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Midata: Towards a Personal Information Revolution

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Abstract. There has been an explosion of data on the Web. Much of this data is generated by or else refers to individuals. This emerging area of personal information assets is presenting new opportunities and challenges for all of us.

This paper reviews a UK Government initiative called 'midata'. The midata programme of work is being undertaken with leading businesses and consumer groups in order to give consumers access to their personal data in a portable and electronic format. Consumers can then use this data to help them better understand their own consumption behaviours and patterns, as well as make more informed and appropriate purchasing and other decisions.

The paper reviews the history and context, principles and progress behind midata. It describes concrete examples and examines some of the challenges in making personal information assets available in this way. The paper reviews some of the key tools and technologies available for managing personal information assets. We also summarise the legislative landscape and various legal proposals under development that are relevant to midata.

We review similar efforts elsewhere in particular those underway in the US under a programme of work called Smart Disclosure. This work seeks to release personal information held by government and business back to citizens and consumers. Finally we discuss likely future developments.

Keywords. Midata, personal information, consumer empowerment, personal information stores, smart disclosure

Introduction

The World Wide Web has had profound effects at all levels of society. It has changed the way that individuals interact with one another, the way governments connects to their citizens, the way businesses connects to their clients. The development of new services and the creation of new content are occurring at ever increasing rates on the Web.

One of the most dramatic examples is the extent to which content is being generated by individual users. We now generate prodigious amounts of data. In 2013 every minute it is estimated that YouTube users upload 72 hours of new video, Google receives over 3.25 million search queries, over half a million corporate emails are sent, over a 170,000 tweets are sent and Facebook users share almost 700,000 pieces of content. It is esti-

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mated that 2.7 Zettabytes of information were created and stored in 2012 – 2.7 trillion Gigabytes [1]. This is an abundance of information at an unprecedented scale.

This is just one class of data relating to individuals – what we might term *explicitly contributed*. There is also data that is *implicitly contributed*. The transactions that we carry out with a whole range of businesses and processes all generate data – the transactions are ones that the user is usually aware of making – however, the resulting data generation is often implicit. There is also data that is *third party sensed* – transactions where the user is not aware that they are generating a data stream – these third party sensed data can range from switching on a light in a smart metered household to powering up their mobile phone.

From the search terms we enter, to the cookies placed in our browsers when we visit a website, from the click streams we generate to the tweets we make, from the location data contained in our mobile phones to the Near Field Communication (NFC) data that logs our transactions, the Web and Information Technology is transforming the way individuals and organisations interact, and these new data sources are increasingly being used to generate new value. The ability to store large amounts of information relating to our individual activities, transactions and behaviours is leading towards the emergence of Personal Data as a new asset class [2]. A recent report has estimated the size of the UK market for information volunteered by individuals at £20bn by 2020 [3]. Research in 2012 estimated that the value extracted from European consumers' personal data in 2011 was worth €315bn with the potential to grow to €1tn annually in 2020 [4,5].

Until recently nearly all attempts to deal with the growing abundance of data belonging to individuals have been made by the supply side. Companies and governments alike still tend to look at individuals, and at data belonging to individuals, as stuff that needs to be "managed". This is the fundamental perspective of many Customer Relationship Management (CRM) systems, leading one commentator to note that the proponents of such systems employ the language of slavery ("acquire", "control", "retain", "manage", "lock in" and "own") in talking about customers [6]. What many now observe is that individuals are in command of far more data than any large supply-side organisation can maintain on their behalf. On the Internet and in the age of the Web, individuals are in the best position to manage their own data.[2] In technical terms, each individual is the best point of integration for his or her own data, and the best point of origination for what gets done with it.

The figure below depicts the emerging structure of this market. It will be supported by services helping individuals collect store and manage their own data (Personal Data Management). Varieties of personal data include; personal attribute data, data that we volunteer, data that is observed in our interactions with systems and processes, and data that is inferred from our behaviours and history. We already see services helping individuals use this data to get a variety of things done (PIMS) and number of them will be discussed in this chapter. By encouraging increased sharing of information between individuals and organisations, new opportunities are created for existing providers to add value and reduce cost whilst consumers benefit from new insights and services. In fact this amounts to a new set of opportunities for Business Management of personal information.

[2]Current usage sees the terms data and information used interchangeably – strictly speaking information is data with an interpretation – thus the data elements 150 and 56 might be interpreted in many ways – a scheme to provide them with meaning turns them into information – blood pressure and age is one such, another might be cost in pounds and number of items bought.

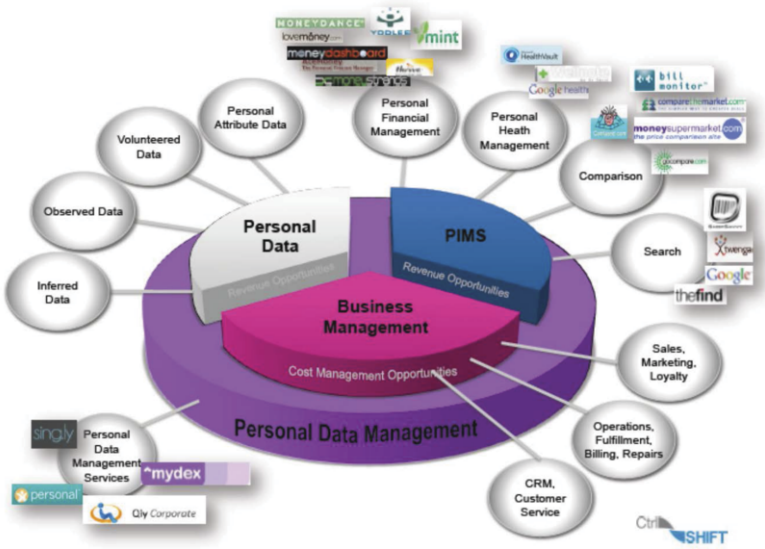

Figure 1. The Personal Information Data Market – reproduced with permission from Ctrl-Shift.

In the rest of this paper we will review the history and origins, principles and progress behind the UK midata programme – a programme of work that seeks to empower individuals by giving them access to their own data whilst at the same time enabling business to have richer and more profitable interactions with their customers. We will describe concrete examples and examine some of the challenges in making personal information assets available in this way. Finally we review similar efforts elsewhere and look to future developments in this fast evolving area of our digital lives.

