	§ 9a ZAG
Examples of eligibility requirements	Depending on the type of service starting capital of between at least EUR 25,000 and EUR 5,000,000 Suitably qualified and reliable management Transparency of company structure	Depending on the scale of the payment services offered a starting capital of at least EUR 350,000 Suitably qualified and reliable management
Rights associated with authorisation	Operation of banking/financial service business	Providing e-money services as an e-money institution
Regulator	BaFin	BaFin

\*Kreditwesengesetz = German Banking Act; \*\*Zahlungsdienstenaufsichtsgesetz = German Payment Services Oversight Act

Source: Deutsche Bank Research



## Fintech – The digital (r)evolution in the financial sector

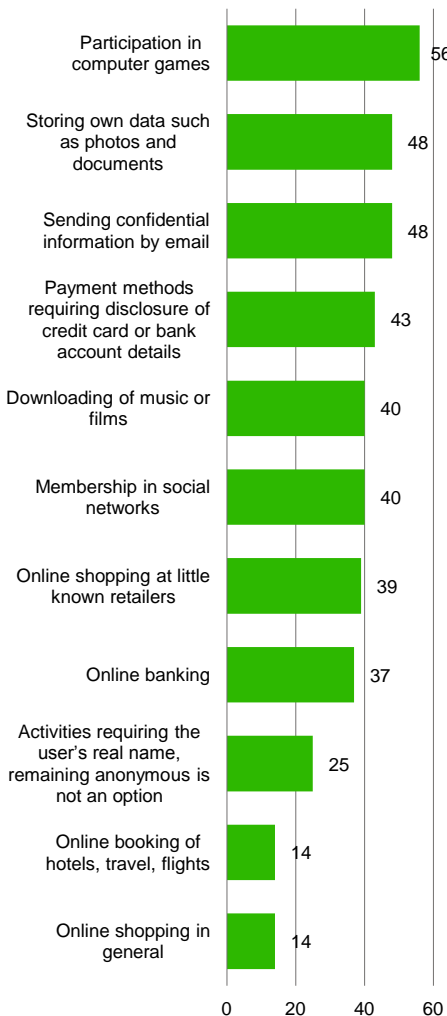
At the same time, modern internet technologies and the increasing use of innovative data analysis methods will allow new dimensions of knowledge superiority in future. At the moment these information advantages tend to be deployed more by the new web-driven players and not so much by the established banks. However, this is likely to change in the medium term.

### The data economy: A new dimension of efficient information use

In the growing data economy, personal data and customer profiles constitute a key element of the business model. Even though it is becoming easier for consumers to find the information they want, e.g. given sophisticated search engines and individualised search results, some technology-driven vendors may be able to permanently position themselves more favourably in this data market than established financial players. After all, depending on which tracking tools (e.g. cookies) and data analysis instruments (web or predictive analytics) are used, a good deal of information from and about the consumer is collected, stored and evaluated, this being the core competence of “big data”. This means that not only several large internet players but also many new start-ups have informative and, above all, valuable customer profiles at their disposal. They enable the new players to address customers more directly and individually with products and services. Experts already say that some platform operators can predict the needs of their customers so accurately that they can appeal to consumers with personalised offers which they would very probably order anyway given their purchasing behaviour to date. Alternatively, customer data may also be anonymised and sold to third parties. Lately, in violation of existing data protection laws, the internet data-gathering practices of some players have spun out of control, and informational self-determination is being lost in the process.

### Abstinence for security reasons 31

% of German population aged 16+ by age cohort (n=1,487), 2013



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

### Algorithm-based banking with the human touch (“algo banking”)

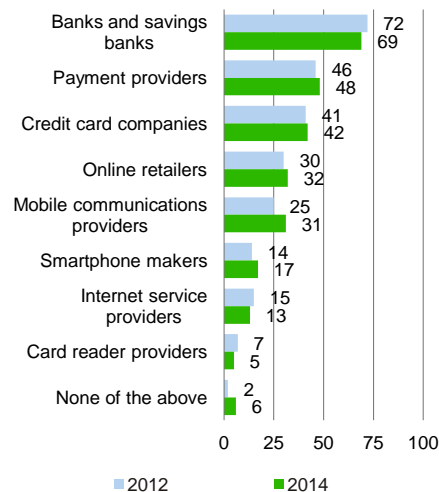
Irrespective of the legal rules (which are in urgent need of amendment), the implication of the above for established financial institutions is that there is already a plethora of competitors in the market able to benefit from a decisive information advantage in terms of knowledge about (potential) customers. They have detailed customer profiles at their disposal which they are quite capable of exploiting – with the help of modern analytical methods and intelligent algorithms – to create attractive and useful financial services. Thus, the art of earning money with the efficient use of information has not disappeared. However, in the area of simple financial services there has been a shift away from traditional financial intermediaries towards better-informed customers, and above all towards the technology-driven, data-evaluating vendors. In this context, it is necessary to differentiate between two levels: banks used to have more specific information than their customers in many areas, e.g. current market conditions. By contrast, the new vendors from the data economy have very much more personal information about their customers and their consumption behaviour than the banks do. Above all, they are able to use the data efficiently. As a result of this shift in power, the exposed flanks in the financial sector become even more vulnerable to attack from the other products and services offered by non-banks. The offerings range from payment solutions and information services, savings and deposit-taking right through to online banking, advisory services, securities trading services, simple financing solutions and other modern financial software. Hence, the focus is primarily on banks' retail business, although it is presumably only a matter of time before corporate clients and institutional investors will also be provided with simple web and algorithm-based financial services by new vendors.



## Fintech – The digital (r)evolution in the financial sector

### Trust in mobile payment providers 32

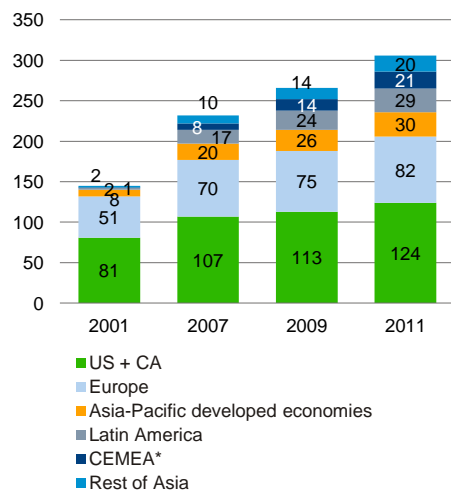
% of respondents, users or would-be users



Sources: Initiative D21, TNS Infratest

### Number of cashless transactions worldwide 33

Billion, by region



\*Central Europe, Middle East, Africa, Russia and Poland

Source: Capgemini Analysis

### 4.2 (Mobile) Payment solutions

The market for mobile payment systems remains in a state of flux and holds promise of lucrative market entry and growth opportunities for many players outside the banking sector. Some customers put great trust in established web-based service providers and their processes, expressing this in a decidedly noticeable show of loyalty. Company names such as “Amazon”, “PayPal”, “Apple” and “Google” are associated with user-friendly, convenient and reliable service. In a few cases, they enjoy a similarly high level of trust as traditional financial service providers. If Amazon offers retailers or customers its complete value chain – from the presentation of the offering to payment options – from a convenient single source, the payment process *per se* is obviously only a final step in the value creation process. The more automated and convenient the concept of the individual process steps on a platform, the less consumers will accept the idea of having to switch over to a bank (e.g. online banking) for the last step, that is the payment transaction. Convenience, security and above all the principle of “everything from a convenient single source” is increasingly becoming established online especially.

However, since publication of our report on “The future of (mobile) payments” in December 2012, not a great deal has really been done in structural terms in the market for mobile payment solutions. The number of cashless transactions and the number of (mobile) digital payments continue to rise. The data for 2011 confirm this trend. For example, in 2011 there was already a global total of 307 billion non-cash transactions (2010: 282 bn). The growth has remained relatively stable over the past few years; even the European market registered moderate expansion in spite of the economic turbulence in recent years. Despite the particularly robust growth in the emerging markets, nearly 70% of cashless transactions are still accounted for by the US and European markets. The national payment markets also continue to show significant differences due to the income gap, contrasting customer preferences and the regulatory environment.

Furthermore, debate still only focuses on a few technologies that can be counted on a single hand such as nearfield communication<sup>31</sup> (NFC), quick response<sup>32</sup> (QR), web-based financial services via apps and now, increasingly, Bluetooth low energy<sup>33</sup> (BLE). To date, however, none of the technologies has been able to make serious inroads in the mass market, which is partly attributable to cultural payment preferences. The recently planned thrust by Apple (Pay)<sup>34</sup> to seek collaboration with various credit card providers could change this in the medium term, though. But the jury is still out on whether a single payment technology will be able to corner the international market in future. After all, the consumer is used to having a range of payment methods to choose from, and feels relatively comfortable with these options. A country-specific breakdown shows that many people use a variety of credit cards, debit cards, prepaid instruments and cash in parallel. In addition, the high penetration rate of mobile devices has now also enabled the use of web-based payment facilities via smartphone or NFC chip. In other words, a diverse array of payment options is available. Therefore, we believe that a portfolio solution will prevail in the medium term and not an individual payment method.

<sup>31</sup> For info, see [http://de.wikipedia.org/wiki/Near\\_Field\\_Communication](http://de.wikipedia.org/wiki/Near_Field_Communication).

<sup>32</sup> For info, see <http://de.wikipedia.org/wiki/QR-Code>.

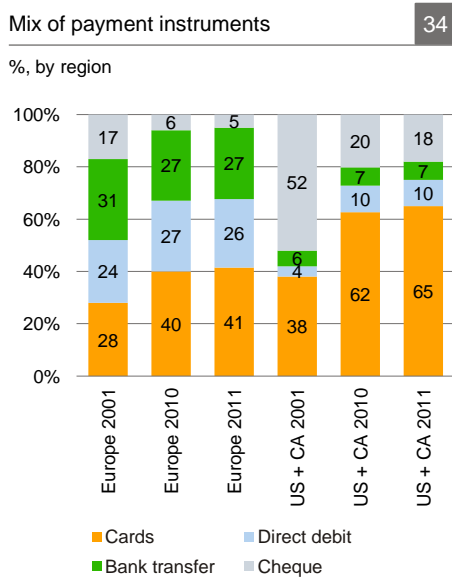
<sup>33</sup> BLE is a radio technology that enables devices to be linked up within a range of about 10 metres. Compared with “traditional” Bluetooth, BLE is said to use significantly less power and incur lower costs, yet enable communication over a similar area.

