

Networked Society Lab



ERICSSON

# ICT & THE FUTURE OF FINANCIAL SERVICES

INDUSTRY TRANSFORMATION  
- HORIZON SCAN

# STRUCTURE OF THIS REPORT SERIES

This report is one in a series of seven investigating industrial transformation in the Networked Society.

The impact of technology on our everyday lives and economic interactions is undeniable. In conjunction with megatrends such as globalization, climate change, urbanization and aging populations, ICT is helping to transform our society and the economic structures that have formed the basis of industries since the industrial revolution.

Digital technologies allow new organizational forms to emerge within and outside of industrial boundaries, thereby challenging our traditional notions of economic organization in markets. Where once size was an important driver of success, now many smaller companies are able to compete both locally and globally. Where firm, strongly defined boundaries and clearly defined economic roles were necessary, now the ability to dynamically participate in a variety of networks is key to a resilient corporate strategy. ICT is transforming the rules of our world's economic value systems, and industries are being transformed as a result.

It is not possible to provide a deep dive into every industry covered within this series. Instead each report investigates the role of ICT in creating productivity improvements and industrial disruption with a view to gaining a broad perspective on the overall transformation the world is undergoing. Six industries are investigated and across them general themes are identified that form the basis of the final report, the "Economics of the Networked Society", which outlines some of the broad economic principles that may help us understand the era we are entering.

These reports represent the culmination of several years' work investigating the changing economic structures of the world in the digital age. We hope our small contribution helps to further not just the vision of a Networked Society, but also its implementation – a society where dynamic, digitally enabled strategic networks allow us to build an economically, environmentally and socially sustainable world.

# METHOD

The reports in this series are developed using systems analysis to identify the operating boundaries of each industrial structure. Through analyzing the boundaries and their associated thresholds, a stronger understanding of capacity for change within an industry is possible to achieve. This method combines systems analysis with traditional measurement methods as well as extensive interviews across various parts of an industry's value chain in order to try and understand the possible emergent characteristics of industrial structures and the role that digital technologies may play in creating innovation, disruptive or otherwise. Many boundaries may be affected by a number of different aspects. Within these reports, however, we focus solely on how these thresholds can be adapted by ICT. Each report outlines the following:

1. **The industrial boundaries and associated thresholds**
2. **The role of data within those boundaries and the emerging information value chains**
3. **An overview of the industrial archetypes / organizational forms of start-ups in the industry**

Each of these industrial analyses has then been further analyzed to understand the emerging characteristics of the Networked Society, which is covered in the final report.

For further information on the method, contact  
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## SCOPE OF THE REPORT

The term “financial services” encompasses a wide range of products, services and providers of all sizes. A financial service can be both a product and service in its own right, such as a mortgage, or a complementary good to another “real” transaction, as in the purchase of a good, a settlement of a debt or the management of risk. Financial Services deal with money and risk in a variety of ways, such as providing a “service now” (e.g. transactional payments), “product now” (e.g. trading) or “future product” (e.g. investments, borrowing and insurance). For the purposes of this report, we classify them into two groups:

1. **Money and banking**
2. **Insurance and risk**

Different forms of financial services and regulation have emerged in different historical and regional contexts. Due to the scale of FS and the limited nature of this report, we concentrate on digital disruption within consumer services, with occasional references to investment banking and trading as appropriate.

There are also many differences among national regulation and taxation regimes, as well as among their supranational equivalents, where they exist. National and religious attitudes towards risk and usury are also known to differ widely. In fact, as the globalization of trade combines with the supplier push for global connectivity, it may be primarily cultural forces that remain as the major influencers of national and regional differences. Within this report we focus on the markets in the UK and USA due to space limitations.

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# EXECUTIVE SUMMARY

Financial Services (FS) are foundational to the functioning of our society. At the same time, FS is also one of the industries most susceptible to disruption: while ICT has thus far been leveraged within FS to increase efficiency and productivity for incumbents, digital technologies are now disrupting the very foundation of the FS industry itself, restructuring the way trust is managed as well as the manner in which confidence in currency and financial systems is created. Incumbents and regulators alike must carefully assess how to respond to the emerging digital transformations that bring both new opportunities and new entrants from adjacent industries.

Moreover, digital technologies are enabling both people and things to acquire economic identities that they were previously unable to have. As the Internet of Things emerges, and as digital disruption affects financial services markets, an internet of relationships begins to take shape in the form of new networks of trust based on the technologies that enable digital currencies.

Digital transformation within financial services is foundational in the emerging Networked Society, triggering not just new forms of currency, but also redefining the types of entities that can act as corporations. By linking together several aspects of the emerging digital economy, disruption in this industry will redefine many

aspects of our industries and our society. This report outlines the impact of ICT and emerging digital technologies on financial services, by examining the broad history and nature of financial services and the nature of digital disruption within this industry. Four main areas of transformation are identified:

1. **The continued use of ICT in productivity improvements in the banking industry, including omnichannel**
2. **New entrants into the industry, in particularly in mobile payment systems**
3. **Increasing cross-over with other industries, e.g. the changing nature of retail**
4. **The emergence of cryptocurrencies and the ability to disrupt the foundations of how the world's financial services are delivered**

As one of the main foundations of our economic system, a digitally transformed financial system holds potential to disrupt not just money, banking and insurance, but the very foundations of our social structures, the role of governments in currency and the manner in which goods and services are valued and paid for. As a result, this is one of the most important systems in providing a critical understanding of the emerging economics of the Networked Society.

# 1. INTRODUCTION

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“Money was invented to get round the problem of trusting other individuals. But then the issue was – could you trust the person issuing the money?”

**Mervyn King,  
former Governor of the Bank of England**

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Financial Services form the basis of our global economic system and help facilitate nearly every other facet of our economies. The industry offers a large array of instruments, products and services that allow customers to create wealth, perform transactions with others and manage risk. Over the last 30 years, this sector has also experienced enormous growth in many nations. For example, since 1980, financial services have accounted for more than a quarter of the growth in services, which in total grew from 53.8% of GDP to 65.9% of GDP in the USA.<sup>1</sup> Financial markets in the United States are now the largest and most liquid in the world. In 2012, finance and insurance represented 7.9 percent (or \$1.24 trillion) of U.S. gross domestic product.<sup>2</sup> In the UK, meanwhile, in the decade before the financial crisis the financial services sector grew significantly and by more than in most other major advanced

economies. In this period the measured output growth in the sector averaged over 6% per year.<sup>3</sup> Financial Services is now an extremely complex industry, with an increasing focus on products and services that create profits for financial market participants. This view stands in contrast to the more traditional “functional” view of finance, in which a primary function of the sector is to dampen risk by reallocating it efficiently within the economy.<sup>4</sup>

A number of characteristics distinguish financial services from other more transactional or “real” industries. These include, but are not limited to, issues of trust, security, governance, politics, national and international sovereignty, time, taxation and regulation. Each of these issues is today under re-assessment due to the impacts of digital technologies.

Money, for example, is used to store value and exchange that value for goods and services supplied by others. Over several centuries, the financial services industry has grown around the need to move, store and manage money. Banking, which has long relied on governments as the trusted intermediaries for establishing trust in both currency and the banking system, has traditionally been the most common method of storing money. FS also connects the future with the present by managing interest and compounding, selling risk products, and enabling the long-term financing of mortgages and pensions – in effect, creating opportunities for the transfer of economic value between the present and future.

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<sup>1</sup> Greenwood, R., and Scharfstein, D., 2012, The Growth of modern finance, Harvard Business School and NBER white paper, 2012

<sup>2</sup> Select USA, 2014, Financial Services Industry in the USA, accessed August 2014

<sup>3</sup> Bank of England, 2011, Measuring financial sector output and its contribution to UK GDP, Quarterly Report Q3 2011

<sup>4</sup> Greenwood, R., and Scharfstein, D., 2012, The Growth of modern finance, Harvard Business School and NBER white paper, 2012

## 1. INTRODUCTION

While FS was one of the first industries to embrace digitalization, particularly for accounting and recording systems using mainframes from large technology corporations, the sector's early adoption of technology has led to issues of dominant design. Incumbents now struggle to innovate and respond quickly enough to disruptive technologies. Mobile banking and internet-based channels have exacerbated this trend: new entrants now can not only disintermediate the value chain, but also set up full- or partial-service integrated banks at low cost. Entrants from adjacent industries with innovative, convenient products and services such as Apple or mobile network operators are increasing in impact on the industry. In addition, changing behavior and customer expectations are driving changes towards mobile devices and digital products and services.<sup>5</sup>

FS is therefore now highly susceptible to digital disruption due to ubiquitous low-cost technologies that allow end users to re-create or reinvent the manner in which FS is delivered within society. One example of this is the blockchain that forms the basis of Bitcoin (covered in Section 3.4), which disrupts the manner in which trust is established around currencies. A number of other ICT systems now make it possible to provide alternative means of generating trust, and while many are still in their early stages, they are a precursor to broader and more significant digital disruption, as trust can become embedded in networks themselves, rather than requiring a separate third party.