1. Midata Programme

1.1. History and Origins

On the 13 April 2011 the UK Government's consumer empowerment strategy *Better Choices: Better Deals* was launched. This strategy had been jointly developed by the Department for Business, Innovation and Skills (BIS) and the Cabinet Office's Behavioural Insight Team (BIT) [7]. The strategy described voluntary programmes and "nudges" designed to help consumers find and adopt the best choices for their circumstances and needs.

One of the key elements of the empowerment strategy is the midata programme under the Chairmanship of the author. This is a programme of work involving Government, consumer groups and leading businesses designed to give consumers more control and access to the data that companies hold about them. Midata seeks to give consumers access to their transaction data in a way that is machine readable, portable and secure. The ambition is to rebalance the current asymmetry that exists between business and consumers. This asymmetry is one in which companies have large amounts of data about the individual transactions we undertake with them whilst consumers usually have little or no access to this data.

We are all confronted with information that is important to us but that is hard to gain useful access to and even harder to make sense of. A powerful combination of new technology and new government policy is set to change this landscape and stimulate the growth of new capabilities – *choice engines* that interpret this data on our behalf [8]. Since April 2011 midata has been a voluntary partnership between the UK Government, businesses, consumer groups, regulators and trade bodies. The programme is being led by a steering group with working groups tackling specific issues such as interoperability, security, authentication and the like. The initial focus of the midata programme was around four major sectors which account for a substantial amount of the personal information held by corporates in the UK; finance and banking, energy, telcos and retail. The steering group is chaired by the author who is also involved in the effort to open up non-personal public sector and government data in the UK.

The three main objectives of midata are to:

- secure broad private-sector participation in the project with a significant number of businesses agreeing to release individual consumers' personal data on request;
- let consumers access and use their data in a safe way; and
- encourage businesses to develop innovative services and applications that will enable consumers to interpret and use the data.

The belief is that the midata programme will: help improve information sharing between organisations and their customers; sharpen incentives for businesses to compete keenly on price, service and quality; build trust; and facilitate the creation of a new market for personal information services that empower individuals to use their own data for their own purposes. By combining data from many different sources and letting consumers add information of their own, businesses have a significant opportunity to help customers create rich, new, "person-centric" data assets.

The Government expects that the data released will help stimulate new markets offering personal data management services. These are likely to include services that:

- help individuals understand their own consumption behaviours and patterns and help them change them for the better;
- use an individual's data to help them make more informed purchasing decisions;
- and combine personal and other data from a range of different sources for use by the individual and by organisations to offer new goods and services.

We shall see examples of these services and benefits later in this chapter. However, it is also important to note and it was always anticipated that some companies would find this a challenging agenda. A number of them derive considerable business and customer intelligence from the transaction data they hold [9]. Disturbing this status quo is difficult for some. Others could not see a user demand for returning the data. Some were concerned that customers might lose their data and so compromise themselves, or else allow third parties to use the data and were concerned about liabilities on such use. Many companies were convinced that this would result in wave of switching in which consumers would move to the lowest priced offerings. Some companies complained that this would result in their words to a "race to the bottom".[3]

[3] Another way of looking at it is that transparent markets are efficient markets, and in most competitive efficient markets most of the benefit goes to the consumers rather than the producers.

Table 1. The TACT stages of personal data sharing

Transparency	Access	Control	Transfer
Providers are open and transparent about what customer data they hold.	Providers enable individual customers to have secure, personal access to data held about them.	Providers give consumers the ability to correct, update, change settings, preferences, permissions etc.	Data is released back to the individual for re-use. Data can be analysed and consumers can take action.

These concerns notwithstanding, many organisations where keen to explore a world in which consumers were both empowered and in which they had much richer two way data interaction existed between themselves and their customers. In November 2011 just six months after the release of the Consumer Empowerment Strategy the Government launched its detailed vision for midata with 26 organisations signed up to realise the vision and in particular agreeing a core set of principles about data release [10].

1.2. Principles

In order to assuage the concerns of some in the corporate world the midata programme developed a staged approach to the sharing of data. This is known as "TACT" (Transparency, Access, Control and Transfer) – and it describes a set of key stages or journey that any organisation would follow in the sharing of personal data with consumers. The first is around Transparency. It requires that organisations are transparent about the customer data that they hold. A key benefit that flows is through establishing trust via a reputation for honesty and openness. The second and third phases of the TACT journey Access and Control further enhances an organisation's reputation as a trusted repository for personal information but it also creates new opportunities to improve data quality and cut costs. The fourth stage of data Transfer provides many opportunities, as we shall see, for the creation of value through service enhancement and innovation.

Using the TACT approach we have been able to map the impact of its various stages to particular business functions and associated business benefits. For example, Transparency, Access and Control should lead to higher levels of trust and mean that customers are more likely to be willing to volunteer additional information such as future plans, current preferences and priorities which in turn could lead to increased customer retention and acquisition. Transfer of data to an individual who has the opportunity to forward it to third parties or other providers generates significant market research insights to the benefit of all. For example, to allow an individual to see their financial affairs in the round rather than the silos of bank, credit card, savings and other statements that exist.

This more integrated single customer view provides better insight into a company's share of an individual's financial world, where products and services are succeeding or failing, better customer segmentation and an ability to gain permissioned access to other personally volunteered information. All of which provides an opportunity for an organisation to cross or up sell and for an individual to have a much more comprehensive view of their own propensities, choice options and patterns of behaviour. Of course, as we begin the TACT journey we are beginning to gather the evidence to support the contentions and quantify the benefits laid out. It is also interesting to note the range of companies that are now embarked on a TACT journey in the UK; from Tesco to Marks and Spencer, Lloyds Bank to British Gas, MasterCard to Telefonica.

Alongside the general stages of TACT there sit 9 core midata principles:

1. Data that is released to customers will be in reusable, machine-readable form in an open standard format.
2. Consumers should be able to access, retrieve and store their data securely.
3. Consumers should be able to analyse, manipulate, integrate and share their data as they see fit – including participating in collaborative or group purchasing.
4. Standardisation of terminology, format and data sharing processes will be pursued as far as possible across sectors.
5. Once requested, data will be made available to customers as quickly as possible.
6. The focus will be to provide information or data that may be actionable and useful in making a decision or in the course of a specific activity.
7. Organisations should not place any restrictions on or otherwise hinder the retention or reuse of data.
8. Organisations will work to increase awareness amongst consumers of the opportunities and responsibilities that arise from consumer data empowerment.
9. Organisations will provide customers with clear explanations of how the data was collected and what it represents, and who to consult if problems arise.