<sup>34</sup> [http://de.wikipedia.org/wiki/Apple\\_Pay](http://de.wikipedia.org/wiki/Apple_Pay).



## Fintech – The digital (r)evolution in the financial sector

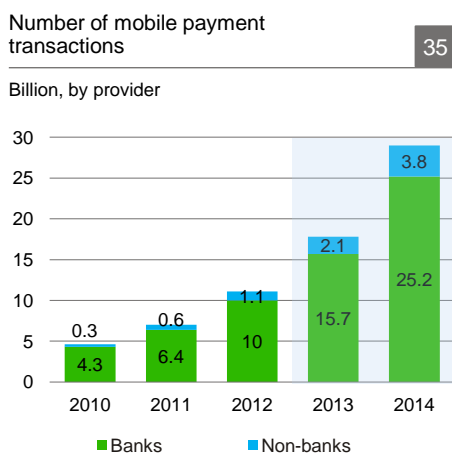
### More players, more pilot projects, pronounced market dynamics



Source: Capgemini Analysis

Nonetheless, both the number of players and the number of pilot projects in the market have increased over the past few months. This is the approach being taken by the various vendors to test the robustness and acceptance of the respective payment media in real time. Some retailers are offering modern payment technologies at their sales desks and on their web portals. In both cases, customers can shop and pay via their mobile devices. Going forward, various wallet solutions from various players will increasingly hold sway; these will have to be simple to use and, above all, secure. Dealer acceptance is just as much a prerequisite as is the additional utility that a wallet solution should generate for all the players involved. In particular, though, the focus should be on the benefit to the customer and not on the technology in isolation. Naturally, the technology can increase the appeal of the services and products, but not the level of trust. Thus, the technology is, and remains, only a means to an end. Some points of sale already accept web-based payments (e.g. restaurants, filling stations, taxi operators, local public transport and retailers), and further expansion is underway. The online segment is also experimenting with various digital payment solutions. In particular, aspects such as data security and the protection of personal data will increasingly become the focus of future payment innovations, because the uncertainty linked with moving in virtual space has risen on account of diverse players' increasingly widespread spying methods.

### (Banking) Licences are a potential hurdle for the new players



Source: Capgemini Analysis

Having said this, the bulk of innovative payment ideas continues to come from the non-bank sector and not from the financial sector itself. Above all, it is the digital ecosystems, credit card providers, telecommunications providers and many start-ups as well as niche vendors that are experimenting with mobile payments using innovative solutions and successfully completing initial practical trials in the market.<sup>35</sup> It is the large internet platforms with their extensive customer reach in particular that are noticeably upgrading their systems. In order for Facebook to offer its meanwhile 1.3 billion users a global "micro-payment system", the company will require an e-money licence. The media reports that it has already applied for one in Ireland.<sup>36</sup> This would let Facebook offer a virtual payment service within its own "walls". On the one hand, this will enable its users to transfer funds to one another and, on the other, enable them to use the numerous Facebook-linked businesses (restaurants, retailers, cinemas etc.), so they can consume diverse products and services by paying with a proprietary Facebook currency (e.g. Facebook credits). With its application for a "European passport"<sup>37</sup> and approval from the Central Bank of Ireland, Facebook would in fact be likely to extend its payment service to the European Economic Area. While Facebook users will continue to need a bank account to transfer monies to the platform, both transfers to friends and acquaintances as well as shopping on company websites could take place within the big Facebook community without a traditional bank.

<sup>35</sup> A detailed description of the players may be found in: Dapp, T. et al. (2012): The future of (mobile) payments. Deutsche Bank Research. Frankfurt am Main.

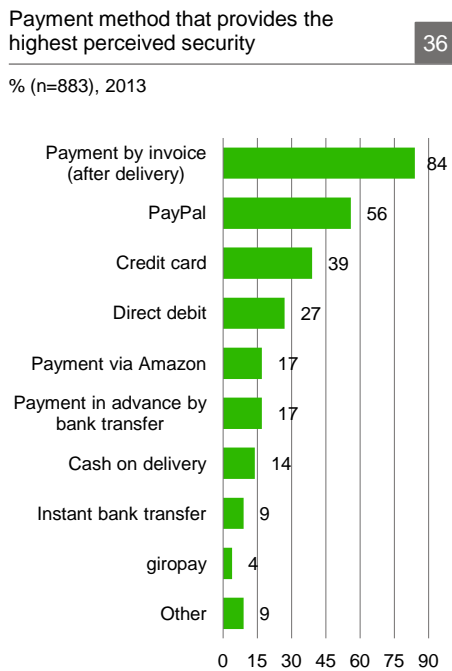
<sup>36</sup> <http://deutsche-wirtschafts-nachrichten.de/2014/06/10/facebook-beantrag-bank-lizenz-in-irland/>.

<sup>37</sup> This "passport" enables financial service providers that have legally established a presence in one EU member state to offer their services in the other member states without having to first obtain official authorisation.



## Fintech – The digital (r)evolution in the financial sector

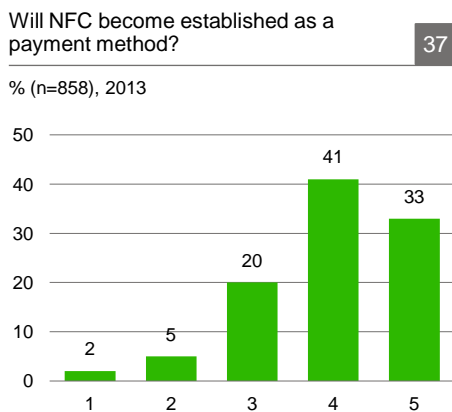
### Developing countries are potential markets for mobile payment services



Sources: ibi research / Internet World Messe 2013

Further expansion of Facebook's proprietary payment service to the African continent, for instance, would be a logical step merely because of the fact that much of the population there does not have a bank account and many monetary transactions are conducted via mobile devices, which are relatively widespread, and the mobile network. Once the digital network reaches the far corners of the Earth – incidentally, these are strategic business targets proclaimed by Google<sup>38</sup> and Facebook<sup>39</sup> – more and more internet users will be able to optimise numerous inefficient markets and systems. The (r)evolution being brought about by the digital structural change is ensuring in developing countries in particular that entire generations of technologies (e.g. slow dial-up modems) are being leapfrogged, i.e. the population can, for example, immediately be provided with wireless internet connections, with efficiency and productivity being boosted as a result.

Payments via mobile devices (smartphones), without the need of a regular bank account, have been possible in Kenya, for instance, ever since 2007. M-Pesa<sup>40</sup> is a system offered by the Kenyan mobile communications provider Safaricom in cooperation with Vodafone to handle basic functions of fund transfers and private cashless payments.<sup>41</sup> M-Pesa is suitable for rural regions with poor infrastructure and a below-average number of bank branches and cash dispensers, and similarly for customers having no bank account or unable to obtain one because their income is too low. The bodies responsible for handling the transactions are referred to as M-Pesa agents. In the countries participating to date, this job has been assumed mostly by filling stations or retailers such as telecommunications outlets or internet shops. Vodafone also has plans to launch M-Pesa in Europe. Worldwide, the system is reportedly used by 17 million people – and the figure is rising.<sup>42</sup>



1 = Will be used far more rarely in future  
5 = Will be used far more often in future

Sources: ibi research / Internet World Messe 2013

Google obtained its e-money licence back in 2007 and offers its Google wallet via NFC technology.<sup>43</sup> Google's registered customers can thus pay digitally in selected online shops and in its own Playstore. The US online payment service PayPal and the German crowdinvesting platform Bergfürst in fact have a banking licence that allows these platform operators to conduct conventional banking business. Amazon also already offers an online payment service in the US.<sup>44</sup> Internet users may go shopping conveniently and simply in participating online shops by using the payment and address information from their Amazon account and paying for their purchases digitally, i.e. the payment environment does not change for the customer, and time-consuming and constantly recurring inputs of personal data thus become unnecessary.

### Pressure gradually building on established banks

The examples cited clearly show that new competitors – technology-driven non-banks in particular – are increasingly making inroads in the market for mobile payment solutions. They are investing across sectoral boundaries in new

<sup>38</sup> See "Loon for all" project". <http://www.google.com/loon/>.

<sup>39</sup> <http://www.gulli.com/news/23434-facebook-plant-angeblich-uebernahme-von-drohnen-hersteller-2014-03-04>.

<sup>40</sup> <https://www.mpesa.in/portal/>. THIS IS ABOUT INDIA

<sup>41</sup> The name "M-Pesa" comes from a combination of the "M" in mobile and the Swahili word "Pesa", meaning cash. Since 2008, Vodafone and the mobile operator Roshan have offered a similar service in Afghanistan known as M-Paisa; furthermore, it is available in Tanzania and, since 2010, also in South Africa. Going forward, Vodafone plans its introduction in additional countries such as India, Egypt and Ethiopia.

<sup>42</sup> <http://www.spiegel.de/netzwelt/web/bezahlen-per-sms-m-pesa-kommt-nach-europa-a-961856.html>.

<sup>43</sup> <https://support.google.com/wallet/?hl=de#topic=3209987>.

<sup>44</sup> <https://payments.amazon.de/home>.

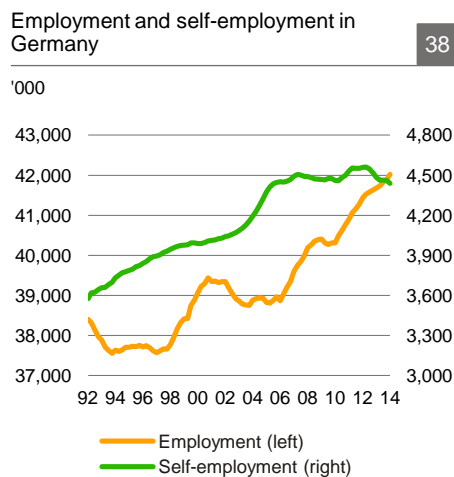


## Fintech – The digital (r)evolution in the financial sector

internet technologies and data analysis methods. Moreover, they are successfully seeking new collaboration partners to further expand their market positions, increasingly in developing countries with underdeveloped infrastructure. At the same time, established players such as credit card providers and telecommunications companies are likewise boosting their efforts to participate in the market.