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<sup>5</sup> Accenture (North America), 2014, The Digital Disruption in Banking, 2014



## 2. INDUSTRIAL STRUCTURE

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“The whole modern banking system of paper and credit is built on this one simple act of faith. Paper money is truly one of the revolutionary inventions of human history.”

Mervyn King

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The FS industry may be viewed as being formed of four main facets from the perspective of the consumer or end user:

- > **The creation of money** and financial resources, including trust in the currency in question
- > **The storage of money** and value for future use
- > How **transactions** are processed, i.e. transferring money for payment
- > How **risk** is managed – most commonly in the case of consumers, this is handled by insurance

These aspects of the financial services value chain are illustrated in Figure 1 below, where money is first created or earned, then stored (or banked) and used in transactions. Finally the financial services industry is used to handle risk management such as insurance and pensions.

The following section provides a brief summary of the core fundamentals of money, banking and insurance that are most pertinent to digital disruption.

Figure 1: Financial Services Value Chain



# 2.1

## THE NATURE OF MONEY AND BANKING

Money has had a variety of forms and purposes over the centuries but until now has most commonly been viewed as a:

- > **Medium of exchange**, eliminating the need for barter, reducing transaction costs and creating efficiency by enabling specialization.
- > **Unit of value**, which can establish a relationship between the present and the future, and between people. The fungibility of money means these relationships can remain anonymous to both parties.
- > **Store of value** that is uniform, portable, divisible and identifiable. Its uniformity means it can be used as a currency unit.

# 2.1.1 MONEY

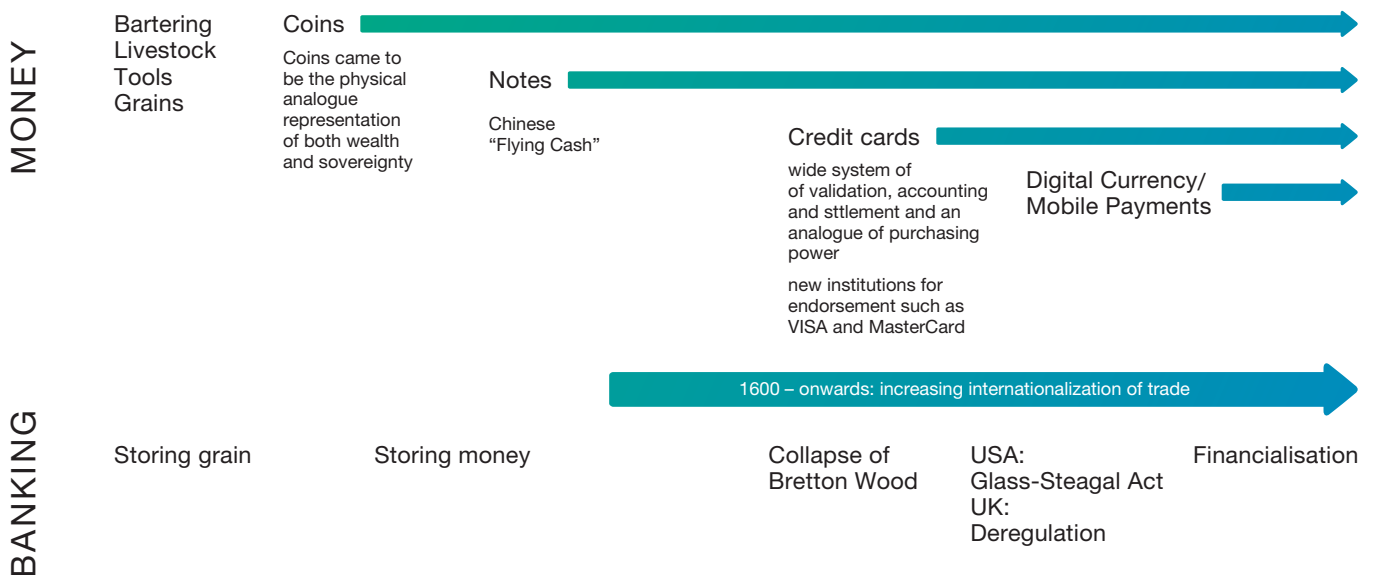
Money has taken many forms even within our own century: for example, credit cards represent a broad system of validation, accounting and settlement and are an analogue to the purchasing power of money. Credit cards are also perhaps the first attempts at digitizing money, enabling a shift from transactions based on paper and an imprinting machine to the use of microchip and pin devices that electronically authenticate the end user.

As we transition to an increasingly digital world, some of the most deep-seated questions about the role of money are beginning to resurface. How can we ensure that paper money retains its value in society? Does it need to be convertible into something with intrinsic value as was previously the case with the gold standard? The gold standard and the convertibility of paper money have gradually eroded to the point where all

that remains a promise. As a result, the future value of money is now actually a judgment on the issuer of the currency. In most modern societies, the national government has been the sole distributor of money with the power of “seigniorage” – the ability to “create” money in order to create value for itself and for its citizens. Today, however, this power is now available to private entrepreneurs due to digital technologies such as the blockchain, as discussed in Section 3.4. Within the Networked Society, anyone with sufficient computational capacity and capabilities can use it to create trust across a network of people or even among digital entities. This network of trust can create the same trust in a currency as the government, the early stages of which have been seen with Bitcoin.

A brief history of money and banking is illustrated in Figure 2 below:

Figure 2: Timeline of Money and Banking



# 2.1.2 BANKING

Modern banking is not remarkably dissimilar from its origins in Sumeria or Babylon: the bank maintains a record – or ledger – of the financial transactions of its account holders. From a conceptual perspective, we may view the modern banking system as consisting of three main components:

- > **Ratio accounting**, which allows banking institutions to create money in the form of credit
- > **Connecting the future** with the present, by taking a long position when the natural human tendency and less risky position is to match assets and liabilities as closely as possible.
- > **Incorporating private banks**, including national banks, into a sphere of regulation and a role in monetary policy, through the use of ratio manipulation and the manifestation of central banks, which are intended to preserve the integrity of the system and to provide finance to the government. Regulations still tend to be restricted to national jurisdictions, resulting in an absence of international law and standards. We cover these three aspects in the next section.

# 2.2 RISK AND INSURANCE

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“The aim of the insurance industry is not necessarily to reduce risk but to understand it.”

**Anonymous commentator**

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While the banking industry provides means by which to store and exchange value, the insurance industry aims to protect against loss, generally by monetary provision, in an uncertain future by quantifying the probability of an occurrence and the magnitude of the outcome. A price (or premium) is then set for products that cover against loss. This price is essentially a “risk treatment option”, in which the losses are shared within a pool.

Financial risk has been well categorized, theorized and refined by models such as the capital asset pricing model, as well as by the creation of exoteric financial products and their related industries. The main purpose of such models has been to understand, calculate and mitigate or enhance risks.

The industry has consolidated significantly in the last two decades, especially in Europe where a limited number of players have emerged. Prior to and concurrent with this consolidation was the FS industry’s experiment with “bancassurance”, where retail banks would acquire insurance companies, or set up their own, in order to be able to offer a complete range of products and services to their customers, with the intention of increasing share of wallet, improving customer retention and reducing customer acquisition costs. An emerging area of concern within the insurance industry is how to deal with new products such as data and information value chains. As discussed in our utilities, retail and transport reports, these new value chains require the insurance industry to come up with new solutions in order to handle the emerging risk associated with information products.<sup>6</sup>

Insurance is a complex amalgam of different industries and processes, but underlying commonalities include pooling or groupage, regulation, and joining the future to the present. Digital technologies will affect how insurance is delivered, and the collection of data itself will raise new risks for companies and individuals, as well as throughout society. The following section investigates the role of ICT in these sectors and the emerging impact from newer digital technologies.

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<sup>6</sup> Impact of Datafication on Service Systems, Ericsson and Imperial College, 2014

# 3. ROLE OF ICT IN FINANCIAL SERVICES

ICT has played a large role in financial services since computing became widespread with mainframes in the 1960s. Computerized control of ledgers and transactions helped reduce human error and initially removed the possibility of fraud. As systems developed ICT increased in use, branches themselves adopted digital technologies, money became available 24 hours a day via Automated Teller Machines (ATM) and payment systems became digitalized after the introduction of chip and pin solutions. By the late 1990s, FS was a truly digitalized industry and even trading floors fell silent as fully electronic exchanges took over.

ICT's reach into FS is still increasing as new entrants use digital technologies to enter adjacent markets through payment schemes. At the same time the potential for industrial disruption is also increasing as computational capacity is distributed across the globe.

This section investigates the role of ICT from the following two main perspectives:

1. **ICT for continued productivity improvements within FS**
2. **ICT for industrial and societal disruption**

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“You can see the computer age everywhere but in the productivity statistics.”