It is no accident that some of these principles echo the public data principles [11] that apply to the Government's releasing of non-personal public data. Clearly personal information assets are not open data – they are personal to the individual and the individual should have control as to how widely they are disseminated. However, the power of open innovation on any information asset is amplified by the commitment to the information being available in a machine readable fashion, non-restrictive conditions of reuse, the adoption of open standards, by timely release and high quality meta data as to how the data was collected and what it represents.

On the back of these principles are specific commitments to develop online 'personal data inventories' (PDIs) in each sector. PDIs will describe the types of data an organisation holds about each customer. The proposal is that a consumer would log in to a secure website where their Personal Data Inventory would contain a simple explanation of each category of data available and whether and how it could be accessed. The Personal Data Inventory would contain data such as address and contact details, existing tariffs/contracts, payment methods and a history of items purchased or services used.

Protocols will also be established to handle any issues relating to privacy, data security and consumer protection. Midata is also working with companies to develop common approaches that will allow customers to access their data including their contact details, current tariffs and contracts, etc. and update basic information about themselves. And it is to progress in this area that we now turn.

1.3. Progress and Examples

In October 2011, and following an Energy summit at No10 Downing Street, energy companies in the UK agreed to make midata a reality on their sites [12]. This was prompted by ministerial concerns that consumers did not have sufficient access to their data to allow them to make informed decisions about switching supplier. Scottish Power, EdF, First Utility, Npower, Scottish & Southern Electricity and British Gas now provide customers with electronic access to their consumption and tariff data in a structured machine readable format that conforms to the midata principles outlined in the previous section.

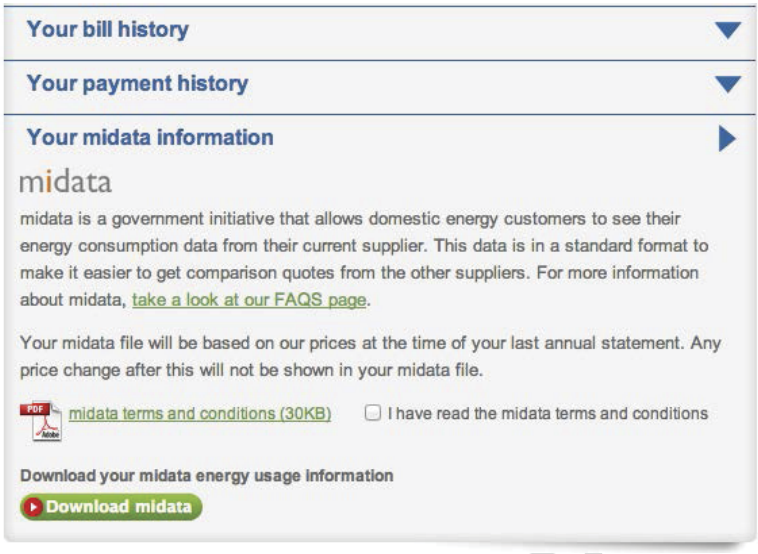

Figure 2. Southern Electric midata download capability.

When Scottish Power launched its new service for online account holders Neil Clitheroe, CEO of Scottish Power Retail and Generation, said:

> "We want to be open and transparent with consumer data, and build greater trust between Scottish Power and our customers. The midata concept is designed to empower customers when making decisions about their account, and we are pleased to have delivered on the commitment we made to customers at the Energy Summit…"

At this stage the data hand backs are in the form of simple structured csv data files – detailing the tariff and usage data. The ambition is that we see this sort of data being used by choice engines to perform comparisons or else provide the sort of insight in to behaviour change that we see in social enterprises such as CleanWeb [13] or in *for profit* companies such as Opower [14] a $50 million venture backed US company who in 2011teamed up with the UK's' First Utility.

Opower provides a range of behavioural insight and social media tools to enable consumers to understand their energy data and take appropriate action ranging from energy abatement to switching, from collective purchasing to low income outreach programmes. New entrants to the energy market in the UK are also embracing midata – for example Marks and Spencer Energy [15].

Another sector targeted by the midata programme is the finance, credit card and banking sector. This is a sector in which online accounts are already familiar to consumers and this has certainly increased with the rise of mobile banking applications. A good example of consumer insight around financial data is the Lloyds Money Manager product. Spending is categorised, budgets can be set, and spending profiles analysed. Whilst popular, this only represents a first step, for example, it does not enable individuals to aggregate data from different accounts.

This is also an area where concerns around whether consumers and customers can be trusted with their own data [16], and where liabilities lie if such information is disclosed

Figure 3. Opower offers insights to energy customers.

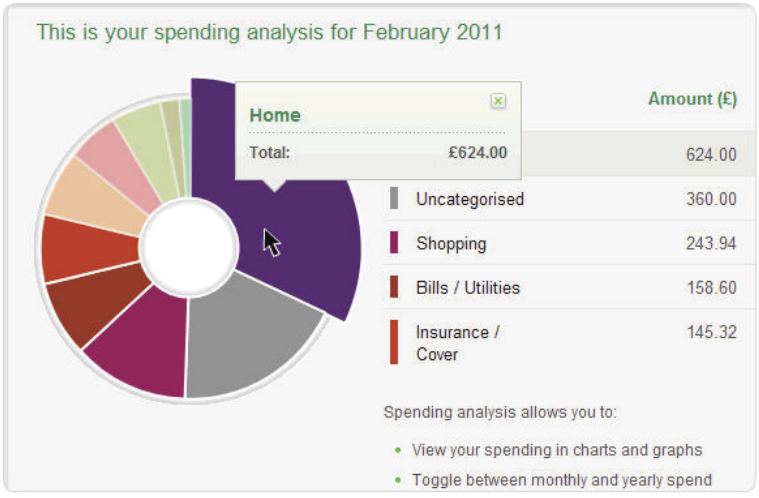

Figure 4. Lloyds money manager offers customer insights around customer spending patterns.

to a third party, have already been addressed. Similar innovation is happening around credit agency data. Noddle, a part of Callcredit, now provide free lifetime access to an individual's credit data. Here the calculation is that there is more to be gained by establishing a strong customer relationship around an individual's data – particularly in terms of cross and up selling of products and services around the data that is made available free of cost.