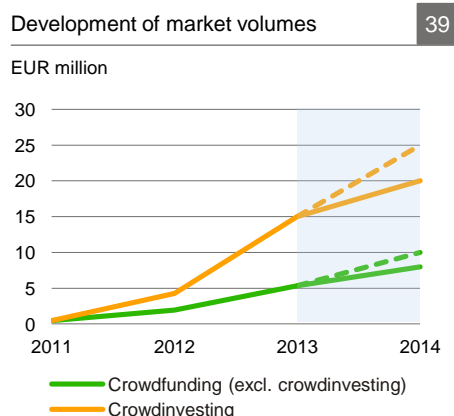
The market pie has not yet been fully sliced up and distributed. We are now in the midst of a largely experimental trial-and-error phase that also permits the conventional banking industry to play a part in shaping the future development of modern digital payment solutions. It is imperative that banks seize an active role in the process in order to share in the innovation drive. The traditional banks still have considerable potential to make an impact.

### 4.3 (Early-stage) Financing of the self-employed and start-ups



Entrepreneurship delivers not only growth stimuli but a valuable macroeconomic contribution in terms of employment, vocational training and international competitiveness. In the past decade there was a sharp increase both in the number of employees and in the number of self-employed persons in Germany. A study conducted by the DIW (German Institute for Economic Research) found that the positive trend in self-employment was due almost exclusively to those who work on their own (the “solo self-employed”).<sup>45</sup> Becoming one's own boss brings with it considerable economic risks. In the early stage, above all, the self-employed require start-up capital to turn their plans into reality. Future monetary inflows – and thus the basis for credit repayments – are often difficult to gauge. In addition, many self-employed persons and start-up companies often do not have (sufficient) collateral. Thus, they have little appeal for risk-averse traditional investors. Moreover, self-employed people do not have a steady income and therefore have particular difficulties gaining access to loans.

Anyone requiring funding for his or her start-up in today's modern network economy can, as an alternative, also seek to attract private investors. Problems in the start-up phase that were cited earlier are solved or mitigated by means of funding via a multitude of smaller creditors – the so-called “crowd”. Crowdfunding, as an alternative or complementary type of financing, has the potential to plug funding gaps in the critical early phase of a start-up company.



Thanks to modern web-based technologies, more people can be appealed to more quickly and more cheaply on the internet for donations and/or financial backing. Internet technology boosts the dynamics, the “virality”, and reduces the information asymmetries between conventional creditors and debtors. Beside the traditional funding sources (banks, business angels, public subsidy programmes, venture capital companies), crowdfunding platforms act as a project accelerator and hence increasingly offer an alternative or complementary type of financing.<sup>46</sup> Basically everyone can appeal for funding for their project using a (public) internet campaign. The rules of crowdfunding are relatively simple. They thus exactly satisfy the currently very widespread desire for “convenience” and “participation” among the tech savvy. Put simply, initiators first present their project or ideas – in the form of a video, for instance – on a given platform. The project needs to inspire as broad a group of potential investors as possible so that via network effects the collective fundraising drive “goes viral”.

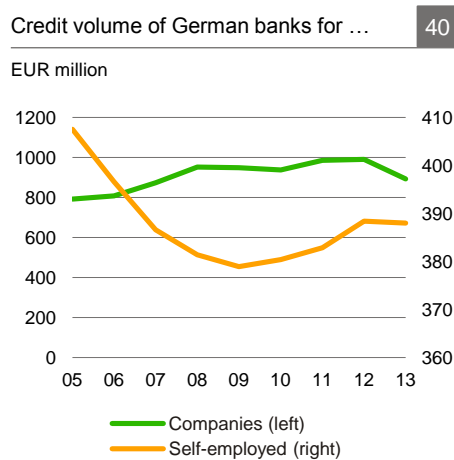
<sup>45</sup> Brenke, K. (2013). Allein tätige Selbständige: starkes Beschäftigungswachstum, oft nur geringe Einkommen (English abstract: Increasing Number of Solo Entrepreneurs but Incomes Often Low). DIW Wochenbericht 7. 2013. Berlin.

<sup>46</sup> For a detailed analysis of the German crowdfunding and crowdinvesting market, see: Dapp, T and Laskawi, C. (2014). Crowdfunding: Does crowd euphoria impair risk consciousness? Deutsche Bank Research. Frankfurt am Main.



## Fintech – The digital (r)evolution in the financial sector

### (Still) Small volumes, but high growth rates



The volume of funds raised on crowdfunding and crowdfunding platforms in Germany is no doubt (still) negligible compared with the loan offerings made by traditional banks. In 2013, the crowd (crowdfunding + crowdfunding) merely generated an investment volume of about EUR 20 million in Germany. For 2014 as a whole, experts forecast a crowdfunding market volume of about EUR 20-25 m and expect the uptrend to continue over the medium term. In the crowdfunding segment, experts put the market volume in the current year at a total ranging from EUR 8-10 million.<sup>47</sup> Furthermore, it looks as if the number of projects and the average project size are going to grow. Despite the still relatively small volumes, the growth rates are huge and ought to be sized up properly in the financial services market. At the international level, the volumes have already reached the single-digit billions.

By contrast, statistics from Germany's Bundesbank indicate that German banks lent a total of nearly EUR 1.3 tr to companies and self-employed persons last year. The lending volume expanded by close to 7% during the period from 2005 to 2013. However, the statistics also show that the volume especially for the self-employed fell by nearly 5% between 2005 and the end of 2013, whereas corporate loans rose by around 13% during the same period.

### Crowd-based platforms providing start-ups with early-stage funding

#### Not a fad, but rather a serious alternative

Crowdfunding is not just the latest fad, but instead a trend that is still in its infancy. Many aspects not only of its ways of functioning, its opportunities and risks, but also of its supervision and regulation have not (yet) been properly investigated owing to a lack of empirical evidence, statistics and historical records. Despite the (still) modest crowdfunding volumes this also applies to its role in the (international) financial system, which requires further analysis.<sup>48</sup>

Nonetheless, alternatives for funding projects and companies via and with the aid of modern internet technologies will increasingly go viral and become established. Above all, the movement is being driven by the accelerating penetration of the digital economy in all aspects of life and by the growing desire of many people for (greater) mobility, participation and interaction. Last but not least, the crowdfunding movement will also help to eliminate a bottleneck that can be observed not only at the national level: the scarcity of liquidity available to entrepreneurs for early-stage funding.

From an economic standpoint, the provision of early-stage company funding via diverse crowdfunding platforms is indeed to be welcomed. From the perspective of traditional banks, the crowdfunding movement is still at a modest level in volume terms, but has long ceased to be just a passing fad. Banks should definitely keep the developments of these alternative funding sources on their radar and consider what options they have at their disposal to advise and nurture start-ups (not only) financially especially in the early stages of their founding. Many a start-up evolves into a major player in international markets with a pronounced need for sophisticated funding solutions. In the medium to long term, crowdfunding platforms will probably be able to increasingly snatch away market shares from the established banks not only in these early phases of company financing. The high growth rates are only one piece of evidence, and further experiments in this segment are bound to follow.

#### Traditional banks need to reassess valuation approach

Whether pursuing business with high-risk start-ups is in keeping with a traditional bank's risk appetite and business strategy should be reassessed and

<sup>47</sup> See: Für-Gründer (2014). Crowdfunding-Monitor 2013.

<sup>48</sup> See Communication from the European Commission (2014). Unleashing the potential of Crowdfunding in the European Union.





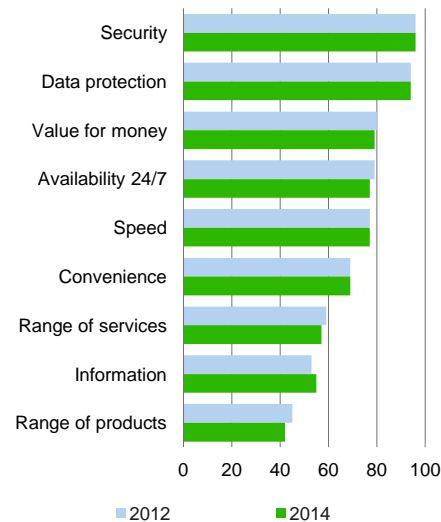
## Fintech – The digital (r)evolution in the financial sector

discussed. Customer behaviour in the internet age has changed in any event, and the obviousness of first turning to one's house bank for financing has as well.

### Online banking requirements

41

% of respondents (2012: n=1,002; 2014: n=1,001)



Sources: Initiative D21, TNS Infratest

### 4.4 Modern data analysis methods (using big data in the financial segment)

A knowledge lead decides how well individual players are able to perform and prove themselves in a competitive environment. It follows that knowledge and information are the key resources that primarily determine the success of every enterprise in the internet age. Today, the bulk of in-house and external information is available in digital form, and can be called up quickly at any time and anywhere. At the same time, we are increasingly living in a digital environment in which we are confronted with an "information overload". While non-knowledge-intensive information asymmetries are declining in some cases across sectors, decision-making processes are not necessarily getting simpler given the complexity and scale of information available. This increases the risk of wrong decisions being made.

Hence, in the medium to long term, success and failure will no longer necessarily be measurable only by new products alone, but rather by which technologies and analytical methods are used. In the internet age, customers expect a large degree of personalisation. This includes being addressed personally as well as being offered bespoke services based on a previous analysis of one's (online) behavioural data. In the data economy, increasingly the idea is to evaluate and analyse existing and newly acquired masses of (personal) customer data in order to eventually transform this knowledge into specific customer offers as lucratively as possible. The secret lies in evaluating collected customer transactions and linking them anew in order to predict future customer wishes as precisely as possible via probability calculations and modern algorithms. The flip side of the coin is that this does not always dovetail with applicable data protection laws.