Robert Solow, 1987

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# 3.1 FS AS AN EARLY ADOPTER OF ICT

Commercial banking was one of the first industries to computerize its operations, originally through the development of large centralized data centers, and then by extending the practice to branch operations. However, most of these operations did little but computerize existing overnight analogue batch processing, with very few commercial banks creating real-time, online systems, since there was no competitive advantage in being out of sync with the rest of the industry. Therefore, the initial investments in digital technologies in the FS industries, along with their underlying processes – and therefore the financial systems themselves – remained intact.<sup>7</sup>

Early investment in large IT systems and often substantial physical branch networks, which in the past have posed significant barriers to entry within the FS sector, can now be considered as brakes on innovation and unnecessary cost bases due to the creation of a dominant design in the banking technology and business model. The current dominant design is one reason that the UK banks have difficulty implementing services similar to mPesa.

More recent developments include electronic bill payment and online near real-time, interbank, inter-account transfers. Channels have been added such as ATMs and telephone, internet and mobile banking. For the existing industry, this represents a vertically integrated multi-channel approach with cost and complexity being added to aging systems, rather than industrial disruption. The established mechanisms for performing the tasks remained intact, with some opening for new entrants that would support existing actors with these digitized versions of their existing systems.

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<sup>7</sup> Maull, R., Godsiff, P., Mulligan, C., 2013, The Impact of Datafication on Service systems, HICSS 47, Hawaii, 2014

# 3.2

## MOBILE MONEY: BANKING AND TRANSACTIONS

Digital technologies have enabled a broad range of banking innovations, from Near Field Communication (NFC) systems allowing contactless payment systems<sup>8</sup> to new identification methods utilizing biometric and location information such as Apple Pay.<sup>9</sup> Other technology, like PayPal's Beacon and Apple's iBeacon, uses proximity-based Bluetooth connections instead. Payment would occur online, with the cashier simply confirming your registered picture for purchase security.<sup>10</sup> These technologies provide innovations in how transactions are performed in the wider economy as new forms of payment become more broadly established and reduce the requirements for physical cash.

Mobile payment systems are currently widely utilized and there are a number of solutions that are increasing in popularity – between 2012 and 2013, mobile payments doubled to \$1 billion. It is predicted that mobile payments will top \$58 billion by 2017.<sup>11</sup> For example, the introduction of Paym in the UK enables customers who are members to make payments to each other via mobile phone numbers, but these developments are the just the beginning. The interaction between customers and companies will change as the relationship around the transaction adapts to the new payment forms. For example, some fast food restaurants have started using the ez-pass system used for collecting tolls from cars to collect payments from their customers.<sup>12</sup> Cars could therefore become much like credit cards.<sup>13</sup>

However, the real success story of mobile payments is mPesa<sup>14</sup> in eastern Africa, which has successfully helped provide banking to those traditionally without access to banking infrastructure. Other countries with similar informal banking structures may also benefit from similar solutions if they are developed appropriately. For example in many emerging Asian economies, loans and savings are handled through “circles of trust”,<sup>15</sup> rather than through large institutional banking systems that are common in the west. These social saving and loaning schemes form the basis of the economic system for many countries. As will be discussed in Section 3.4, similar circles of trust are being formed digitally in the west and hold the potential to create broad-scale disruption of the global financial system.

All of these developments, irrespective of which country they are developed and installed in, provoke new questions regarding security and ease of use. As there is no depositor protection on cash, they may also create openings for innovative insurance products as well as increasingly innovative security breaches.

All these digital developments accelerate transactions, but do not have a transformative impact on the manner in which financial services themselves are built – they still rely on traditional notions of money and trust described in Section 2. The next section covers the role of ICT in creating digital disruption across the financial services industry.

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<sup>8</sup> <http://www.tfl.gov.uk/fares-and-payments/contactless>

<sup>9</sup> <http://www.apple.com/apple-pay/>

<sup>10</sup> Rommann, R., 2014, Cash is Trash: The Future of Mobile Payments, Technology, Jan 23rd 2014

<sup>11</sup> eMarketer, 2013, US Mobile Payments Top 1 Billion in 2013

<sup>12</sup> Grossman, S., 2013, Fast Food Drive-Thrus Are Getting E-ZPass System So You Don't Have to Exhaust Yourself Digging for Change, Time Magazine, Dec. 16th 2013

<sup>13</sup> Rommann, R., 2014, Cash is Trash: The Future of Mobile Payments, Technology, Jan 23rd 2014

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<sup>14</sup> [mpesa.org](http://mpesa.org)

<sup>15</sup> Ericsson 2014, Mobile Commerce in Emerging Asia



# 3.3 BIG DATA AND FINANCIAL SERVICES

Perhaps the most obvious new application of ICT within FS is the role of so-called “big data”, where banks are able to track individuals’ transactions in fine-grained detail as they move about their daily lives and conduct daily activity. Within mobile and digital payment systems, they are able to understand intimate details about end users and consumers that customer loyalty cards are unable to garner. A bank has a record of nearly every financial transaction that a customer makes across all aspects of their lives. Such data can be used to create tailored financial services products for the customers in question. Again, while this will create new products and services for end users, it does not fundamentally disrupt the manner in which FS is delivered in society or to consumers. We discuss these types of ICT solutions in the following section.

# 3.4

## DIGITAL DISRUPTION IN FINANCIAL SERVICES

Digital technologies are redefining our relationship with money, banking and insurance in a variety of ways. ICT has previously allowed incumbent firms to become increasingly efficient and provide a broader range of services to end users. Mobile devices have created multiple routes for FS companies to engage with and deliver services to their customers. All of these solutions, however, rely on the existing institutional frameworks outlined in sections 1 and 2 of government-controlled systems of trust in money and banking.

Digital technologies are now sufficiently spread across the globe, however, that they can create some fundamental changes to the manner in which financial services are constructed within society. Distributed computational capacity allows individuals across the globe to work together in dynamic networks to create new forms of financial systems.

This section outlines the impact of digital disruption on FS, focusing on two main aspects:

1. **The value of data within the emerging digital economy**
2. **The emergence of crowdfunding**
3. **The creation of cryptocurrencies**

## 3.4.1

# DATA AND VALUE

As described in the previous sections, money connects people in a complex set of trading exchanges and social relationships, using various methods. People and things are increasingly connected digitally, often in non-financial exchanges. At present, the exchange of value through these connections is therefore not usually monetized, although suppliers are experimenting with different models of capturing value other than through advertising. One challenge will be for providers and users to create exchanges that need not be measured in traditional monetary terms. An example of this, as covered in our retail report, is how value is captured from consumers as they use a product or service.

Modern service theory suggests that all economic agents are now resource integrators, acting so as to create value in context and use from a set of goods, services, actions or relationships. Connectivity and smarter algorithms will make resource integration by actors or their agents easier and more practical to achieve, affecting not just the customer relationship but the financial interactions as well, as customers increasingly move to protecting their privacy or demanding value in return for the use of their personal data.

Internet businesses in both social media and financial payments have business models related to the use of data or metadata. This data can be described as volunteered data, observed data, and inferred data.

The data begins to have monetary value when companies apply it to deepen the connection to their customers, create new advertising models and sell the data to one another in order to create new revenue streams. This, however, raises a number of important concerns, such as: Who owns and has access to the device and the data? Who owns the integrative algorithms? And who, therefore, owns the resulting value? Will a new form of currency emerge with data as its basis?

It is increasingly apparent to all users of 'free' services such as Facebook and Google that the cost of these services is actually the user's data and loss of privacy. The tradeoffs between access or service and privacy, whether personal or communal, are not always apparent, and appropriate decisions are difficult to make. Privacy is often treated as a "transactional" personal good, rather than a public good we all share or lose. Through the expansion of digital technologies, markets may emerge in which privacy and data are traded either for exchange value or use value, for example in return for personalization or special treatment. Data Exchanges such as the open Personal Data Store<sup>16</sup> developed by MIT are early examples of systems that may capture data as a form of value and provide end users the opportunity to use it in exchange for monetary or other types of value.