A third sector on which midata focused was telcos and mobile operators in particular. Such companies have access to some of our most sensitive data – high reso-

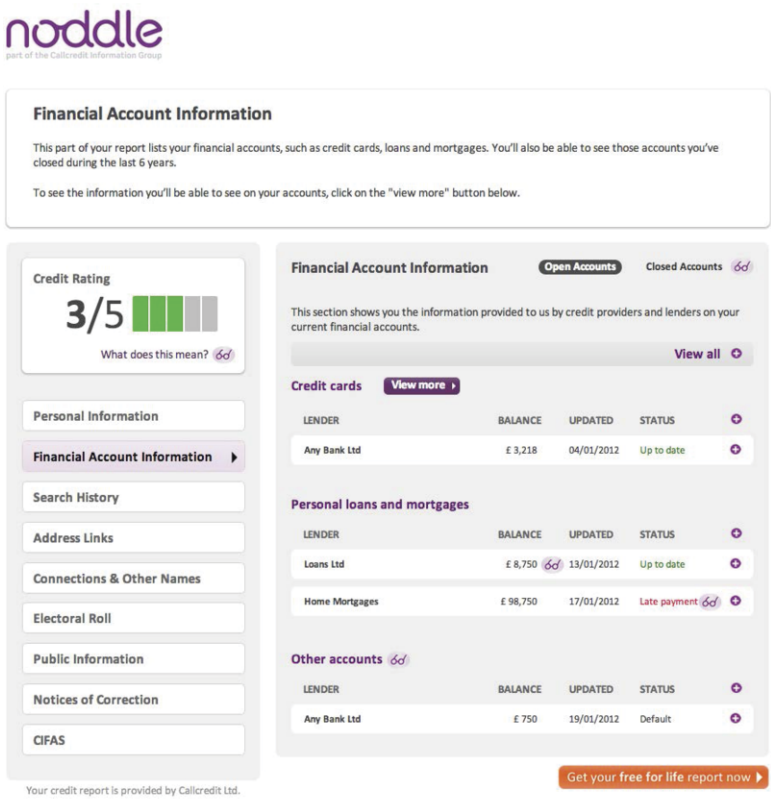

Figure 5. Callcredit's Noddle offers life time free consumer credit data to users.

lution location data. With this data they are beginning to engage with their customers to offer location based services. O2's Priority Moments is one such example – offering a range of discount, special offers and promotions as one walks down the high street.

The question from a midata perspective is what sorts of additional data hand back and insights will O2 and other operators provide for their customers. O2's chief executive Ronan Dunne recently described their thinking:

> "Our trial running right now gives customers a digital dashboard sharing with them all the information we have about them, why we have it, what services it is used for. [Open access to data] gives customers the opportunity to take more or less of our different services, based on a better understanding of what information we hold [on them]."

Customers will be able to view their location data, phone usage and sites they have browsed, with access tied to existing services such as the O2 Priority Moments.

Dunne said:

> "If you have an interest in a particular area of shopping and we have a special deal with one of the providers in that area, then we can match those two things together to give you a better experience."

Figure 6. O2 Priority Moments uses personal location data to promote offers.

We can expect to see other significant data access services from UK telcos. However, despite these positive developments it is still the case that routine data describing usage and tariffs – just the sort we have seen emerge from the energy sector – are still far from routinely available. This is one reason why an innovative third party comparison site Bill Monitor still invests substantial effort in scraping the websites of mobile operators to establish tariff data. Consumers, when they engage with Bill Monitor, provide details of their account credentials – Bill Monitor then compares a customers usage with tariffs and plans in the market. This company, approved by the UK regulator Ofcom, has shown that a very significant amount of a customers plan is unused [17] and that more appropriate choices can be made with the data in hand.

A fourth sector highlighted by midata is retail. Here data analytics have been at the heart of many large retail marketing strategies. We have already mentioned the UK supermarket Tesco. Despite initial reluctance to engage with the midata programme we have seen recent signs that here too there is a recognition that there are real business benefits in data access services [18]. Tesco is developing products and games to give Clubcard holders "simple, useful, fun" access to their own data, to help them "plan and achieve their goals". But as yet there is little evidence of what this amounts to.

The examples above are largely where additional business services are being created by the existing holders of the data for their customers in order to add value to their products and so retain customers. There are still relatively few examples where competitive or third-party services are driven by that data. At this early stage of the midata programme this could be a market failure (see the later section on legislation), or else a market lag.

An area where customer empowerment is happening via third parties is the seemingly innocuous area of eReceipts [19]. With British retailers issuing some 11.2bn paper receipts, at a cost of £32m, there are clearly some efficiencies to be had. But for those companies offering mobile and cloud based storage solutions for our receipts they outline a number of other distinct benefits to the consumer such as proof of purchase, spend profiling, managing insurance claims, warrantee and guarantee registration. For the companies issuing the receipts there are new communication channels, promotional routes and ways of staying in contact with the customers. The former chairman of Tesco and current chairman of E-Receipts Lord MacLaurin is on record as saying

Figure 7. Bill Monitor a third party application using personal telco data.

"Combining the obvious benefits for retailers, consumers and businesses, with the simplicity of the eReceipts system, we will see the end of the paper receipt."

Participating shops will be able to publish geographically-located and time specific promotions on the created eReceipt, allowing them to create targeted promotions based on customer spending habits and visible trends. This, combined with the cost savings in terms of the administration streamlining, lack of receipt paper and ink, and the reduction in consumer returns frauds is likely to be a compelling offer. Comprehensive eReceipt records will be a rich personal information resource with many applications for both consumers and business.