### New competitors' professional use of big data

Many large internet platforms and technology-driven start-ups operate their business with (personal customer) data in a very professional manner. They offer diverse individualised services based on data analysis. With the help of sensor technology, smart tracking software, a multitude of data sets, including personal profiles and smart algorithms, they will in future be able to make automated predictions about certain behavioural preferences (not only online) on the basis of simple correlations and transform these into innovative products and accompanying services. The steadily growing volumes of available customer data are not only being collected and evaluated in the context of business relationships, but also of personal situations from daily life. Customer profiles will increasingly be generated in digital form in future, and virtually no more distinction will be made between private and professional information. In other words, the business activity of many large internet companies is focusing on entering cross-sectoral competition not only with the use of internet technologies, but above all with the use of a wealth of personal data on specific target groups. Some digital ecosystems know much more about the needs of their customers on the strength of their huge databases than banks will ever learn. The more frequently and the longer companies follow their customers on proprietary platforms along their own value creation networks and observe, measure and evaluate their behaviour,

- the more comprehensive will be the data set (personal data) from which new findings can be derived in the shape of probabilities,



## Fintech – The digital (r)evolution in the financial sector

- the easier it will be to offer more, new individualised services in future on the basis of the probabilities calculated and on the back of modern algorithms,
- the more effective will be the lock-in effect, and
- the higher will be the switching costs for customers.

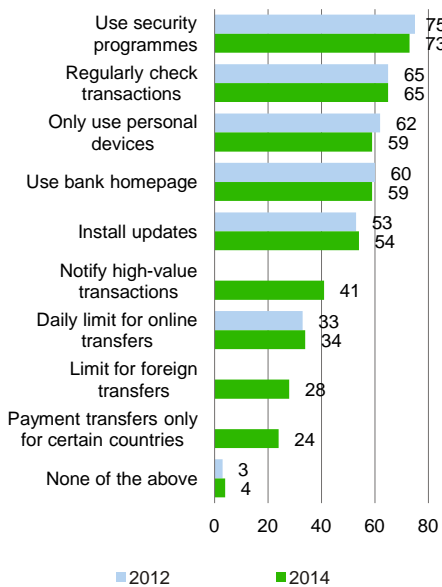
### Exponential data growth

Depending on how heavily the internet firms' web portals are frequented and which tracking software is used to measure customer behaviour, the faster the relevant data volumes will grow. Despite the potential, traditional banks are still far from able to make adequate use of this valuable customer information. Many internet-based companies focus nearly exclusively on gathering and evaluating these volumes of data – whether to offer their own individualised products and services or to sell the (personal) data to third parties, which is against the law in Germany without the customer's prior permission. This means that competitive advantages are being lost especially to the traditional banks, which have so far not measured and evaluated the data of their customers to this extent.

Security measures in online banking

42

% of respondents (2012: n=1,002, 2014: n=1,001) multiple responses allowed



Sources: Initiative D21, TNS Infratest

### Banking is not being reinvented, but it is going digital

The new competitors are not really reinventing the banking business. However, they do know how to make good use of modern data analysis methods and numerous (especially personal) data sets to individualise certain financial services digitally in such a way that they can be of greater benefit to internet-savvy customers in particular. Some vendors try to anticipate what their customers want, and send them personalised offers. In some cases these offers are impressively accurate (e.g. Amazon's recommendations).

The above approach enables many a new vendor to lure even longstanding customers away from their bank. Some new competitors, for example, latch onto the banks' existing infrastructure and offer similar, though 100% digital, services, such as payment solutions or all sorts of online banking products. Moreover, they integrate all sales and advisory channels so that the customer no longer differentiates between online and offline. This means that traditional banks run the risk of losing significance in the market for standardised services in future because these are passed along to the tail end of the value creation process, and banks now only execute the transactions in isolation – without the valuable possibilities of customer contact in the other phases, such as the origination phase.

### Option of forming strategic alliances

As to be expected, several strategic alliances have emerged in this way, i.e. in a few cases the new technology-driven companies have joined forces with conventional banks. For example, several start-ups offer web-based financial services (payments, account administration etc.) and collaborate in the background with conventional banks to make use of their valuable existing infrastructure. This simplifies market entry for the internet-savvy companies even more, because they do not have to provide all the required expertise (e.g. on regulatory measures, financial know-how) via their own resources but can fall back on the expertise of established players. The new technology is primarily at the forefront, but this is what enables the new vendors to establish contact with their customers and, above all, take stock of their behaviour and collect personal data.

### Push ahead with modern proprietary analytical methods

This form of strategic alliance naturally offers the banking world the chance to also participate in the modern internet technologies without themselves having to develop or offer their own technologies. However, this raises the question as to whether conventional banks might not permanently lose too much of their significance – in direct contact with the customer in particular. With an appropriate digital strategy traditional banks could certainly be equally able to



## Fintech – The digital (r)evolution in the financial sector

offer their own technologies in future in order to provide their web-savvy customers with modern financial services.

**Preliminary conclusion: The banks' digital vulnerabilities are growing more varied and larger**

The financial sector's exposed flanks increasingly offer industry outsiders, technology-driven internet companies in particular, the chance to enter markets for simple financial services. Many are succeeding in anticipating technological developments early on and optimally linking them with contemporary customer wishes. They are accurately pinpointing the Achilles' heels of the established players and offering products, services and processes that appeal in particular to web-savvy consumers. To date, only a limited number of traditional players have been crowded out. Moreover, the scale of the exposed flanks can be limited depending on the banks' adaptation and digital strategies. Finally, according to the KfW/ZEW Start-up Panel nearly one in three start-ups fails within the first four years in business – evidence of the pronounced dynamics in this budding segment of the financial sector.<sup>49</sup> Nonetheless, banks would be well advised to take the new fintech developments seriously.

The new players in the financial sector

Digital ecosystems	Payment services/banking/investment advice	Crowdfunding/crowdinvesting/loans/P2P
Google**	payleven	payworks
Apple	iZettle	payever
Facebook(**)	sum up	GO4Q
Ebay	Avuba	traxpay
Amazon	numbrs(*)	Mambu
PayPal*	figo	yavalu
	vaamo	Voola
	myIBAN	ayondo
	Fidor*	WeltSparen
	iPayst	moneymeets
	kesh	quirion
	PayCash	Debitos
	sqwallet	StockPulse
	Pactas	rethink finance
	Barzahlen	paij
	Paymill	Yapital
	Finanzblick	sharewise
	twindepot	
		Bergfürst*
		Seedmatch
		Startnext
		VisionBakery
		smava
		Lendico
		Companisto
		zencap
		Kreditech
		Finmar
		Auxmoney
		bankless24
		Vexcash
		Deutsche Mikroinvest
		friendfund
		Fundsters
		innovestment
		Mashup
		Finance

(\*\*),(\*)applied for: \*Banking licence, \*\*E-money licence

Source: Deutsche Bank Research

Naturally, the digital vulnerabilities in the financial sector being targeted by the new players only apply to selected segments so far. Moreover, market entry for the new players is linked with costs for potentially necessary licences and infrastructure development. But in contrast to the established banks, the technology-driven competitors often immediately gear their digital business models to the current market conditions and current customer preferences without having to perform cost-intensive revamps of outdated infrastructure or

<sup>49</sup> See Bretz, M. et al. (2013). Junge Hightech-Unternehmen trumpfen auf. KfW/ZEW Gründungspanel Jg. 6.



digital upgrading. Furthermore, the digital ecosystems can realise economies of scale because as a rule they have many more customers in their “walled gardens” than traditional banks. Reforming and restructuring the in some cases outdated infrastructure of traditional banks devours a lot of money, but above all valuable time. Furthermore, it is difficult to bundle the necessary expertise for the diverse, sometimes outdated systems and infrastructure. This comes at the expense of market dynamics and speed in the ability to offer even adequate company services in short order. Established direct banks that only operate digital sales and communications channels no doubt have an advantage in this respect; nonetheless, their product portfolio is more heavily standardised and less complex than that of a universal bank, which is why they are more vulnerable to attack from new vendors in these areas. The technology-driven race for customers and market shares in modern digital financial services currently seems to be weighing more heavily on conventional banks focused on relatively simple products and services. If, by contrast, a bank's focus is more on advisory-intensive and sophisticated products, the exposure is still minor – at least at present. Having said this, the established banks should not rest on their laurels. After all, the innovativeness of the new competitors may also intensify competition on more sophisticated bank products in the medium term. The examples from other industries discussed in chapter 3 show that digital structural change may give rise to new opportunities and growth stimuli in this sector, too.

## 5. Recommendations for action (not only) for the financial sector

### A bank is a bank, is a bank, is a bank

Banks are not really known for being early adopters of state-of-the-art technologies for their customers, i.e. the financial sector is not necessarily one of the industries that drives technological developments. But it does not have to be, either. The main tasks of a bank are, among other things, to provide the markets with sufficient liquidity and maintain the credit creation mechanism in the long term. It is of course essential to incorporate modern technologies, because they help to speed up and optimise processes and therefore reduce costs. They are, however, more of a means to an end.

Nevertheless, banks are of course well advised to confront the challenges of digital structural change in a timely fashion and to deploy the corresponding modern digital technologies in their internal and external systems and processes in order to remain competitive and meet modern customers' demands. Above all, they should not lose sight of their internet-savvy customers, because their share in the total population continues to rise due to demographic change and the high adoption rate of web-based, mobile technologies.

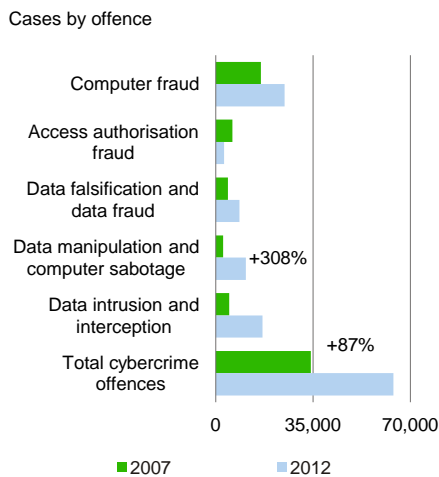
A large proportion of customer interactions in the financial sector are already conducted via digital channels but only a few of them generate really new revenues. Customers monitor their account balances, check their payment instructions or authorise new transactions – in many cases online and a large share thereof in the meantime also via mobile devices. However, hardly any new products and services are sold via mobile channels. Thus, traditional banks ought to integrate their digital (mobile) channels more efficiently into their existing infrastructure to provide the customer with a multi-channel service and to be better able to monetarise individual new financial services. For sure, one or the other strategy of the digital ecosystems (e.g. boosting the lock-in effect) is an appropriate means of making contact with internet-savvy customers. Banks therefore have a realistic chance of remaining the contact partner for all money-related matters. Some action has to be taken very soon, however.