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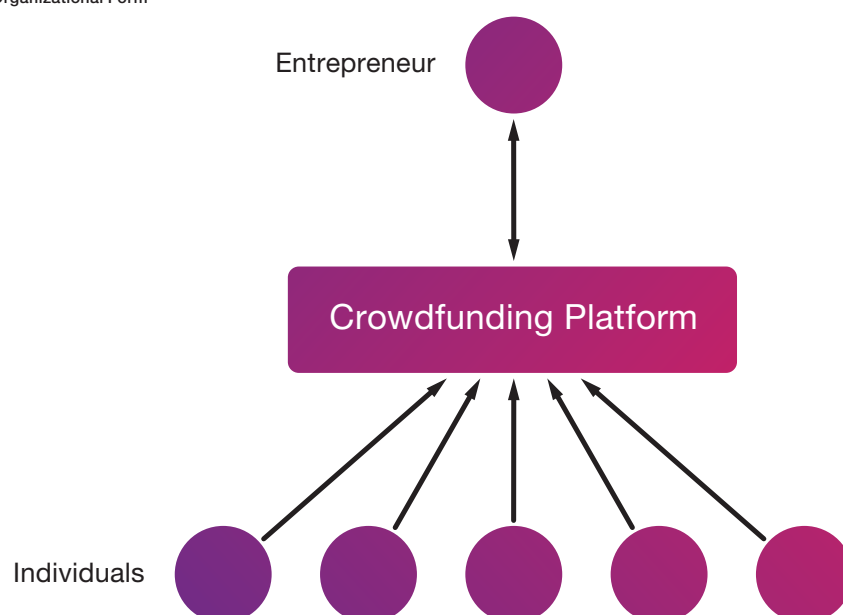
<sup>16</sup> <http://openpds.media.mit.edu/#philosophy>

## 3.4.2 CROWDFUNDING

Another example of digital disruption in FS is crowdfunding, which allows networks of end users to provide small-scale contributions to individuals and enterprises who cannot or do not wish to obtain traditional loans from a bank. This creates a new relationship between an individual or organization and a surrounding network of contributors. These growing peer-to-peer funding systems allow users to bypass established financial service players, instead providing direct links between entrepreneurs and individual funders, who could contribute individually, as in p2p networks, or in aggregation, as in crowdfunding. Digital technologies are used in the form of platforms connecting the ideas of entrepreneurs to funding of individuals, as illustrated in Figure 3:

A similar digital innovation allows end users to use the power of networks to access the benefits of having a company, without the necessity of managing the overhead, by aggregating a number of individuals together. For example, CoolCompany.se in Sweden allows individuals to invoice for their services via the internet, allowing to act as a company without having to register as one. This shows that “instant accounting” easily extends beyond finance providers and facilitates the necessary accounting, banking and tax requirements for each transaction in real time.

Figure 3: Crowdfunding Organizational Form

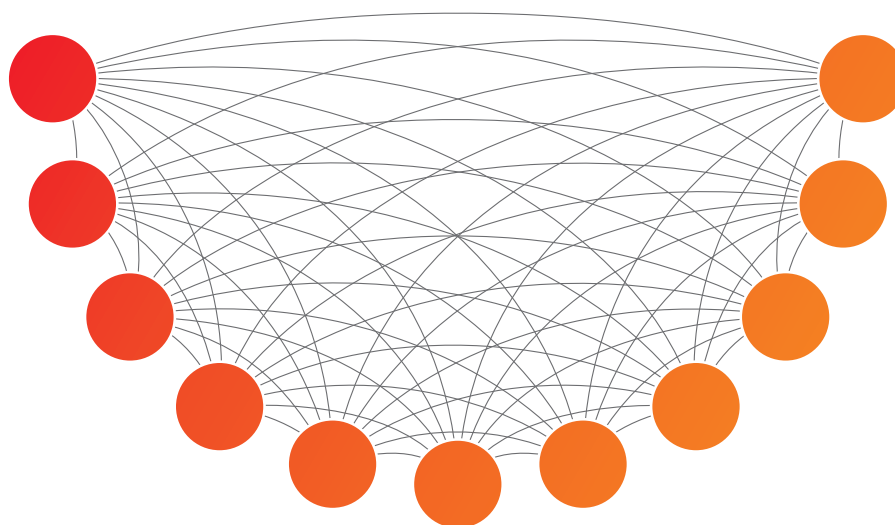


## 3.4.3 CRYPTOCURRENCIES

The most significant forces for industrial disruption within the financial services industries are more than likely the emerging cryptocurrencies, which allow the creation of trust without government participation. As a result, these solutions can create not just a new financial system but can also trigger entirely new forms of corporate enterprises. Cryptocurrencies hold the potential to disrupt not just financial services but a significant majority of social and governance practices as well. More than just “digital currencies”, cryptocurrencies are also a collection of protocols and transaction programming languages. More importantly, however, they essentially provide an Application Programming Interface (API) towards money itself.<sup>17</sup> Cryptocurrencies are therefore able to act as a platform for 3rd party financial services, not just as a replacement for money and banking systems.

The most commonly known cryptocurrency is Bitcoin, which was created in 2009. The foundation of Bitcoin is the block chain, which performs the same function as a ledger for a bank. The block chain, however, is distributed across the entire network of entities connected into Bitcoin, in that every entity in the network has a copy of the ledger,<sup>18</sup> instead of the ledger being centralized within a bank. The network itself is the ledger and becomes a truly distributed organizational structure, as illustrated in Figure 4:

Figure 4: A representation of Bitcoin's organizational structure, enabled by digital technologies



<sup>17</sup> Antonopoulos, A., 2013, Bitcoin is a money platform with many APIs, O'Reilly Radar, May 29th, 2013

<sup>18</sup> Bank of England, 2014, Innovations in payment technologies and the emergence of digital currencies, Quarterly Bulletin, Q3 2014

### 3.4.3 CRYPTOCURRENCIES

Cryptocurrencies raise the possibility of significant disruption by operating on the notion that currencies can be underwritten by a community, rather than guaranteed by the state. This is an entirely new paradigm for the FS industry, challenging both the existing models of FS and the responses of regulators, which need to be agile in their approach to these currencies. Additionally, if the popularity of the cryptocurrencies increases, they may start to replace companies that traditionally have facilitated transactions, such as Visa/Mastercard, as well as banks. This could lead to a restructuring of financial services in many countries.

Bitcoins are now sold via ATMs and are accepted in shops in many cities. Their value in exchange and time is guaranteed by designed restrictions on their creation and the amount in circulation. Transactions are assessed, underwritten and locked by the community,<sup>19</sup> and the dollar value of Bitcoins can fluctuate wildly.

As discussed in Section 2, many of the world's financial systems have been built around societal structures that ensure the public's trust in the currencies used – mostly governments have acted as trusted intermediaries of financial transactions. In today's digital world, however, trust can be established between networks and communities instead of via these social structures.

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<sup>19</sup> <http://www.bitcoin.com>

# 3.4.4 CRYPTOCURRENCIES AND APIS FOR MONEY

APIs provide access to systems for programmers to develop applications on top of existing software without necessarily understanding the details of how the system in question actually works. More importantly, however, Open APIs – those APIs that are made available to external developers to create innovative third-party applications – dramatically reduce transaction costs and act to help create a market.<sup>20</sup>

Cryptocurrencies are unique as they are effectively providing the first set of Open APIs for money. While there are significant numbers of APIs within the banking system already, they are closed and only those with a special and approved relationship are able to develop applications on top of them. These have to be approved by the system owner first – for example VISA or the bank in question. Cryptocurrencies change this by not just offering an API towards accounts and transactions, but also making that API available to everyone –

it is the world's first Open API for banking.<sup>21</sup> Bitcoin, for example, “shifts the model from ‘trust by exclusion’ to ‘trust by computation’ – this levels the playing field for anyone who wishes to operate a bank, stock exchange or escrow service.”<sup>22</sup> Anyone with sufficient computational capacity – even a mobile device is enough – can now provide the same services as large scale banks such as Lloyds, HSBC or Bank of America.

Such solutions may therefore have a significant flow-on effect to the rest of the economy and the manner in which resources are purchased and developed. These APIs towards money and banking may assist in the creation of e.g. the sharing economy through allowing multiple people to co-sign, or pay for, an item that they wish to share ownership of. For example, a number of people could combine their keys to pay for a song or video that they all would co-own and share.<sup>23</sup>

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<sup>20</sup> Mulligan, C.E.A., 2011, *The Communications Industries in the Era of Convergence*, Routledge, 2011

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<sup>21</sup> Antonopoulos, A., 2013, Bitcoin is a money platform with many APIs, O'Reilly Radar, May 29th, 2013

<sup>22</sup> *ibid*

<sup>23</sup> *ibid*

# 3.4.5 REGULATORY RESPONSE TO CRYPTOCURRENCIES

National governments are unsure how to deal with this new pseudo-democratic currency. The Japanese central bank has suggested that Bitcoin is an asset, rather than a currency or financial instrument, and that it does not constitute banking. The US Federal Reserve has concurred with this view. The Danish central bank likened it to glass beads, remarking that it was not a currency because there was no issuer and no utility value. Other jurisdictions are trying to ban its use, completely or partially. China, for example, has acted to reduce its use and restrict trade in the currency. These views and the treatment of such currencies have systemic effects on taxation, regulation and record-keeping, and regulators therefore continue to discuss whether they should be treated as currencies or assets.

Bitcoin uses cryptography to control the creation and transfer of Bitcoins, and transactions are jointly verified by members. Supply is limited both in total and on a daily mined basis, and is stored in a bitcoin address. The system has been deliberately set up to prevent a government's ability to depreciate the currency.