Despite these various examples of applications and opportunities arising from returning data to consumers there has been a degree of skepticism in boardrooms. To address this the UK midata programme has been keen to show how the development of consumer applications can unlock new ways of using consumer data. The recently launched Open Data Institute (theodi.org) has held two midata "hackathons", one using publicly available data in the healthcare sector and the other using individuals' anonymised financial data [20]. These have brought together sector experts, programmers, marketing people and other experts at the Institute over a weekend to brainstorm ideas for applications and prioritise a few to work up. These in turn have been shown to political and business

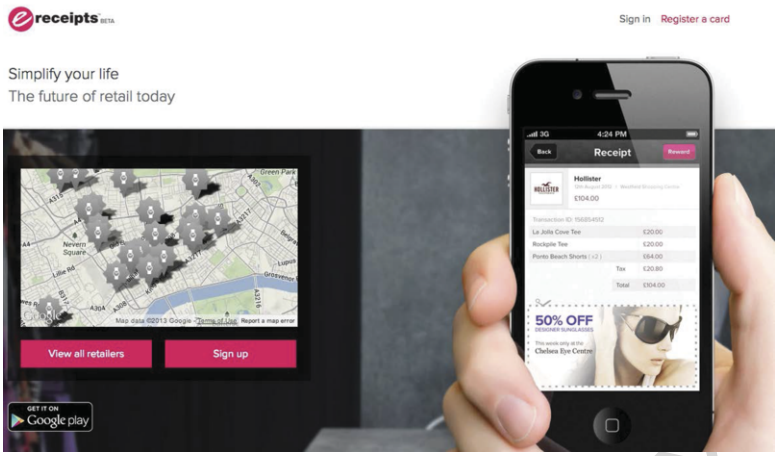

Figure 8. eReceipt company paperlessreceipts.co.uk.

leaders, who once they see the ideas made concrete begin to appreciate the opportunities that midata presents.

Often these opportunities arise through an inversion of existing business assumptions. One of the winning concepts at a midata/ODI event was MyLoan, a service to enable individuals to build a personal *Request for Proposal* of their loan requirements. In MyLoan individuals offer broad information sets to potential lenders of their financial status and other related information. The service is founded on trust and reputation: and embodies the proposition that *In the past my word was my bond. In the future, my data is my bond*. The individual is incentivised to provide accurate data where accuracy forms the foundation for their current and future reputation, not just with the lender but across their network. The idea is that this therefore also helps enable responsible lending and reduced risk for lenders.

These examples of the exploration of the opportunities offered by midata has led to the establishment of the midata Innovation Lab or mIL – joint work between BIS and the ODI – due to launch in July 2013. The mIL will offer a safe haven to bring together consumers, business and platform developers to explore over an extended period of time the opportunities for products and services using personal data. The mIL is a secure and safe development environment where sensitive information is respected and kept secure but used for the purposes of experimentation. These and other developments are all aimed at stimulating the market and applying the midata principles. Another method that has proven successful in the past is competition with other programmes around the world. And this is the topic of the next section.

2. Related Work

The World Economic Forum has issued two reports [2,21] on the subject of personal data assets and has encouraged detailed discussion through international "Tiger Teams" on the business, legal and technical requirements for a personal data ecosystem to develop.

In France the FING think tank http://www.fing.org/ has created the Mesinfos group [22] to look at developments in personal data and is running a pilot whereby a

range of different datasets from the private sector are available to explore the opportunities for new applications and services.

The most developed programme of work outside of the UK is the US effort – variously called "smart disclosure" and more recently echoing the UK effort it has been relabelled "mydata". An interesting feature of the US work is that as well as the commercial world of personal data the Federal authorities have been looking at a systematic programme of work to give control of personal data back to the citizen's to whom it relates. The single most successful example here has been the "Blue Button" initiative. Blue Button, together with the slogan *Download my Data*, was introduced by the US Veterans Association (VA) in 2010.

In August 2012, the millionth download was reached, and the initiative has had high level backing and support within the US Administration all the way up to President Barak Obama. Todd Park the current US CTO was at the Department of Health when Blue Button began and has been a major advocate. In January 2013, the VA announced plans to significantly expand Blue Button by adding: demographics, active problems lists, discharge summaries, progress notes, lab results, vitals and readings, pathology reports, radiology reports and more. Also announced is a new standardised structure for what is called a VA Continuity of Care Document (CDD). The VA CCD is a feature that contains a summary of the Veteran's essential health and medical care information in an XML file format – and as such the goal is to be a portable and persistent personal information record.

It has become so successful that the US Department of Health and Human Services now oversees the Blue Button concept. It is being seen to promote easy, secure electronic access by an individual to their health information and sharing between that individual's medical practitioners and health services. It has been adopted by a range of public and private healthcare providers. Aetna announced in September 2011 [23] that it had added the Blue Button function to its patient portal, and in addition offered its beneficiaries the ability to share their Blue Button downloads with Aetna providers. At the time, Aetna said it served more than 36 million people. In October, 2011, McKesson Corporation's Relay Health Division added Blue Button functions to the patient portals which it offers through its 200,000 physician and 2,000 hospital clients [24]. These represent slightly less than one third of physicians and slightly more than one third of hospitals in the United States [25]. United Health Group began offering Blue Button downloads to its commercial health plan beneficiaries in July, 2012, rolling out the capability to its customers [26]. The company expects 26 million plan beneficiaries will have access to Blue Button downloads by mid-2013.

Blue Button's success has led to another sector following suit in the US. In September 2011, former US CTO Aneesh Chopra challenged the energy industry to model a Green Button [27] where energy providers would give energy users their consumption data in an easy to read and use format at the click of the button. Green Button is based on a common technical standard developed in collaboration with a public-private partnership supported by the Commerce Department's National Institute of Standards and Technology (see http://www.greenbuttondata.org/greendevelop.aspx). In January 2012, two major California utilities Pacific Gas & Electric and San Diego Gas & Electric announced their implementation of Green Button. Recently, nine additional major utilities and electricity suppliers signed on to the initiative, committing to provide more than 15 million households secure access to their energy data with a simple click of an online