Fintech – The digital (r)evolution in the financial sector

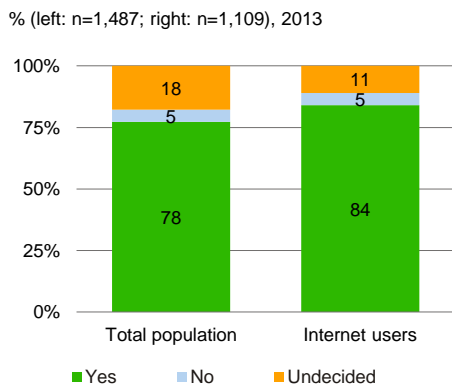
Longstanding experience in regulation and security

Cybercrime in Germany 44



Source: Federal Criminal Police Office

Do certain internet offerings prompt the careless disclosure of personal data? 45



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

Comparative advantages of the banks not to be underestimated

The most valuable comparative advantages that a traditional bank offers include specific financial expertise (risk assessment, evaluation and management), discretion in handling client-specific (digital) data, as well as many years of experience of providing clients with a high standard of regulation-induced operational security. Traditional banks have also experienced numerous external shocks and adapted their structures and processes again and again, i.e. they have valuable crisis management expertise. Nevertheless, traditional banks have to promptly digitise and harmonise their in some cases old-fashioned structures. Modern data analysis methods will have to be used just as routinely as a seamlessly integrated web of online and offline distribution channels. In addition, banks will have to modernise their branch networks. The integration of state-of-the-art technologies and additional automation processes will send the still high number of branches falling considerably in the long term, which will have repercussions on the personnel development and qualifications required at banks. Strengthening one's own brand and identity as well as the obligation to handle client data confidentially may also help to boost customer satisfaction and loyalty.

5.1 Win (back) trust with secure web-based financial services

Banks handle personal client data confidentially and do not sell it to third parties. These confidence-building measures could be the key to success or failure in the internet across many sectors. It is only those who can provide clients with the lasting and credible assurance that their data will neither be sold to third parties nor used for other non-business purposes who will be able to hold their own in the sensitive (digital) financial market and obtain growth opportunities. This is a major opportunity for the banks not least because some practices of the major (international) internet firms are worrying and data security is an issue that many users are now re-evaluating.

Unfortunately, the speed and efficiency of security technologies used usually lags behind the adoption of new internet technologies. This is reflected not only in rising cybercrime but also – as a result of increasing cases of data misuse – the fact that more and more people are acting more cautiously and less naively in digital channels. In particular mobile devices and the booming mobile app market are revealing a growing number of security vulnerabilities, and they provide potential targets for data misuse, spying, sabotage and hacking using malware and spyware. According to a report from Germany's Federal Criminal Office, cybercrimes involving data manipulation and computer sabotage rose by more than 300% between 2007 and 2012. However, these were only the reported crimes; the number of unreported cases is certainly higher.

Nevertheless, it can also be observed that internet users have a clearly ambivalent attitude towards online security. This contrasts with the assessment by many internet users of their own online behaviour: according to a survey conducted by the Institut für Demoskopie Allensbach, 84% of internet users hold the view that certain internet offers prompt the careless disclosure of personal data, while only 22% are ready to admit that they themselves are possibly too careless in handling their personal data.

Since many digital transactions as well as the accessing of data via desktop computers in households and companies have migrated into the cloud and users are increasingly logging in via mobile devices, the importance of IT security is becoming more pronounced in both the private and business arenas. As a result of the release of the Snowden documents in June 2013 the awareness of IT security vulnerabilities undoubtedly intensified the growing sense of uncertainty and the feeling "of not being alone anymore" online. There

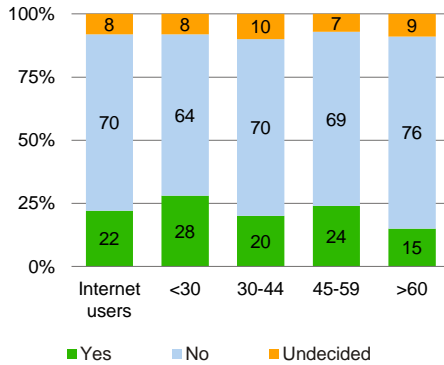


## Fintech – The digital (r)evolution in the financial sector

Are you too careless when disclosing your personal data?

46

% of internet users (n=1,487) and by age cohort, 2013

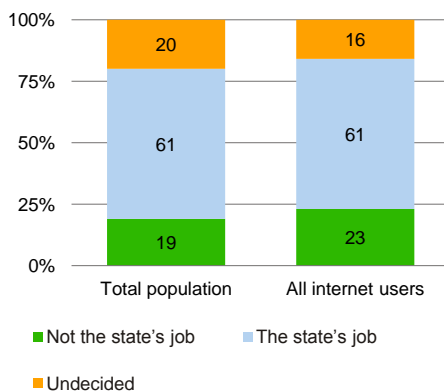


Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

Should the state regulate the internet?

47

% (left: n=1,487; right: n=1,109), 2013

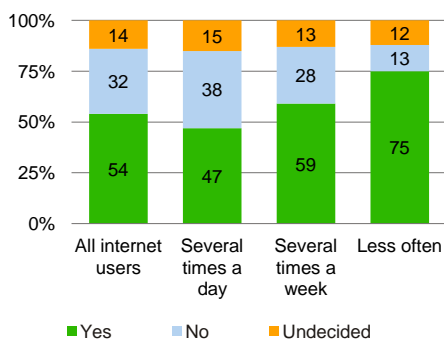


Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

Should online content be monitored more strictly?

48

% of internet users (n=1,487) and by usage intensity, 2013



Sources: Institut für Demoskopie Allensbach (IfD), Dt. Institut für Vertrauen und Sicherheit im Internet (DIVSI)

is hardly any other internet-related issue that is currently causing as much disquiet across all generations as the question of data security and informational self-determination. This is an opportunity for the banks, for especially when it comes to sensitive financial data, people are rightly worried about the snooping activities of some providers.

According to another survey from the Institut Allensbach, it is primarily the over-30s who believe that their personal data is not secure online and that therefore they have to learn to better protect their digital identity online and in social networks.<sup>50</sup> Users, especially of social network platforms, have virtually no control over the security of the operating system provided, potential access to personal data, the security and use of their data as well as their deletion. Nevertheless, in most cases they leave control over their data to the large internet platforms and assume that the platforms provide the necessary levels of security and protect the users from data misuse. Thus, people's behaviour in digital channels is quite ambivalent and difficult to understand. Critics are becoming more vocal in emphasising that suspicions are being confirmed that internet users themselves with their individual behavioural patterns are increasingly become a traded good.

Younger people, however, are increasingly confident that researchers and scientists will succeed in developing new ways to protect internet users more efficiently from data misuse, illicit profiling as well as various data monetarisation strategies and hacker attacks.<sup>51</sup> The internet familiarity of younger generations is probably the reason why they tend not to assume that the public's concerns about their personal data will prompt people to avoid internet activities such as online banking or the use of social network platforms in future. Nevertheless, there is increasing demand for secure systems and processes in virtual environments, however, in many cases without user willingness to pay a (higher) price for secure transactions in the internet. For banks, the confidentiality of sensitive customer data is non-negotiable anyhow and will remain so.

### People who feel they are being watched alter their behaviour

There is the economic risk that people will adapt their consumption and media use behaviour in the medium to long term due to declining confidence and increasing uncertainty and reduce their adoption rate of web-based technologies. This may not happen overnight but may slow the growth in the development of web-based technologies. Above all, this would affect digital eco-systems but also public administrative bodies, many niche providers and start-ups which are currently already increasingly busy making credible promises to provide secure IT infrastructures and operating systems and to close potential security loopholes.

Even though many people do not regard the revelations about (the state's) secret access to IT systems or the increasing data misuse by many internet agents as a direct risk but more of an abstract one, some uncertainty could develop subliminally because of unhindered snooping as well as permanent reporting. If more people feel they are being watched and snooped on or monitored when online, more people will no longer act authentically on the internet. Of course, this has repercussions on individual development, freedom, creativity and last but not least the innovative strength and competitiveness of an economy as a whole. Needless to say, 100% data security is an illusion and will remain so. Nevertheless, the security of IT infrastructures will become more

<sup>50</sup> Die Zukunft der digitalen Gesellschaft. Ergebnisse einer repräsentativen Bevölkerungsumfrage. 2014. Institut für Demoskopie Allensbach .

<sup>51</sup> See loc. cit.



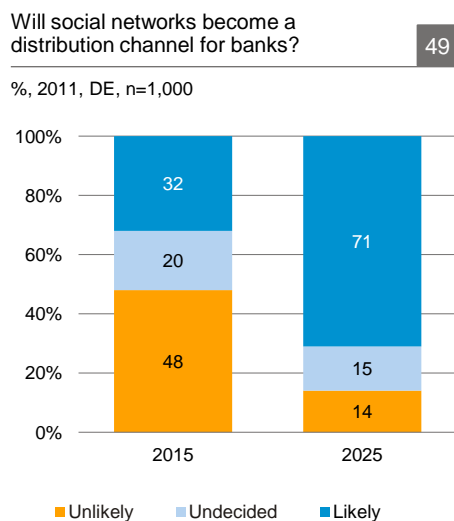
## Fintech – The digital (r)evolution in the financial sector

important to users in future. Companies credibly providing secure internet services and technologies should already be benefiting from this.