Although Bitcoins may not currently be seen as units of account or stores of value, they nonetheless fulfill their role well as a medium of exchange. Since Bitcoin is not unitized, it is particularly attractive for use in micropayments, which tend to be flawed in many existing payment schemes that charge high transaction fees. As a result, Bitcoin value chains could help create entirely new forms of value and supply chains, perhaps even triggering some of the micro-supply chains covered in our report on the retail industry.

Bitcoin – or its equivalents – could be a money transmission system and store of wealth for the digital age. It is very low-cost in comparison to traditional banking services and represents a challenge on many fronts: banks and their cost base; regulators; money supply and control; monetary policy and inflation. However, it is also being used for illicit purposes, finding, like most forms of money, some of its most useful applications on both sides of the law.

Not unlike traditional banks, which experience crises of confidence and hence a “run”, its exchanges, such as MtGox, are currently best known for their recent collapses, or are beset by fraudulent management. There are a large number of open questions associated with cryptocurrencies, such as:

1. **Can they be taxed, and if so, how?**
2. **Will the wealthy gravitate towards them?**

Auroracoin,<sup>24</sup> a pre-mined currency invented by the Icelandic government, has been distributed in the form of 30 coins to each Icelandic citizen. It is also a direct attempt to circumvent the physical exchange controls reintroduced following the Icelandic banking crisis. A similar scotcoin<sup>25</sup> is being attempted in Scotland as a private effort at stimulation.

The desire of national regulators to treat Bitcoin as an asset, and its ongoing appreciation in value, may provide a useful illustration of the digital implications of Gresham's law, “that bad money drives out good”, in that the value of “good” money as an asset may discourage people from using it in exchange.

<sup>24</sup> <http://auroracoin.org>

<sup>25</sup> <http://scotcoin.org>



# 3.4.6 MORE THAN MONEY – CRYPTOCURRENCIES AND THE FUTURE OF CORPORATIONS

The infrastructure developed for cryptocurrencies such as Bitcoin provides significantly more than just a method for creating truly digital currencies. By creating a distributed network that can act as a third party trust mechanism, these infrastructures permit the development of innovative financial services on top of the protocol and, in conjunction with the Internet of Things (IoT), can help reshape the defining features of corporations themselves:

automated companies, or DACs in cryptocurrency vernacular – an “entity without any central point of control, but with a certain agenda, business plan, and protocol.”<sup>27</sup> In short, a DAC operates as a corporation, but without the people.

As an early indicator of how these automated corporations might take shape, a fully decentralized P2P microblogging platform, Twister,<sup>28</sup> was recently cre-

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“Building features on top of the Bitcoin protocol that will allow for the decentralized execution of financial services, from currency hedging to loans to stock issuance to rental and purchase contracts... [Bitcoin’s] M of N transactions, which require agreement between a certain subset of a group, and can be used for escrow, mediation, or shared financial management; time-locked transactions, in which bitcoins are distributed on a strict schedule, useful for trusts or wills; and even data-conditional transactions.”<sup>26</sup>

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In the Internet of Things (IoT), machines can receive an identity, in the form of an IP address, at which the device can be reached for communications. By applying a blockchain, they can also receive an economic identity, allowing machines and devices to act as economic entities. They may even create their own distributed

at by leveraging Bitcoin and BitTorrent technologies as open software.<sup>29</sup> Such technical solutions could be extended to include machines more advanced than servers and connect them together in financial transactions.

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<sup>26</sup> Morris, D., 2014, Bitcoin is not just digital currency. It's Napster for finance, Fortune Jan 21st 2014

<sup>27</sup> <http://invictus-innovations.com/i-dac/>

<sup>28</sup> <http://twister.net.co/>

<sup>29</sup> Bitcoin: It's the platform, not the currency, stupid!, available from:<http://thenextweb.com/insider/2014/02/15/bitcoin-platform-currency/>

### 3.4.6 MORE THAN MONEY – CRYPTOCURRENCIES AND THE FUTURE OF CORPORATIONS

In the future, however, such digitally enabled corporations may become even more automated, gaining the ability to “engage in economic activity without guidance or direction from humans”.<sup>30</sup> For instance, a solar panel could create electric credits, which could be used as needed by other household appliances. A community’s virtual power station, as described in our report on the utilities industry, would not require human intervention or money in this new form of direct, non-intermediated barter. This is not so much a question of how data can be monetized, but whether it can be exchanged in non-monetary ways or ways that reduce cost while enhancing the outcome for the data owners.

Such corporate entities would necessarily challenge our regulatory environment, along with a number of fundamental components of social order, as expert tasks that are traditionally the domain of humans can be distributed across large networks of machines.<sup>31</sup> This raises questions about the nature of work, the role of the humans in our economic system and even the very basis of how human beings find meaning in their day-to-day lives. Moreover, it begs the question: How would autonomous corporations be taxed in order to provide the public services on which we all have come to rely?

This section briefly reviewed the impact of emerging digital technologies on financial services. The key themes that emerge are the importance of: promises, security and trust; the financial sector in the national and international economy; and government regulation. Despite the early adoption of ICT by the banking industry, many of these issues continue to be managed by analogue methods.

Digital technologies, however, hold immense promise and disruptive potential for the entire FS industry. Equipped with the ability to create new currencies and aggregate financing through crowdfunding, entrepreneurs have the opportunity to pose fundamentally new challenges to the established business models of the banking industry. It is possible even to create an entirely new banking system based on the capabilities provided by the current era of digital technologies.

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<sup>30</sup> Montevideo, JMP, 2014, DAC attack, The Economist Jan 28th 2014

<sup>31</sup> Ödling, P., Karlsson, G., Janson, S., Våra hjärnors arbete är på väg att ersättas, Svenska Dagbladet, 13:e September 2014

# 4. THRESHOLDS IN THE FINANCIAL SERVICES INDUSTRIES

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“I don’t care if they spend it all on a  
Lamborghini.”

**Pensions Minister  
UK Government**

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In this section we will briefly summarize some the thresholds associated with the financial services industry. As illustrated in previous sections, the financial services industry is vast and covers many areas. It also is formed by a broad variety of thresholds, including:

- > **Financial**
- > **Economic**
- > **Social and Political**
- > **Environmental**

In this section, we focus on the Financial and Economic thresholds as these have the largest direct impact on FS.

The thresholds of the FS industry are complex and several are deeply intertwined with one another. Money, banking and insurance are essentially social systems and as a result, people – mainly governments – define the thresholds and the associated boundaries. FS, however, have a strong impact on how our natural resources are valued, used and recycled throughout the economic system. It is important, therefore, to understand how they are linked together.

ICT can have a dramatic effect on FS, as highlighted in previous sections, by changing where thresholds are located and when boundaries are crossed – e.g. by cryptocurrencies changing how trust is constructed within society or allowing individuals to create value together via crowdfunding, rather than needing to use traditional institutional systems such as banks or venture capital.

# 4.1 FINANCIAL

The crossing of systemic thresholds in the FS industry is often accompanied by dramatic impact on society, as has been seen in the 2008 global financial crisis (GFC). ICT has played a role in some of the more recent crashes, with the global interconnectivity of financial services helping to exacerbate minor liquidity “blips” involving smaller players and spreading them across the globe. We cover some of these impacts and their potential outcomes in this section.

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**“The future is already here; it’s just unevenly distributed.”**

**William Gibson**

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## **Crises in financial services**

Frequent crashes occur in the financial system due to the instabilities of people, credit and financial structures<sup>32</sup>. The sustainability of the national ecosystems of regulation and control is not guaranteed in a globally linked world: bank runs are familiar in small banks, but systemic crashes have structural effects and wider impacts on the global system. For example, during 2008, the collapse of a small building society saw some UK high street banks come dangerously close to running out of cash in their ATMs. Previously, in 1973, the secondary banking crisis saw another UK high street bank come dangerously close to collapse.

Light-touch regulation and economic orthodoxy had led to the feeling – within governing financial institutions – that, even during the crash, matters were under control. However, this understandably may not have been the perception of the general public, in particular as the UK central bank has pumped £375bn of quantitative easing into the market and held interest rates artificially low since the 2008 crash. Estimates in the USA are that more than \$3 trillion of quantitative easing has been used to support its banking system. This support has led to the criticism of banks being “too big to fail” and being unfairly supported at the cost of other requirements in society.

## **The role of the regulator**

US Federal Reserve transcripts clearly show that regulators were under the impression that they were in control of the crisis and implementing sufficient measures to manage it. Both the current and previous governors of the bank of England have expressed concern over lax regulations, and have linked the excesses in FS to the nature of capitalism itself. Mervyn King, the former governor of the Bank of England, stated: “If you’d asked me four or five years ago before the financial crisis, I would have said, ‘I think we’ve now worked out how to manage paper money.’ Perhaps in the light of the financial crisis we should be a bit more cautious...”