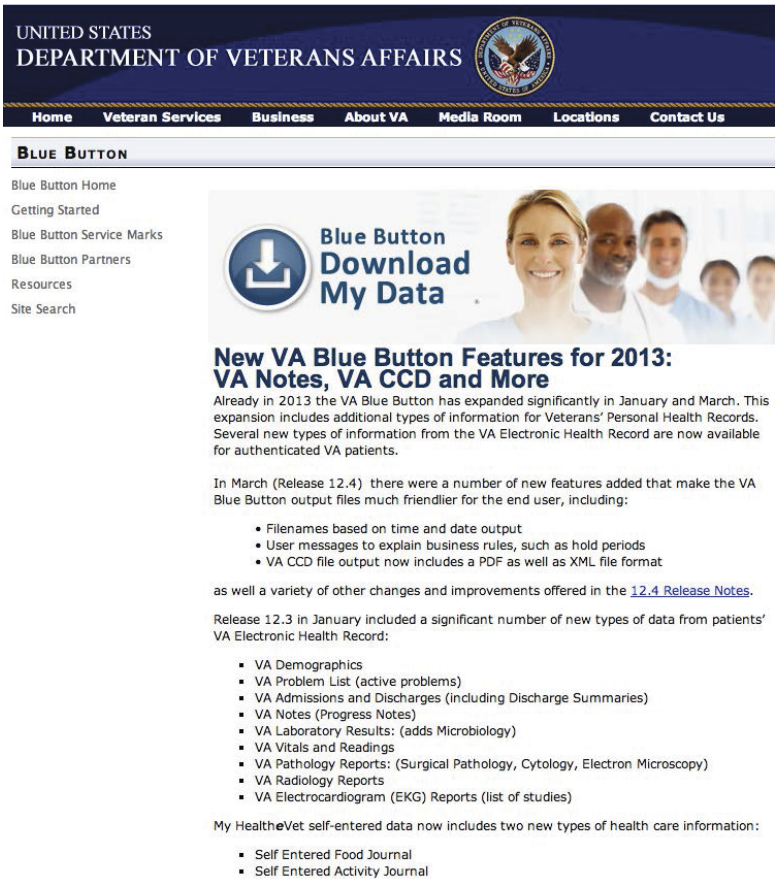

Figure 9. US Blue Button Initiative.

Green Button. In total, these commitments ensure that 27 million households will be able to access their own energy information. One consequence is that energy customers can manage their consumption via their smart phones using the standard Green Button data format [28].

We have already noted that US efforts seek to empower both the citizen and consumer. In May 2013 the White House announced the latest progress on the programme to release data under their Smart Disclosure programme [29] and their consumer.data.gov site, which hosts data and resources to enable individuals to make more informed choices [30]. Other governments would do well to note this important development.

3. Legislation and Personal Data

Both the UK and US work described here has had to proceed against a background of different positions and assumptions as to the extent to which legislation should be used to establish our rights and protections with respect to personal data.

The law around personal data is complex, fast evolving and varies from jurisdiction to jurisdiction. Indeed the fundamental notion of data ownership can be subtle and

complex. In many cases of "explicitly contributed" data the convention is that the user owns the IPR but grants a company a wide licence to use it – for example, this is how Google's Terms and Conditions are set up. In the case of implicitly contributed or third party sensed data the ownership may not be entirely obvious. In general, data is regarded as non-rivalrous – if a company has data about an individual and makes that data available to the individual – it is still data the company has. "Ownership" of data assets, because of the nonrivalrous nature of data, is less definitive than that for other assets. For these and other reasons legislative protection is often cast in terms of privacy.

In Europe the right to privacy is deeply enshrined in law. All EU states are signatories to the European Convention on Human Rights and Article 8 provides a right to respect an individual's "private and family life, his home and his correspondence". This has been given a very broad interpretation by the European Court of Human Rights. It is against this context that the European Union developed its Data Protection Directive [31] which regulates the processing of personal data within the member states. The Directive was also concerned to facilitate a single market for the free movement of such data. The Directive embodied a number of principles that had been framed in earlier work by the OECD [32]. The principles were as follows

1. Notice – data subjects should be given notice when their data is being collected;
2. Purpose – data should only be used for the purpose stated and not for any other purposes;
3. Consent – data should not be disclosed without the data subjects' consent;
4. Security – collected data should be kept secure from any potential abuses;
5. Disclosure – data subjects should be informed as to who is collecting their data;
6. Access – data subjects should be allowed to access their data and make corrections to any inaccurate data;
7. Accountability – data subjects should have a method available to them to hold data collectors accountable for following the above principles.

The Directive has been a cornerstone for the way in which personal information is managed in the EU. It led to member states setting up Information Commissioners of various sorts. It established the concept of a data controller within an organisation who ultimately had obligations and responsibilities to deal with personal information in line with the Directive.

With the passage of time it became evident that the Directive was in need of updating. It had not foreseen a world of Cloud based computing services where an individual's data may be collected in one jurisdiction, processed in another and stored in a third, nor did it foresee a world in which individuals could be their own data controllers, nor indeed one in which the only practical method of providing access to data was through a machine readable format. Most subject access requests that are invoked under the current Directive involve letters, fees and the provision of data back to an individual on reams of paper.

On 25 January 2012, the European Commission unveiled a draft European General Data Protection Regulation [33] that is planned to supersede the Data Protection Directive. From a midata perspective, a critical component in the original draft is Article 18. This introduces the data subject's right to data portability, i.e. to transfer data from one electronic processing system to and into another without being prevented from doing so

by the controller. As a precondition and in order to further improve access of individuals to their personal data, it provides the right to obtain from the controller those data in a structured and commonly used electronic format. This is extremely close to the midata principles enunciated earlier.

As of May 2013 the new draft Regulation is subject to over 3000 proposed amendments and it is likely to take some time before a definitive timetable for its adoption is known – the ambition had been for it to become law in the member states by 2016. There are also concerns around other elements of the Regulation that many fear will impose onerous burdens on those organisations handing personal data [34], the net effect of which may be to impede innovation around personal data services.

In the UK a rather different legislative route has been taken. To date, the midata programme has been proceeding on a voluntary basis. The programme has shown how consumer empowerment through data release can operate. We have seen that progress has been made on establishing a vision and principles. There are now concrete examples of midata being adopted by corporates. Companies have started to make data available. This initial promise convinced the UK Government that more could be done to unlock the benefits of this data revolution. As a consequence the UK Government consulted between July and September 2012 on the possibility of taking an order-making power which, if used, would compel suppliers of goods and services to provide to their customers on request, historic transaction data [35].

The Government's response to the consultation was published on 19 November [36]. It concluded that there was broad support for the principles of midata and a recognition of the potential of the data that is released to stimulate the market for data services and advice. It became clear that the Government view was that where businesses choose to collect information about an individual's consumer transaction history which can be linked to that consumer, that individual should be able to access their own transaction data in a portable electronic format. At the end of 2012 the UK Government was pursuing a twin track approach. Looking for progress with the current voluntary approach, whilst looking to establish an order-making power[4] as soon as the Parliamentary timetable allowed. On the 24th April 2013 an amendment was made to the Enterprise Bill which saw the order making power pass into law.

The legislation is initially targeted at specific sectors, namely energy, the mobile phone sector, current accounts and credit cards. The Government retains the possibility of regulating other sectors should there be an evident need. Other than in these specific sectors, the Government intends that before regulations are made in relation to a particular sector Ministers will need to be satisfied that it is appropriate to regulate that sector. The factors governing such a decision will include a situation where:

1. the market is not working well for consumers, for example where consumers find it difficult to make the right choice or where an individual's behaviour affects the price they pay but it is difficult for that person to predict what their behaviour will be;
2. there tends to be a one-to-one, long-term relationship between the business and the customer with a stream of ongoing transactions;

[4] An order-making powers is a power to make provisions by means of secondary legislation if certain circumstances arise.