### Opportunities for the banks: Credible IT security and 100% discretion

Data security is precisely the area that could be a trump card for traditional banks in the future. For the financial sector should now take advantage of this unbalanced development of value-generating state-of-the-art internet services on the one hand and the revealed security vulnerabilities of IT systems and data security on the other. These shortcomings provide the entire financial sector with the opportunity to hold its own in the market against the technology firms. This requires the provision of appropriate financial services and processes that are embedded in a secure IT architecture and preclude both data misuse and data sales to third parties. Confidence in the security of transactions is the basis for every kind of relationship between bank and customer. This relevant expertise possessed by the traditional banks is acknowledged and esteemed at an international level. It may also serve as an entrance ticket for future strategic alliances. However, this asset has to be communicated appropriately and must be accompanied by convincing marketing activities.<sup>52</sup>

### 5.2 The application of state-of-the-art data analysis methods will be crucial for success



Sources: A.T. Kearney, FIM

The evaluation of client data is still in its infancy at the traditional banks. Here, however, is a lot of experimental potential to gain unforeseen new insights from existing client data. In principle, though, it is a matter of offering clients modern added-value services on digital channels that provide them with efficiency, diminishing search costs and easy access to information. For instance, personalised online banking services are very popular: customers are offered an automated statement of their credits and debits, which can be illustrated graphically or categorised via click/touch, e.g. depending on the kind or level of expenditure. Customers can thus interactively gain an overview of the status of their finances around the clock. On this basis, additional services can be activated, such as setting alarms or SMS notification in the event of an overdraft. The thereby derived customer behavioural pattern with regarding to individual expenditure forms the basis for future, new personal customer approaches. For example, the customer's attention may be drawn to a potential reduction in his fixed costs or the customer may be approached regarding alternative savings potential. In the data economy, each recorded item of customer information and each behavioural pattern measured represents a new opportunity to make contact with the customer and to offer him appropriate and personalised financial services. On the basis of these services along the bank's value chain customers should be able to make better investment decisions and to derive greater benefit from the services of their house bank.

### Algorithm-based financial services (algo banking)

Customers who, for example, do not get a loan from their house bank may resort to internet-based credit apps which make their consumer loans available to their customers up to a certain volume via smartphone. The customer is conducted through a standardised credit rating programme and, upon approval, is provided with the sum requested. The loan decision is taken by a self-learning algorithm which is fed by various data sets. For instance, it is taken into

<sup>52</sup> In times of increasing data misuse, this applies not only to the financial sector but could become relevant for all sectors which have to modernise their business models as a result of digital structural change.



## Fintech – The digital (r)evolution in the financial sector

Specimen home banking app

50



Chart: Oliver Ullmann, Deutsche Bank Research.  
Source: Dapp, T. (2014). Fintech – The digital (r)evolution in the financial sector: Algorithm-based banking with the human touch. Deutsche Bank Research. Frankfurt am Main.

consideration, among other things, whether the customer always pays their (online) invoices on time or which books he buys on Amazon.

State-of-the-art web-based financial services surpass traditional online banking. The focus is on the mobile application (app) or the web-based service. Both options may be accessed via mobile devices around the clock. For many customers, the application of internet-enabled devices means a substantial increase in their quality of life because they save valuable time and can avoid search costs. For many new players, dormant business potential can therefore be leveraged with bank-specific applications (apps) that customers use frequently and can be helpful in everyday situations. Future, technology-driven financial service providers will provide customers with banking-related services and information services rather than push the sale of new products. Mobile services will range from simple payment transfers and consumer credit right through to securities trading across distribution channels, i.e. online and offline.

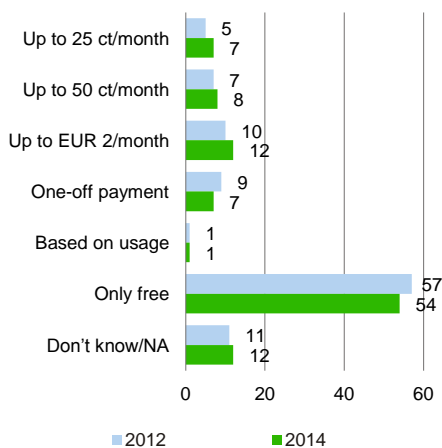
### This is how modern banking may look

For some customers, the interactive communication with experts or analysts is important as well which could be organised via bank-owned social platforms or fora. Smart trading, for example, offers clients more than the hitherto available services of buying and selling securities and the ability to check their portfolio online. Banks could conceivably offer their own social platforms on which customers could converse with one another or with specialist advisors about certain investment strategies, or other financial products. Client fora, live chats or blogs on specific topics or video meetings with analysts provide the community with relevant information or details of developments in securities. Webinars are another instrument for providing clients with product and risk seminars via digital channels. Participants thus exchange views in real time. Idea competitions guide new external knowledge into one's own structures and processes, banking-related gamification delivers additional internet-savvy target groups and creates further incentives. A large share of customers will probably not be willing to pay a fee for additional banking services. According to a recent survey, more than half the respondents object to an additional transaction fee e.g. in online banking. This should also apply to further simple financial services.

Willingness to pay for secure transactions in online banking

51

% of respondents (2012: n=1,002);  
2014: n=1,001)



Sources: Initiative D21, TNS Infratest

Many banks are still at the very beginning of this journey. However, it is probably only a matter of time before the complementary digital sales and service channels are opened further and customers can access their banks' services anytime and anywhere interactively. Here, a seamless connection between online and offline channels would be of major importance. If customers configure products online on bank-owned web portals, a bank advisor should be able to seamlessly continue developing this configuration on other channels without having to restart systems or re-enter master data. Customers of a modern digital bank should no longer notice that they used different channels until the signing of a contract or the completion of a sale.

### Stronger focus on customer benefit

To compensate for the loss of revenue sources from traditional products and to better protect digital vulnerabilities, banks will expand and intensify their technological opportunities and will have to focus more attention on individual customer benefit. The more intelligently banks connect existent and emerging data sets and information on the demands and the behaviour of their customers, the more effectively individual wishes can be met and customised offers can be provided. Here, they will only succeed if they a) make timely investments in modern data analysis management as well as a higher data quality as a competitive advantage, b) provide customers with additional benefit and c)



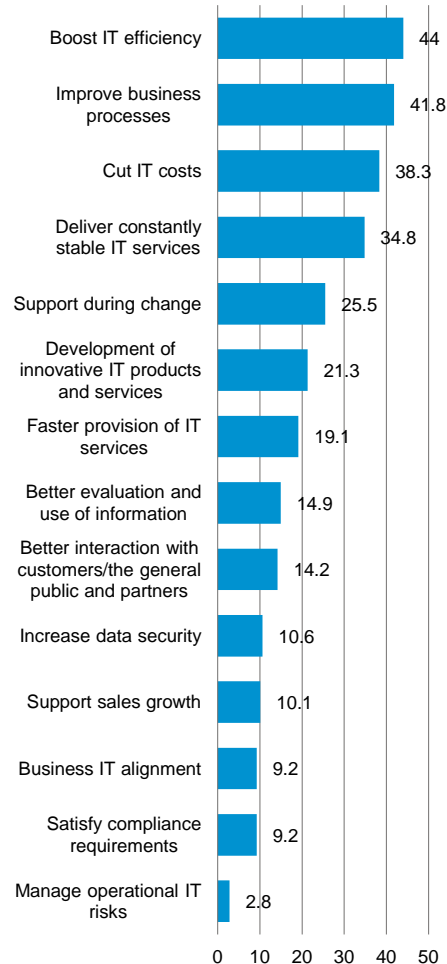


## Fintech – The digital (r)evolution in the financial sector

The most important IT requirements for the coming years

52

% of respondents, n=141



Source: Capgemini

### Pursue a multi-channel strategy

integrate both in user-friendly and secure IT systems. Of course, the required high safety standards of financial institutions must not be neglected. Informational self-determination regarding customer data sovereignty must be guaranteed at all times, so that no data misuse can occur and no data can be passed on without the customer's consent.

With regard to aspects a) and b) it is the non-banks that currently have their noses in front (for now). However, especially the factors security and data protection (regulation-induced) could become crucial comparative advantages for the financial sector and once again provide it with a more dominant and enduring role in the market for simple financial services.

### 5.3 A digitisation strategy in the banking segment is indispensable

There are a lot of reasons why a digitisation strategy for banks is indispensable in the 21st century. No doubt, what matters is, among other things, the optimisation of process and cost structures as well as the adaptation to rising data volumes. Furthermore, the change in customer demands is an equally decisive factor as the new competition conditions in the market for standardised financial services. Last but not least, regulatory arrangements and control mechanisms can be handled more efficiently by a digital infrastructure. Flexible digitised infrastructures will in future enable banks to implement modern technologies and appropriate finance-specific internet services efficiently and above all in a timely manner with the aid of (open) application programming interfaces (APIs). According to the proven strategy of digital ecosystems, e.g. offering mobile payment solutions in the form of white label products could help other companies and their developers to develop new mobile applications or an innovative front-end to serve as a catalyst for instance for a broader use of credit cards for mobile payments.

Many large internet players, but increasingly also small technology-driven firms have their noses in front with regarding to "fintech" because, among other things, from the outset their business model concepts have been "digital", as have been the structuring and constant development of these models. They are in a position to supply open, compatible interfaces along their value chain so that the technologies customers want can be deployed or that collaboration with competitors can be carried out without extensive restructuring. Both enable a fast and flexible reaction to accelerating market dynamics, and both usually make products and services more appealing to us consumers.

### High degree of complexity in structures and processes

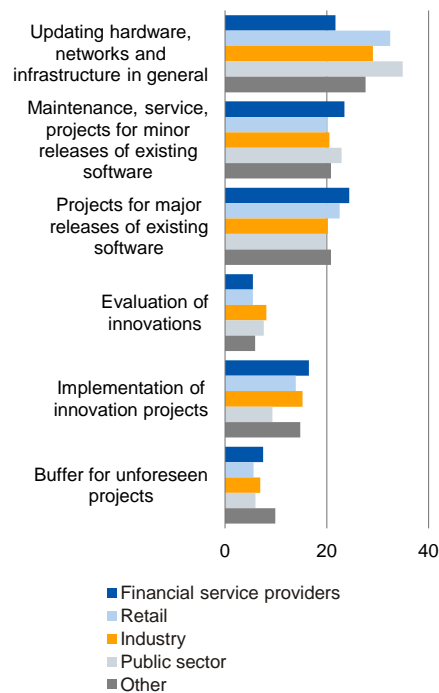
Many traditional companies which were founded back in the analogue era are occupied with the initial tedious and resource-sapping step of bringing their old-fashioned infrastructures and systems up to speed. This raises numerous issues concerning system architecture. These include compatibility, interoperability and the synchronisation of processes, organisational structures, systems (hardware and software) as well as data: can all internal infrastructures be made compatible? Can internal structures also be synchronised with external new processes? Are synergies in the form of efficiency and productivity gains feasible while also cutting costs? Is proficient skilled personnel still even available for one outmoded IT system or the other? Which data is already available? Which data may be valuable in the future? Which data on the customer (e.g. click or search behaviour) could in the future be measured and evaluated on one's own web portals and the various distribution and communication channels? Are there internal skilled data analysts or does new expertise have to be bought in?