Mark Carney, current governor of the Bank of England, has said “capitalism loses its sense of moderation when the belief in the power of the market enters the realm of faith”.

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<sup>32</sup> Swarup, B., 2014, Money Mania: Booms, Panics, and Busts from Ancient Rome to the Great Meltdown, Bloomsbury Press, 2014

## 4.1. FINANCIAL

### Sentiment towards FS following the crash

The impact and cost of the financial crisis has led to negative feelings towards FS, exacerbated by other excesses such as mis-selling, excessive lending, predatory pricing, poor returns, fraudulent rigging of markets, high bonuses distorting asset markets, and “small print” legal clauses. Bonuses in some banks have recently exceeded dividends to shareholders, while past bonuses have been effectively paid by taxpayers, both in bailouts and through the generous monetary policies towards large financial institutions. The results include low interest rates for investors, and overall economic stagnation. As a result, the level of trust in the banking system is currently quite low in many European countries.

In addition to all of the above, recovery from crashes is taking increasingly longer. According to Christensen’s study, in the seven crashes between 1948 and 1981, employment levels in the US took six months to recover. However the time lag in 1990 was 15 months and in 2001, 39 months. Employment levels from the current economic crisis are yet to fully recover across the globe to pre-2008 levels.

A general sentiment of distrust towards the banking system has therefore emerged. As a result, many people have begun questioning not just how the banking system works, but how to use digital technologies in novel ways in order to recover that trust, often by excluding the government altogether.

### End to quantitative easing

As mentioned, central bank authorities have been pumping money and liquidity into the financial system, first to support the system, but also to stimulate bank lending. At some point in the near future, this support is likely to cease, which could seriously impact banks’ willingness to increase lending levels, leading to lower growth and possible deflation as well as a period of falling prices often associated with low growth.

## 4.1. FINANCIAL

### Interest rate increases, negative interest rates and deflation

Japan's recent history has shown the difficulty of stimulating an economy from low growth and very low interest rates without substantial fiscal stimulus. The European Central Bank has itself recently introduced a fee to hold money from their banking system, in effect introducing negative interest rates in an attempt to encourage more lending in the system. Although this may seem counter-intuitive, it is set to incentivize banks to lend more rather than holding their money back to restore their capital bases. As the economy returns to normal, UK interest rates are predicted to rise sooner rather than later, and the Bank of England is currently considering such rate increases.

### Rate resets and interest rate increases

Interest rates in the UK are at a 300-year low. An increase to 3% could place nearly 30% of mortgage holders in financial difficulty. The Bank of England, in its financial stability report, noted that nearly 1/6th of mortgage debt is held by households with less than £200 available after essential household expenditures. Moreover, the debt-to-income ratio in the UK is at an historic high of 140%. Rate increases are now expected to start before the end of 2015.

As in all two-sided markets this will be beneficial for some, generally savers and the elderly, and detrimental to others, mainly families and the young. Rate increases will have a dual impact as fixed rate mortgage loans expire and come up for rate renewal and reset. Borrowers on short-term fixed rates may be particularly affected.

As a result, rate increases and resets in the UK could lead to a sustained "credit crunch" and household liquidity crises causing a lengthy period of low growth and low demand and potentially a long period of deflation similar to other developed countries. This structural conundrum for developed economies was voiced by Adair Turner, the former head of the now defunct Financial Services Authority: "We seem to need credit growth faster than GDP growth to achieve an optimally growing economy, but that leads inevitably to crisis and post crisis recession."

## 4.1. FINANCIAL

### Regulatory changes

In a heavily regulated market, the profitability and stability of business models are extremely susceptible to regulatory changes. For instance, the UK Chancellor recently announced that people eligible for retirement are not required to buy an annuity with their pension income. According to the traditional model, annuity purchase was compulsory in order to avoid savings being spent too soon. Hence, this announcement led to an overnight collapse of this traditional financial services business model.

### New entrants into the banking system

The UK government is keen to attract new entrants into high street banking in a bid to stimulate competition through regulatory encouragement and reduced capital requirements. An example are the tier 2 banks such as supermarkets, e.g. Tesco Bank in the UK or ICA Banken in Sweden. As in many European nations, they are slowly entering full-service retail banking, some even deciding to run their own banks in the UK (rather than outsourcing or joint venturing on a product-by-product basis). In addition to handling groceries, supermarkets, like banks, deal with heavy flows of information, cash and customers. This transition is therefore easily understandable, particularly since supermarkets are in a position to leverage their existing information, strong brand-name recognition and higher levels of customer trust (compared with banks) in order to generate profitable returns.

### The rise of the collective

Digital developments make it possible to reduce setup costs, improve information gathering and facilitate new micro-financing opportunities. Communities can now also set up their own banks, as when Salford City Council in the UK established its own bank using a combination of trade unions and credit unions to create an alternative to traditional and new forms of personal finance (e.g. payday lenders).

Communities are even capable of setting up their own currencies. The New Economics Foundation, along with community currencies such as the Swiss WIR complementary currency (started in 1934, with an estimated turnover 1.2bn Swiss francs, and frequently used by SMEs) and the Brixton pound (with 1,000 pay-by-text users), among others, represent several attempts to create more equitable and sustainable communities bound by a common currency. Experiments are being conducted to introduce an energy-based currency to reform the monetary system and to stimulate low-carbon energy growth. Additionally, the English town of Hull has introduced “hullcoin”, which will be used as a reward for voluntary work. All these actions are enabled and stimulated by ICT, and each has the potential to create financial change while unleashing new social forces.

# 4.2 ECONOMIC

The increase in zero-hour contracts<sup>33</sup> is closely connected to rising inequality. More than 10% of UK employers now use such contracts, with estimates of 1.4 to 1.6 million people on some sort of “standby”. These types of contracts make long-term planning increasingly difficult and are likely to lead to lower incomes and lower consumption and saving patterns.

## Reducing returns to investment

Returns to wealth may be stable, but returns to investment may be decreasing. Commentators have argued that technical innovation will lead to lower and lower marginal cost, reducing prices and profit to the point where everything is a utility, and market exchange may cease.<sup>34</sup> This may be happening with information and labor. Neoclassical economics argues that price should equal marginal cost, at a point when marginal cost is increasing. If this is the case, then a challenge to traditional profit maximization may arise – e.g. how does a company maximize profits when marginal costs are zero?

Near-zero marginal cost is spreading from music, through information industries and towards labor supply with sensors and automation increasing productivity and efficiency (such gains through cost reduction may not be recognized in national statistics), and

further reducing the costs of information. Is the answer, as some economists suggest, a return to natural monopolies, as once were prevalent in many utility industries? Or will the “collaborative commons” and collaborative production and consumption replace the market economy, pushing monetary exchange to the margins, as others propose?<sup>35</sup>

In a world of very low marginal cost, economies of scale tend toward zero and economies of flow tend toward infinity.

## Concentration of wealth and rising inequality

Globally, just 85 individuals have as much wealth as the bottom 3.5 billion of the world’s poorest. In the UK the wealthiest 100 own as much as the poorest 30%. International research indicates that inequality is a “social pollutant” affecting the way communities take shape and relate to one another. The IMF maintains that reducing inequality goes hand in hand with ensuring poverty reduction and broadly beneficial growth.

Increasing inequality leads to consumerism and a rise in personal debt, which may eventually cause economies to run out of purchasing power. However, if this consumerism is funded by artificially low interest rates, that is of equal concern.

<sup>33</sup> A zero hour contract is a employment in use in the United Kingdom, which create an “on call” arrangement between employer and employee – the employer only needs to pay for those hours worked.