3. consumer engagement is currently limited, as evidenced by low levels of switching between tariffs, account types or providers, or where competition needs promoting; and
4. the sector does not voluntarily provide transaction/consumption data to customers at their request in portable electronic format.

The provision of this legislation sends a powerful message that the UK Government is serious about empowering consumers with their own personal information. It has explicitly not sought to establish a dependency between this legislation and anything that emerges from the Draft Data Protection Regulation – although any revised form of Article 18 would provide additional empowerment to the individual.

In the US, until 2012 there was no Federal Legislation proposed or extant around Personal Data Protection. In the US, the approach to the use of personal data was not subject to comprehensive Federal statutory protection, because most Federal data privacy statutes apply only to specific sectors, such as healthcare, education, communications, and financial services or, in the case of online data collection, to children.

On February 23rd 2012 the White House published a Consumer Privacy Bill of Rights – here for the first time we saw a framework for protecting consumer information and privacy rights. It contained many of the OECD features described above above. It holds that, with respect to their personal information, consumers have a right to: (i) Individual Control, (ii) Transparency, (iii) Respect for Context, (iv) Security, (v) Access and Accuracy, (vi) Focused Collection and (vii) Accountability.

Echoing the precepts of midata, the first principle above relates to Individual Control. This is understood within the Consumer Bill of Rights to mean that consumers have a right to exercise control over what personal data companies collect from them and how they use it. It means that companies should provide consumers with appropriate control over the personal data that consumers share with others and over how companies collect, use, or disclose personal data. In terms of access, the Bill also embodies the Administration's own commitment to:

> "publishing data on the Internet in machine-readable formats to advance the goals of innovation, transparency, participation, and collaboration."

At the request of the White House, the Commerce Department was asked to begin convening companies, privacy advocates and other stakeholders to develop and implement enforceable privacy policies based on the Consumer Privacy Bill of Rights. This work is ongoing. One of its principal motivations was:

> "the goal of increased international interoperability as a means to provide consistent, low-barrier rules for personal data in the user-driven and decentralized Internet environment."

What is noteworthy is that in both the EU and US the work on the legislative protection of personal of information and of the empowerment of individuals through access to that same information seeks to provide comprehensive privacy and security safeguards.

4. Technology and Personal Data

The personal asset revolution is being driven by a number of converging technologies. For 50 years the computing power on a specific area of material has doubled roughly

every two years – following what has come to be known as Moore's Law. We have witnessed real exponential rates of change: in 1972 the Intel 8008 microprocessor had 3500 transistors, forty years later the Intel Ivy Bridge processor contains 1.4 billion. These rates of change apply at every level in computing, not just to how many components we can fit on a chip or the minimum feature sizes used to build the chips in our computers and electronic devices; they apply to the speed of a microprocessor, they apply to the amount of information we can store in our memory technology.

Just as dramatic is the reduction in cost. It has been halving for the equivalent amount of capability at exponential rates also. This increase in computing power and storage is one reason that Google is able to index billions of Web pages and serve them up in microseconds, ranked by relevance, using the search terms from millions users. It is one reason that the Internet and World Wide Web exist at all. It is this increase in computing power that has allowed us to build personal information storage devices that have larger capacities than all the printed books in the Library of Congress.

The emergence of mobile computing and the extent to which we now consume and generate content from the device formally known as the mobile phone owes much to Moore's Law. Ofcom calculates that 58% of the UK population now own a Smartphone: a device with enough computing power and data storage to have rated as a powerful desktop computer 10 years ago.

We are seeing an exponential increase in the number of computing devices that are capable of connecting to the Internet and of producing and consuming data. According to one study [37], the number was set to be 9.6 billion by the end of 2012, and 28 billion by the end of 2020. Ranging from simple sensors to Smartphones, individuals are carrying many devices capable of connecting to the Internet. Devices that in turn interact with a huge range of other Internet connected objects; known as the Internet of Things, this will itself be a deeply disruptive development.

The increase in computing power and its availability has had a dramatic impact on the world of data and information – as we have noted they have become super abundant resources. It is an era where users are the largest creators of content, far surpassing governments and enterprises. It is the main reason we are even discussing personal data as a new asset class, as a new and disruptive feature of our digital lives.

It is perhaps unsurprising then that a number of Personal Data Store technologies and supplier companies have emerged too. However, this is still a relatively immature market [38]. Unpublished data from the UK Governments' midata programme indicates that most individuals are not particularly interested in 'managing their own data' for its own sake.[5] They are nervous about security and whether they can trust the technology or businesses with their data. However, it is clear that these same individuals are generating large amounts of personal digital information every day. And there is clear evidence that they would welcome services that make it easier for them to manage this data better, and to have more control over their data [39].

The technology of Personal Data Stores is dominated by start-up companies, backed by personal or venture capital. Some of the key players in the rapidly emerging market for personal data stores include Allfiled, Azigo, Glome, Mydex, MyInfosafe, Paoga, Personal, the Personal Information Brokerage (PIB), Pidder, Privowny, Qiy, Singly and IndX (formerly known as WebBox). Outside of the start-ups there is some, but limited,

[5] Although such research does not generally reveal those innovations that will make the real differences in our lives. Henry Ford is reputed to have said that his customers wanted a faster horse.

activity from large corporations. AT&T, O2 (Telefonica) and Microsoft are among those who are developing some form of personal data service.

As a recent report from Ctrl-Shift, a consultancy specialising in the personal information market stated:

> "Finding the 'sweet spot' of convenience, utility and control is a key challenge for PDSs [38]."

It is not possible to engage in a thorough review of the underlying technologies of these various platforms in this article. However, we can discern very distinctive strands in the various PDS platforms. Some emphasise data security (MyInfosafe) whilst others highlight data sharing (Glome). These are not exclusive categories and many platforms would emphasise both (IndX, Mydex and Paoga). Some platforms are differentiated in terms of the locus of data sharing. For example, peer to peer data sharing (Singly) versus information sharing with organisations/service providers (Azigo, Mydex, Paoga, Personal). The source of data can differentiate the focus of a PDS. For example, Glome and Pidder focus on self generated content such as profiles and logs, whereas Qiy deals with the information gathered and held by organisations about individuals. The use to which the data is put is another differentiator. For Paoga it is about verified credentials, whilst for PIB-d, it is education records, and for Azigo, it's the data needed to generate targeted offers. Services like Mydex and Personal are more focused on 'life management' tasks.