## Fintech – The digital (r)evolution in the financial sector

### IT budget distribution by sector 53

% of respondents, n=89



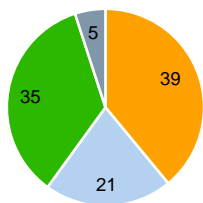
Source: Capgemini

The challenges of a comprehensive digitisation strategy in the banking sector are therefore enormous. The younger technology companies entering the market are not really asking themselves these questions because they offer exclusively web-based corporate services to their internet-savvy consumers right from the start. In the large established groups, by contrast, currently many decision-makers from various business areas are huddling together under intense pressure and conducting basic potential analyses and feasibility studies. Ultimately these laborious efforts devour single-digit billions of euros and cost above all precious time – time which should actually be used to counter the predatory competition threatening in some areas so that these firms themselves can provide innovative financial services that are in step with the internet age. An early comprehensive digitisation strategy could perhaps have restricted some (digital) deficiencies in the financial sector or even prevented them because it would thus have also been possible to conduct timely experimentation with new technologies. Digital structural change has not occurred overnight, the trend-like (digital) developments have already been underway for many years and could have been recognised before.

What makes matters even more difficult is the fact that day-to-day business has to carry on at the established banks during restructuring. Many systems cannot simply be switched off and renewed, however. In some cases, old and new systems have to be operated side by side until the required synchronisations are carried out. In such cases the high level of complexities and inter-dependencies between the different systems and processes needs to be taken into account.

### IT budget 2014 compared with 2013 54

% of respondents, n=100



■ Rising ■ Falling ■ Remaining the same ■ NA

Source: Capgemini

### Comprehensive data analyses require a uniform data structure

To cope with the exponential growth in data, new internet technologies and analysis methods, banks have to perform the additional step of harmonising all internally and externally available data, i.e. making them machine-readable. After all, this is the only way to combine different data volumes and types with new data sets and to detect potential patterns in these cumulative data using intelligent software programmes. Most of the existing data is unstructured, however, i.e. the data is stored in different formats, in different data bases and in different business areas.

For regulatory reasons the data from one business area may not simply be combined with data from other business areas. Within their internal structures, the banks have to observe compliance guidelines which ensure that there can be no exchange of information between individual business areas with differing objectives. This combats a potential conflict of interest (Chinese walls). Of course, these strict regulatory guidelines also apply to the underlying IT systems and (customer) data sets. Furthermore, continuous mutual coordination of the respective business areas and the IT sector must be guaranteed at the strategic (targets, strategies, projects) tactical (portfolio, infrastructure) and operational (day-to-day business, projects, business processes) levels. If all these steps are adhered to, conclusions could ideally be drawn on the basis of compatible databases via trial and error processes to gain new insights regarding customers, productivity and potential. Only then do the modern analysis methods (big data) also realise their much lauded potential at the banks.

### Compliance and alignment

### Digitisation will lead to reductions in branch space and personnel in the long term

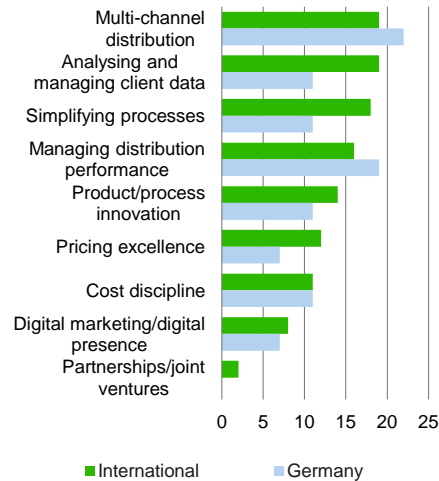
Of course a more digitised infrastructure within a banking group also has a long-term effect on staff and the existing branch network. Thanks to the modern information and communication technologies (ICT) as well as the merger of diverse distribution and communication channels, many services can be



## Fintech – The digital (r)evolution in the financial sector

### Expertise required to boost profitability 55

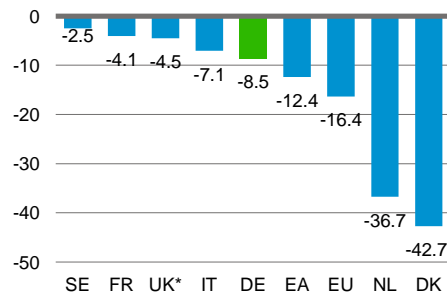
% of respondents, n=60 banks from 15 countries (requirements in the next 3 years)



Source: Roland Berger

### Number of bank branches declining 56

% change in bank branches, 2013 vs. 2008

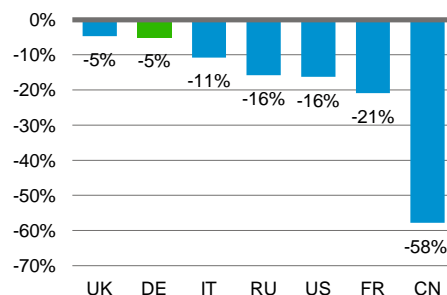


\* 2012

Source: ECB

### Consolidation in financial sector 57

% change in number of financial institutions\*, 2012 vs. 2007



\*Financial institutions that offer payment solutions to non-banks

Source: Bank for International Settlements (BIS)

standardised. This paves the way for synergies which permit higher productivity and, at the same time, lower transaction costs. This leads to an increasing automation of non-knowledge-intensive services. As a consequence, less qualified staff can increasingly be replaced by future technologies and modern analysis methods. As a logical consequence and as a result of a cost-benefit analysis, traditional banks will in the medium to long term make staff reductions in the area of non-knowledge-intensive financial services as well as thinning out their branch network and reducing the branch space on a region-by-region basis. There are, however, several drivers responsible for this development. Germany is one of the countries with the most dense branch network.

At the macroeconomic level, market consolidations in the financial sector resulting from the structural change in some cases also lead to market exits of entire banks. For example, the number of financial institutions in Germany which offer payment transaction solutions declined by 5% in the period from 2007 to 2012. According to the ECB statistics, the number of bank branches fell by 16.4% from 2008 to 2013 (DE: 8.5%), personnel levels were reduced by roughly 10% EU-wide in the same period (DE: 5.0%). However, if it is taken into account that the financial crisis almost completely spanned this period, the decline turns out to be relatively moderate on average. The reasons are from a macro-economic point of view primarily the financial crisis as well as from a business point of view the high fixed costs incurred in operating branches. This can lead to idle capacity costs if employees no longer work at full capacity due to digital distribution channels or self-service terminals installed at many locations.<sup>53</sup> Especially the terminals in the lobbies of many bank branches have contributed to the steady decline in direct contact with the customer. Experts expect this trend to continue. Thus, a restructuring of the branch network with a number of large branch offices (flagship stores) and smaller satellite branches could lead to a 25% reduction in the number of the locations in the medium term.<sup>54</sup> An associated consolidation of the IT infrastructure will enable synergies to be realised and costs to be reduced appreciably.

### New qualification requirements for personnel

Digitisation will also have an influence on the qualifications required of personnel. For instance, new professions, training programmes and academic chairs will be created because many developments and effects of the internet on the financial industry are still largely unexplored. New occupational categories will be created (e.g. data analysis specialists or algorithm specialists). With the growing demand for big data methods newcomers with backgrounds in statistics, mathematics, IT, data analysis or artificial intelligence and robotics have good prospects of finding a lucrative job because they can deploy their skills in a variety of sectors. In order to effectively deploy modern technologies and data analysis methods trained (data analysis) personnel as well as appropriate or newly focused management skills will be required. While the prospects for the less skilled will tend to deteriorate in a digitised work environment it will also become more challenging for highly skilled personnel and decision makers. For them the change will mean that their training will have to be broader and more interdisciplinary in order to handle the complex issues and to swiftly make the right decisions based on the many sources of information.

<sup>53</sup> Köhler, M. and Lang, G. (2008). Trends im Retail-Banking: Die Bankfiliale der Zukunft – Ergebnisse einer Umfrage unter Finanzexperten. Zentrum für Europäische Wirtschaftsforschung. ZEW. Dokumentation Nr. 08-01. Mannheim.

<sup>54</sup> Vater, D. et al. (2012). Retail-Banking: Die digitale Herausforderung. Bain & Company. Munich, Zurich.

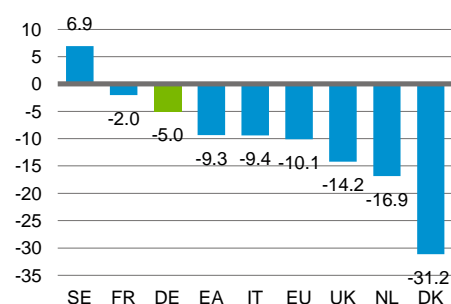


## Fintech – The digital (r)evolution in the financial sector

Personnel development at banks

58

% change in bank employees, 2013 vs. 2008



Source: ECB

## 6. Conclusion and outlook

The future of our economic activity is becoming increasingly digital. The significance of digital structural change is, however, frequently underestimated. It is not only the banks' value-added processes and business models that are being impacted by digitisation. Nor are they being only partly affected but comprehensively and they must also be comprehensively adapted to the architecture of the digital age. The digitisation of structures, processes or business models is a far-reaching process and not an issue that should only be driven by IT departments. Due to changes in the entire value creation process it is more of a paradigm shift or a strategic core issue in the overall strategy that must involve all the decision-makers within the company. In many sectors and at many traditional firms urgent action needs to be taken in order to remain internationally competitive going forward. This is also the case for the financial sector.