<sup>34</sup> Rifkin, J., 2014, *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*, Palgrave 2014

<sup>35</sup> *ibid*



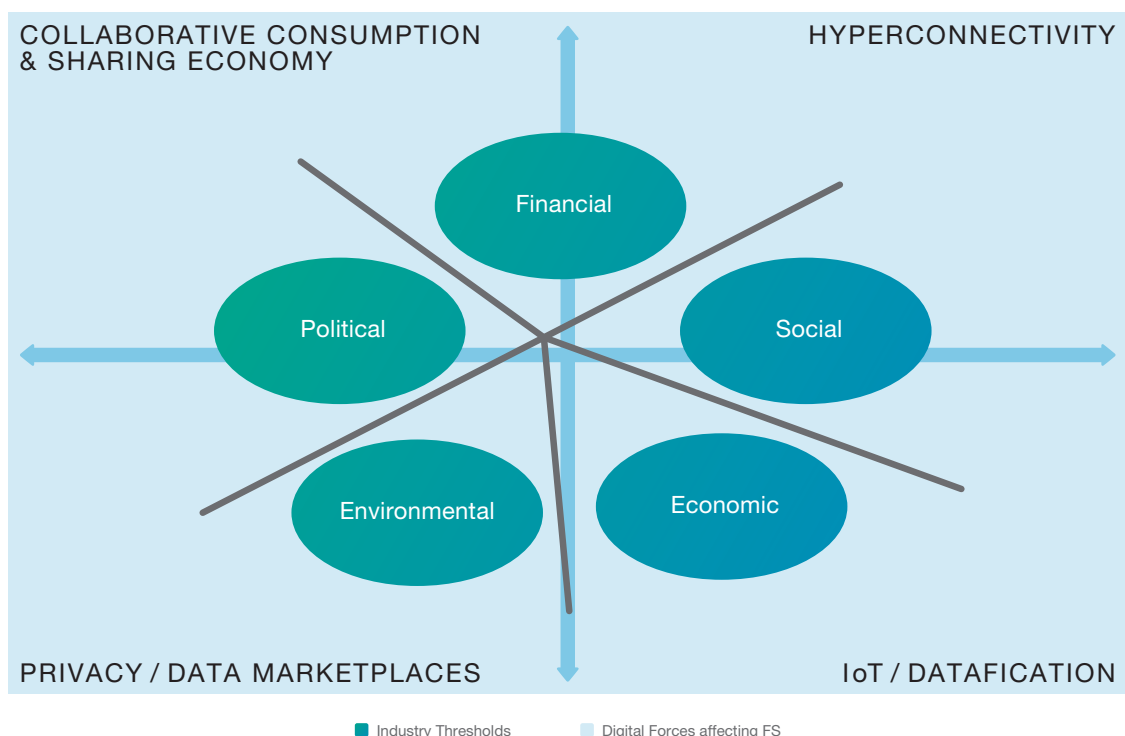
# 5. EMERGING ROLES FOR ICT IN FS

“The economy in crisis behaved more like slime descending a warehouse wall than Newton’s pendulum...”

Andy Haldane  
Bank of England

This section analyzes the potential future impacts of ICT on Financial Services, with particular focus on how the industrial thresholds outlined in section 4 may be affected. Figure 5 illustrates the interactions between the main digital elements of collaborative consumption, hyperconnectivity, privacy and IoT as a background to the evolution of financial services.

Figure 5: FS thresholds and digital forces



# 5.1 DIGITAL TECHNOLOGIES AND TRUST

A key question for the role of ICT in the future of FS is whether digital trust is different from analogue trust, which is usually based on face-to-face encounters, local knowledge and individual perceptions. Digital trust, by contrast, is based on algorithms and aggregate digital “reputations”, which may lead to a liquification of trust that can be traded and used in exchange.

Just as trust and security are fundamental to the functioning of today’s financial services, so are customer lock-in and industry consolidation. Many ICT solutions affect trust by providing greater convenience, immediacy and more widespread access to information. The race is on to see which industry and which players can assume the role of a trusted resources integrator or relationship manager.

Disruption is often sensed first in the difficulty of developing coherent strategies. In this section we investigate three main boundaries and associated thresholds and then place them into four main scenarios. The

wash to this landscape comprises 3 other forces or outcomes which need to be briefly discussed. These are the degree of income and wealth inequality; the type of design culture in financial services in particular, and in the economy in general; and the degree to which people feel they can forecast or prepare for the future.

We outline four possible future scenarios for FS due to digital transformation:

- > **Nowness**
- > **Control**
- > **Serendipity**
- > **Stability**

For each scenario we will discuss the challenges and opportunities for new and existing FS players, along with the challenges likely to be faced by consumers and users.

# 5.2

## SCENARIO 1: RAPID CHANGE/ MANY SUPPLIERS

### NOWNESS

This possible scenario is characterized by very fast rates of technological innovation as well as increasing numbers of ICT and financial services providers. Connectivity, sensors, relationships and open innovation drive these developments. Existing financial service providers are severely affected by a series of crashes over the next 15 years, precipitated by rate increases, unsustainable debt levels and asset price bubbles (e.g. UK housing market). Small savers are protected by regulation and deposit protection schemes, but many existing providers fail, leaving the market to new innovative entrants. The FS market fragments into increasingly specialized providers.

This is a world in which purchase and consumption are increasingly on-demand, provided by an ever-changing aggregation of small suppliers. Agents themselves become more and more subject to datafication, where attributes such as location, physical sensation, health, attention and even emotions become data capable of being aggregated and manipulated. The full-pull economy, where agents act as systems integrators that pull solutions to them when required – rather than having products and services pushed to them by suppliers – will be the major driving force, aided by technical innovations beyond 3D printing and social networking.

Consumption, rather than purchase, will be the focus of recording, pricing and value, (especially of value in use, rather than value in exchange), and taxation. This consumption will often take place at the same time as the provision of the service or good, not at the moment of purchase, and the financial part of the transaction will be seamlessly embedded in the consumption transaction. If, for instance, an agent takes a journey in a Google car or equivalent driverless vehicle, this will be automatically deducted from the agent's bank account or an equivalent ability to pay provided (e.g. credit extended), while at the same time the records and status of the agent and the provider are updated, and taxation payments are deducted and sent to the relevant government authorities.

Agents will seek offers from a range of finance providers at point of use, not all of which need to be using traditional forms of money. New forms of money, such as cryptocurrencies or currencies based on digital reputation, built up by the agent's digital transactions in the real world and in social media, become increasingly commonplace.

## 5.2 SCENARIO 1: RAPID CHANGE / MANY SUPPLIERS

On-demand supply of labor to create or deliver these services leads to a majority of the workforce being on zero-hour contracts. For instance, the model used by transport services like Uber (privately supplied taxi-like solutions) and SHUTL (logistics based on independent agents bidding to deliver packages) will expand to cover other parts of the economy, e.g. medical services and emergency services. Increasing uncertainty mitigates against long-term planning, saving and investing.

The rate of innovation and the rate of change of suppliers will make it difficult for any agent to make long-term plans. The context of now, along with uncertainty about the future, will predominate. Datafication and increasing certainty about personal risk will mean that many agents will be uninsurable, causing a decline in their ability to participate in many everyday services.

This is not necessarily a future in which “the machines have taken over”, but one in which the immediate context becomes an increasingly strong force.

### Early warning signs

- > **An increasing proportion of the labor force** is on zero-hour contracts
- > **Innovative providers** continue to enter the financial payments markets for transactions, but not for long-term savings, investments or pensions
- > **Glimpses of this world** can be seen in the large numbers of new business models, players and mechanisms crowding into parts of the value chain in transactional payments
- > **Cyber-currencies** become increasingly accepted
- > **Insurance companies** insist on personal/material health sensors as a condition of coverage

# 5.3 SCENARIO 2: RAPID CHANGE/ FEW SUPPLIERS

## CONTROL

This possible scenario is characterized by rapid and continuing technological change, especially in the area of the internet of things, connectivity and wearable technology.

The impetus behind this is an aggregation to a limited number of key ICT ecosystem leaders – such as Apple, Google and Amazon, according to current conditions. Through customer lock-in and inertia, along with an ever-widening range of new equipment, dedicated users are encouraged to make large commitments to trusted supply chains and are reluctant to change. These ecosystems apply new technologies to take care of most domestic and commercial needs while maintaining a strong divide between the roles of users as consumers, and of themselves as service providers. Customers prefer to remain as passive consumers, although some collectives are sponsored by an ecosystem owner. In some instances these ecosystems are sponsored by national or regional governments. The ecosystem owners manage security and regulation.

World production continues to grow in this consumption-driven environment, threatening attempts to tackle climate change. Inequality continues to increase in the mid-term as the ecosystem owners accrete more power into fewer hands, but then levels off and improves as the ecosystem owners accept the need for a strong, willing customer base. However, inequality remains an issue and wealth distribution is heavily skewed.

Occasionally, due to a particularly disruptive innovation by a new supplier, a new player manages to achieve a foothold in the existing ecosystems or creates a new demand, and replaces one or more of the existing ecosystem owners. However, these events are infrequent, and due to the strength of the ecosystem model, the number of players remains small. National governments become increasingly powerless due to the advance of financial technology ecosystems and are limited to realms of defense and taxation; the latter becomes more difficult as less and less traditional currency is used. The ecosystems self-regulate as much as possible.

### 5.3 SCENARIO 2: RAPID CHANGE / FEW SUPPLIERS

The ecosystem owners replace the majority of financial institutions, but do not use traditional money, which remains, although in very limited circulation. Traditional commercial banks gradually fade away due to a combination of legacy technology and conventional thinking, being unable to compete with rapidly developing new relationship technologies. They are further damaged by a series of crashes over the coming decade, which sees national governments unwilling or unable to bail them out due to public discontent and lack of resources.

Ecosystems become in effect multinational conglomerates with all previously independent financial activity (e.g. transactions and investments) kept in-house. There is limited competition between ecosystems other than in the rate of change and type of innovation through which they seek to attract new members and retain existing ones. Innovation becomes less open and more proprietary, leading to interoperability issues, which are seen by the owners as forms of competitive differentiation and a way of retaining existing members.