The base technology in these products varies widely, from proprietary protocol stack with which app developers need to integrate, through to open standard offerings using HTTPS and the like. From proprietary rule-based knowledge representation languages through to open standard semantic web formats like RDF. From proprietary id authentication methods through to variants of OAuth the IETF endorsed open authentication protocol. There is also work on privacy enhancing technologies which limit which data is exposed and whether and how that data can be retained after processing [40]. At the moment the market has no clear dominant offer but there is much activity and we can expect acquisition and consolidation as well as new market entrants.

5. Concluding Remarks

Within 10 years, most of the world will be blanketed with high-speed mobile networks. There will have been a switch to mobile as the main interaction method for many digital services. This will include contactless payments. Smart phones will evolve to become personal information storage devices and will themselves be as powerful as today's laptops. They will continuously and wirelessly connect to a set of IP connected devices that together form a computing environment that will monitor our health, direct our movements, deliver video and other multimedia content. Connected continuously to cloud based computing services, we will have access to voice activated context specific search results offering suggestions of where to eat, what to see, what to buy.

Mobile devices will connect me to a wide range of Government services, from my medical records to NHS services, education resources to benefits, welfare and tax. The device will also connect me more widely to the Internet of Things: devices in homes, cars, the workplace, and shops. The device will connect to similar devices carried by others, forming a mesh of social interactions and transactions.

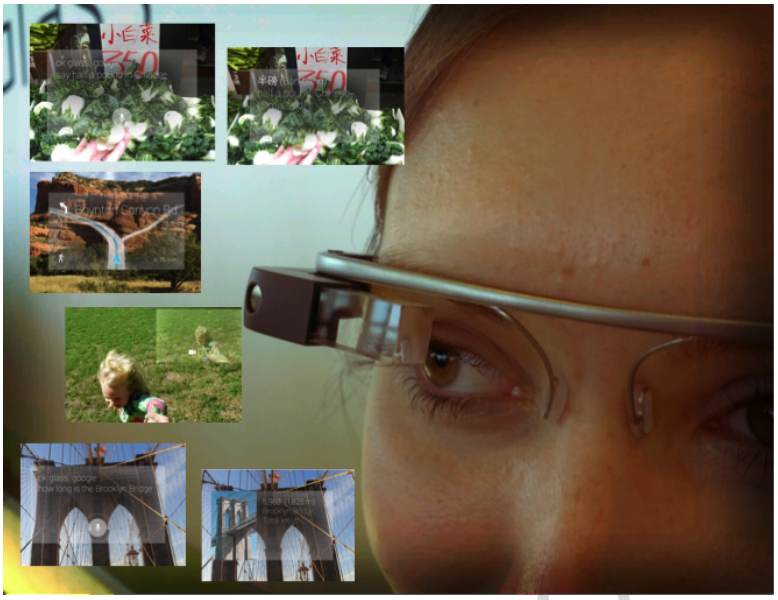

Figure 10. Google Glass.

A foretaste of what this world will look like is the Google Glass project due to ship a device with many of the features above later in 2013. The prototype shown is claimed to be capable of voice-activated translation, route finding, video recording and information retrieval. This new type of product will be as disruptive as smart phones and tablets. Health and leisure apps will accelerate the personal information revolution.

The emergence of a Personal Information Asset market will see substantial innovation around Personal Information Management Technology. The data generated will yield insights about an individuals' patterns of behaviour, propensity to buy, and serve to anticipate their intentions [6]. This will build on the work of the midata programme described here. Citizens and consumers will be able to gain machine readable access to their own data from both governments and corporates and in many cases exercise control over who uses it for what purpose. Data empowered consumers and citizens will become a new norm.

It is often argued that as a society we have become less preoccupied and concerned with what happens to our personal data and indeed with privacy in general [41]. There are studies that show just how easily individuals will part with personal data – often in return for trivial incentives. However, there is equal concern in many quarters that this perfect storm of technology, ubiquity of data and corporate data mining is a fundamental challenge to a human right – the right to privacy, to be maintained and defended at every opportunity. Against this backdrop programmes like midata must steer a careful course.

The midata principle is to empower people through control of their own data assets. This provides for a notion of securing one's own data from unauthorised or unwarranted use. The ambition is to equalise what was earlier described as an information asymmetry. However, there exist a plurality of views as to how far this can and should go. These views arise from a perception of what is culturally and social desirable. What the technology does do is provide a means to generate, collect, integrate and analyse data at

scales never before imagined. The midata programme is also about economic and market improvement. We need to allow the individual to get much more of the value of the data about them, and because data is non-rivalrous this can be done without reducing the value of the data to the data holder. Moreover, this can be done in ways which respect the privacy, commercial and other interests of all the parties concerned.

If there is one area where governments could and should take a lead, it is to give citizens access to their data; giving access to data held in the public sector in the same way that they are asking business to do. Currently in the UK there is only the subject access right under the Data Protection Act. This is burdensome for public agencies to operate and there is no concept of co-creation of data. Moreover, one of the concerns regarding government and personal data is the extent to which sharing occurs with no reference to the individual. A midata approach would enable citizens to see the data about them and to propose corrections if it was wrong. A midata model could serve as a mechanism for making public sector data sharing more effective and more acceptable. It would also allow citizen-mediated sharing – if a citizen wanted Department B to take full regard of the data held by Department A, then the citizen could get the data or else a token from Department A under midata and give it to Department B with his application for Department B's services. This would have the twin benefits of handling many of the "benign" cases which data sharing advocates cite, and allow more scrutiny of more intrusive data sharing.

The move to more engaged, digitally empowered consumers and citizens continues a trend towards *prosumerism*. Alvin Tofler's concept of prosumerism foresaw proactive consumers actively engaged to improve or design goods and services. This, in some respects, holds the greatest promise for midata. It is one in which the products and services offered by organisations have to adapt to and be adapted by the individual, group or collective. The world of data empowered consumers and citizens is inevitable. The question is how quickly and how equitably this new settlement emerges. The midata programme is simply the beginning of a fundamental change in how individuals connect and relate to those organisations that provide them with products and services.

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