### Radical innovation therapy

The efforts of traditional banks are channelled into a relatively strong product focus. Furthermore, their actions and their dynamism are partly restricted by the obligation to comply with regulatory requirements. In doing so they can quickly forget about their actual (bread and butter) client focus. Although the financial sector is relatively well developed digitally, there are other market participants, especially the above-mentioned technology firms, that are streets ahead of them. In general, banks are accused of lagging behind many non-bank firms with regard to implementing the necessary digitisation of their various marketing and communications channels and of preferring to work on siloed solutions instead of subjecting their processes to radical innovation therapy.

### Banks must invest now

#### Traditional banks need to invest now

Despite the very tight squeeze on some margins, the fallout from the financial crisis, the changing consumption behaviour of customers and the increasingly stringent regulatory requirements banks now need to dip into their pockets and adapt to the modern internet age. The challenges facing the banks lie particularly in using existing and new information more efficiently and entering into closer collaboration with innovation leaders. At the same time they have to push ahead with the integration of their own fintech services without compromising the security of customer data. This is a Herculean task and cannot be completed overnight.

### Avatars and 3D holograms

The battle especially for internet-savvy customers is in full swing and is so intense that many traditional banks are not adequately prepared for it. In future banks should form even closer relationships with their customers and provide assistance on all money-related matters using value-generating, modern web-based technologies. If banks should succeed in presenting better informed and net-savvy customers with attractive financial solutions that satisfy the growing consumer demand for mobility, networking, communication, interaction and information, then the sector could hold its own against the new competitors.

Much of what is now technologically possible could already be seen over 30 years ago in spellbinding science fiction films. Much of what will be possible in future is spellbinding content that is currently available via streaming services or video on demand in our living rooms in 3D or as mobile content on our smart devices. No-one can accurately forecast how the bank of the future will look. However, much is already heading in a highly internet-driven, virtual direction. This applies to both the actual banking business and the strategic orientation with respect to jobs and the design of branches. Banking will change faster over the next ten years than in the most recent already turbulent decades. In the long term virtual three-dimensional holograms in the form of an avatar could welcome customers to many of the bank's flagship stores and provide customers with



bespoke services and products via speech recognition and modern data analysis. In addition, biometric recognition procedures will become established in the mass market and, especially in digital distribution channels, complement existing identification methods based solely on knowledge and possession – and might even replace them. In the major flagship stores and the remaining regional branches modern technologies will be deployed, such as large-format touchscreens, flexible LED facades, digital shop windows or work interfaces that can project free-standing 3D holograms. There is an increasing volume of experimentation with digital room solutions that will lead to a merging of real and virtual worlds. There will also be things that no-one can conceive of now. At the end of the development, however, in the easily standardisable financial products and services segment algorithm-based “algo banking” will emerge, combined with a personalised greeting and individual service.

Transparency and authenticity

With respect to the use of modern data analysis methods in the banking segment and especially with regard to individuals deciding how their personal data is used, there are two conditions that will have to become established: for the customer it must be transparent when, where and by whom personal data is collected, processed, stored and used. Moreover, customers must have the opportunity to decide about the disclosure, use and possible deletion of their personal data. This applies especially to very sensitive data about customers' income and wealth situation. If banks succeed in providing credible offerings in this respect, then they should gain a competitive advantage over the new competitors.

A new understanding of data and its added value

Before that is addressed, however, banks will have to learn to rethink their handling of data and its added value. “In information technology we talk about a hierarchy of data: information, knowledge, action. The objective is to take this data and convert it into smart action”.<sup>55</sup> To do this, simple information has to be transformed into organised, usable knowledge in order to deploy it for sensible activities. This requires adaptable digitisation strategies. For example, new IT systems will be so embedded in existing IT architectures that they will be able to sense and act on trends and predictions more quickly, enabling the analysis and forecasting of the behavioural patterns of customers, business partners and/or competitors.

Don't stick your head in the sand

Even though some major US internet firms and some start-ups are currently (still) leaders in modern technologies and data analysis – the battle for customers and market share in the digital age has only just begun. Google, Facebook and Co. were also small when they started out. Of course they enjoy a certain lead in information and expertise with respect to data analysis. But this is not what it's all about. From a German and European standpoint, a favourable environment should be created by policymakers now, given the highly competitive market, in order to stimulate the potential of modern internet technologies and analysis methods. Within the banking sector, too, there are opportunities and sufficient expertise to boost competition.

Innovations come in many guises. There is no magic formula for internet technologies. Many online innovations are incremental in nature and emerge largely via trial and error. However, they require investment, scope for experimentation, scope for freedom as well as scope for creativity and error tolerance. Just as in the analogue age, the people behind them are creative types who have good ideas, are courageous and prepared to take risks – and of course need a bit of luck. Banks, too, must improve the environment for this.

<sup>55</sup> Varian, H. (2014): Google macht uns Angst, Herr Varian. Interview with the chief economist of Google. <http://www.faz.net/aktuell/wirtschaft/netzwirtschaft/interview-mit-dem-google-chefoekonom-hal-varian-13113095.html>.



## Fintech – The digital (r)evolution in the financial sector

---

Digital structural change with all its complex and taxing challenges is not exclusively a technological phenomenon. It is something that we first have to grasp intellectually.

Thomas F. Dapp<sup>56</sup> (thomas-frank.dapp@db.com, +49 69 910-31752)

### Further reading

- Boyd, D., Crawford, K. (2013). Critical Questions for Big Data. Provocations for a cultural, technological, and scholarly phenomenon. In Geiselberger, H., Moorstedt, T. (2013). Big Data. Das neue Versprechen der Allwissenheit. eBook Suhrkamp Verlag Berlin.
- Clasen, N. (2013). Der digitale Tsunami. Das Innovators Dilemma der traditionellen Medienunternehmen oder wie Google, Amazon, Apple & Co. den Medienmarkt auf den Kopf stellen. Amazon Distribution GmbH. Leipzig.
- Dueck, G. (2012). Aufbrechen! Warum wir eine Exzellenzgesellschaft werden müssen. Eichborn Verlag. Frankfurt am Main.
- Dueck, G. (2013). Das Neue und seine Feinde: Wie Ideen verhindert werden und wie sie sich trotzdem durchsetzen. Campus Verlag. Frankfurt/New York.
- Mayer-Schönberger, V., Cukier, K. (2013). Big Data: A Revolution That Will Transform How We Live, Work and Think. Houghton Mifflin Harcourt Publishing Company, 215 Park Avenue South, New York.
- Schmidt, E. and Cohen, J. (2013). The New Digital Age. Reshaping the Future of People, Nations and Business Hodder And Stoughton Limited.
- Shapiro, C.; Varian, H. R. (1999). Information Rules: A Strategic Guide to the Network Economy. Harvard Business School Press. Boston, Massachusetts.

---

<sup>56</sup> Many thanks to Oliver Ullmann for his "handmade" illustrations and to Eric Heymann for his feedback and ideas.



## Current Issues

- ▶ Focus Germany:  
Further disappointments ..... November 5, 2014
- ▶ German industry: Output growth  
to remain shy of 1% in 2015..... October 30, 2014
- ▶ Higher German inflation:  
Mission impossible? ..... October 29, 2014
- ▶ Focus Germany: Heightened risks..... September 30, 2014
- ▶ Focus Germany: Ice bucket challenge  
and structural investment gap ..... September 2, 2014
- ▶ Progress needs broadband:  
Private investment requires more  
government stimuli ..... August 27, 2014
- ▶ Focus Germany: Weaker recovery in H2..... August 4, 2014
- ▶ China-EU relations: Gearing up for growth ..... July 31, 2014
- ▶ Focus Germany: Solid growth, low inflation  
(despite ECB) ..... June 30, 2014
- ▶ The changing energy mix in Germany:  
The drivers are the Energiewende and  
international trends..... June 26, 2014
- ▶ Focus Germany: Strong domestic  
economy to suffer from good intentions ..... June 4, 2014
- ▶ The future of Germany as an  
automaking location ..... May 26, 2014
- ▶ Crowdfunding: Does crowd euphoria  
impair risk consciousness? ..... May 23, 2014
- ▶ Big data - the untamed force ..... May 2, 2014

Our publications can be accessed, free of charge, on our website [www.dbresearch.com](http://www.dbresearch.com). You can also register there to receive our publications regularly by E-mail.

Ordering address for the print version:  
Deutsche Bank Research  
Marketing  
60262 Frankfurt am Main  
Fax: +49 69 910-31877  
E-mail: [marketing.dbr@db.com](mailto:marketing.dbr@db.com)

Available faster by E-mail:  
[marketing.dbr@db.com](mailto:marketing.dbr@db.com)

© Copyright 2014. Deutsche Bank AG, Deutsche Bank Research, 60262 Frankfurt am Main, Germany. All rights reserved. When quoting please cite "Deutsche Bank Research".

The above information does not constitute the provision of investment, legal or tax advice. Any views expressed reflect the current views of the author, which do not necessarily correspond to the opinions of Deutsche Bank AG or its affiliates. Opinions expressed may change without notice. Opinions expressed may differ from views set out in other documents, including research, published by Deutsche Bank. The above information is provided for informational purposes only and without any obligation, whether contractual or otherwise. No warranty or representation is made as to the correctness, completeness and accuracy of the information given or the assessments made.

In Germany this information is approved and/or communicated by Deutsche Bank AG Frankfurt, licensed to carry on banking business and to provide financial services under the supervision of the European Central Bank (ECB) and the German Federal Financial Supervisory Authority (BaFin). In the United Kingdom this information is approved and/or communicated by Deutsche Bank AG, London Branch, a member of the London Stock Exchange, authorized by UK's Prudential Regulation Authority (PRA) and subject to limited regulation by the UK's Financial Conduct Authority (FCA) (under number 150018) and by the PRA. This information is distributed in Hong Kong by Deutsche Bank AG, Hong Kong Branch, in Korea by Deutsche Securities Korea Co. and in Singapore by Deutsche Bank AG, Singapore Branch. In Japan this information is approved and/or distributed by Deutsche Securities Limited, Tokyo Branch. In Australia, retail clients should obtain a copy of a Product Disclosure Statement (PDS) relating to any financial product referred to in this report and consider the PDS before making any decision about whether to acquire the product.

Printed by: HST Offsetdruck Schadt & Tetzlaff GbR, Dieburg

Print: ISSN 1612-314X / Internet/E-mail: ISSN 1612-3158