Relationships and promises are owned and managed by the ecosystem owners. The provision of exchange value and time value is done within the ecosystem, but is not measured in traditional national monetary units. Exchange value in the form of credits is earned by usage and provision of services within the ecosystem, and used when resources or services are consumed. Time value is managed by the ecosystem owner or the collective, ensuring that members are able to consume in the future.

#### Early warning indicators:

- > **Ecosystem providers** move away from purely ICT innovation
- > **Industry consolidation** around a few suppliers
- > **Acquisition by large conglomerates** of integrative technology suppliers
- > **Early interest rate increases** in western economies

# 5.4

## SCENARIO 3: SLOW, SPORADIC CHANGE / MANY SUPPLIERS

### SERENDIPITY

This possible scenario is characterized by periods of ICT and FS innovation followed by lengthy periods of stability as new technologies establish themselves and mature. The innovative period encourages many new entrants to ICT and FS, who consolidate their positions during the stable periods and attempt to block further attempts at innovation. Social resistance to overly rapid change also contributes to the sporadic nature of innovation. The supply of privacy becomes a source of competitive advantage.

New suppliers of financial services eventually replace existing players who reinvent themselves as niche providers or owners of declining but profitable asset bases. Customers of these banks likely stay with them for some longer-term services, such as pensions, whereas new providers attract customers through innovative pricing and investment policies.

Money in its traditional form remains center stage for the continuous stability of the financial services industry. National governments encourage competition at every opportunity by relaxing regulatory burdens on new entrants. New providers offer packaged custom solutions to collectives to enable easy transactions and value storage.

Competition reduces prices as well as costs, and the use and sale of transaction data means that services can continue to be provided profitably. No one supplier or group of suppliers achieves market dominance in financial services. This scenario has the potential to be the most attractive for financial service consumers,

as increased competition in all areas produces more attractive value propositions.

Financial services remain a distinct industry, but in a much less consolidated form. Players change during each period of innovation, but are willing to take on the liabilities of exiting providers in order to build market share. Regulation is tight, but made easier by the absence of banks that are too big to fail.

This scenario evolves more by chance than by corporate or regulatory design.

### Early warning signs

- > **Increasing numbers of new entrants** to simpler parts of FS, e.g. payments, with extensions into more complicated long-term products
- > **Reluctance of ICT suppliers** to offer full-service integrated banking
- > **Existing ecosystems are joined by other players** who compete for market share through interoperability rather than restricted ecosystems
- > **Social resistance to wearable technology** and disquiet over privacy issues
- > **Current banks continue to close branches** but continue to operate stand-alone systems due to the expense of replacement

# 5.5

## SCENARIO 4: SLOW, SPORADIC CHANGE / FEW SUPPLIERS

### STABILITY

This possible scenario is characterized by sporadic technological change as social factors and privacy issues constrain speed of growth. A few major suppliers emerge in technology ecosystems and financial services. These few providers are supported as “trusted partners” by national governments that see them as joining in the management and provision of necessary services to society.

This scenario is much like today, but with a faster rate of change. Familiar trusted players like Facebook, Google, Apple and Amazon will act as system integrators for individuals or groups, providing necessary financial services alongside other products and services while also controlling the pace of change. These competing ecosystem providers will control most technological innovation, either directly or by the acquisition of successful start-ups. After a large spurt of innovation over the next 5 years, these providers will slowly release innovations to the market to reduce costs and exploit benefits. While one or more of these integrators may occasionally be replaced by innovative new entrants, the basic model of a restricted number of ecosystem owners will endure.

The ecosystem providers build up large cash reserves through fees and current licensing policies, which are used to fund acquisitions. As a result, inequality continues to grow as the owners of ecosystems accrue more wealth. World production stabilizes as innovative growth is stifled in order to exploit existing products and services.

The challenge for existing FS providers is to compete with the ecosystems not on technology, but on “trust”. The ICT suppliers and ecosystems show no willingness to become full-service banks or investment houses, preferring to concentrate on managing and slowly developing their ecosystem and its customers. By establishing trusted relationships the ecosystems develop their own long-term savings and investment policies, but outsource these to traditional firms for management and operations. FS providers become limited to back-office processors for their ecosystems, and lose their high street presence. Transactional payments are all performed by new entrants, who exploit existing schemes to maximize the value of data in context. The ecosystems manage and operate their own peer-to-peer lending and crowdfunding operations.

### Early warning signs

- > **Closure of high street branches** by existing players
- > **Ecosystem providers continue to extend** their range of offerings across products and services to achieve a greater share of wallet and attention
- > **Ecosystem providers begin to acquire** financial service start-ups

In this section we have prepared and discussed four very different scenarios and their impacts on the development of FS. It is not possible to say which, if any, scenario will in fact take place. More than likely it will be an amalgam of all four, as the development paths of ICT take unpredictable, and unpredictable, turns. The purpose of scenarios is not to make definitive predictions, but to allow better, more informed choices to be made. In the next section we make a few concluding remarks.



# CONCLUSIONS

“We have it in our power to begin the world over again.”

Thomas Paine

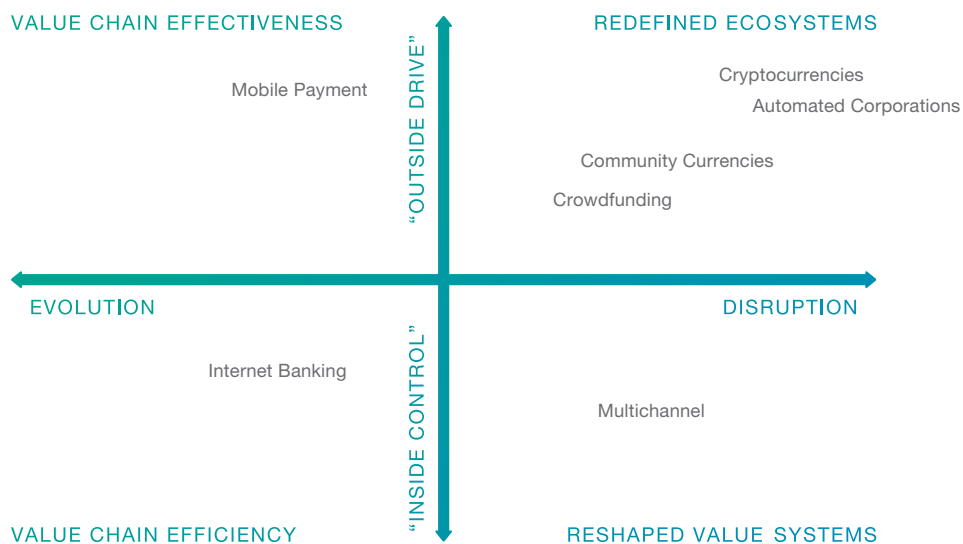
The financial services industry is exhibiting some early indicators of potentially dramatic industrial disruption. With the advent of cryptocurrencies and associated underlying protocols and APIs, there is an emerging potential for highly decentralized networks of people and even machines to collaborate and coordinate not just for financial outcomes but in order to create entirely new financial structures themselves. From enabling individuals to coordinate and finance new ventures via crowdfunding to permitting people to create new banks, insurance mechanisms and financial methods

for the sharing economy, ICT provides the potential to disrupt not just Financial Services, but the foundations of capitalism itself. New organizational forms such as those described here and in the other reports that form this series are beginning to contribute to the foundations of the Networked Society.

Figure 5 illustrates the various levels of impact of ICT on the value chain of the Financial Services industry.

Internet banking, for example, is an internally driven value chain improvement that reduces costs for banks, and to some extent for customers. With the increasing ability of customers to adopt multichannel approaches to banking, however, the level of competition between banks is likely to increase, as is the pressure to modernize their approach to customer relationship management. Customer journeys with their banks are set to change dramatically as a result of digital transformation.

Figure 5: Matrix of ICT impact on Financial Services



## CONCLUSIONS

Mobile payment systems also create a certain level of disruption to the existing industrial structure as many of these payment systems are provided by new entrants such as mobile operators or ICT companies that are able to offer innovative and secure means to perform transactions for customers and retailers alike.

Many of these innovations, while digital, do not dramatically challenge the existing industrial structure. More significant digital transformation is emerging, however, through the increasing use and functionality of cryptocurrencies, which redefine the basis of trust and governance of currencies in our society. In effect, they offer consumers the ability to take the financial services industry into their own hands and

build innovative services that can compete with the largest banks and financial services companies. Due in part to the level of distrust towards the financial system after multiple crashes, these digital innovations may offer attractive alternatives for many customers. Incumbents and regulators alike must therefore carefully assess their role with regards to these emerging technologies.

The following reports in this series outline the profound impact digital technologies are having on society, economy and industry. In the final report, we present a broader analysis of the economics of the Networked Society.



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