“I DON’T DO TECHNOLOGY!”

BREAKING DOWN THE BARRIERS BETWEEN IT AND THE BUSINESS

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Introduction

This book is for all those people who roll their eyes whenever they hear the words digital or IT (Information Technology). It is also for all those who work in IT who have had eyes rolled at them. Having worked for many years alongside many local authorities it has become very clear that there is a requirement to bridge the gap between IT and the rest of the business. This book breaks down the more common jargon in use today. It explains it in clear and simple terms for both those you have tried to explain it and to those who have tried to understand it.

All too often I've been in meetings where the topic of digital comes up and half the room have just switched off or told me that they don't do technology. In today's world everybody does technology and it's everybody's job to do technology. Remember that everything from cars, ovens, microwaves, and telephones are technology. What we do not do very well is to explain the technology in ways that everyone can understand.

It is therefore imperative that everybody in business has at least a basic understanding of the terms and concepts that are out there. People who work in the industry are very good at speaking using acronyms or coming up with phrases that are meaningless to anybody outside of the industry. This is not helped by those outside the industry refusing to engage learn to understand what some of this means. They assume that all the IT and digital work will be undertaken by the IT Department.

However, for a proper ‘digital’ transformation to take place the key element in this transformation is the end user and not the IT Department. It is therefore key that everyone from the Chief Executive down can have a conversation with IT and have a broad understanding as to the terms and phrases that they use that may currently seem like gobbledygook. Without businesses having this basic understanding there is a growing issue with businesses running before they can walk. They are not joining up their business strategies sufficiently as IT are wrongly leading on the overall transformation.

In this book I will break down many of the key terms and phrases that are used today and give examples of what these mean in real terms in language that’s easy to understand. I will also show how all the topics discussed are interlinked and why you therefore need quite a broad, albeit high level, understanding of these.

Whilst I may have to play with artistic licence to explain some of these they will at least give you a basic understanding of the concepts. I have spent many years working as an intermediary between IT and the business in councils. I have had to explain technology, digital and change to a broad range of people and these are some of the techniques that I used to get those messages across. This is a very diverse range of people from councillors and politicians, all the way through to chief executives, directors and staff who have been working in very traditional and legacy ways for many many years. Most of us would have had the joy of trying to explain the internet to our parents and hopefully this book will make that slightly easier!

I will also give more detail around what digital transformation is and what it is not. It Is not a phrase that I particularly like. I will show you how to achieve change as well as give information on wider uses of technology such as the concept of a smart city, artificial intelligence, Automation and the importance of data.

I will also discuss why having a comprehensive strategy is essential to having an efficient and engaged IT department who are delivering a valuable service to the business.

Before we start though let's be clear on a keyword that will be repeated throughout this book. That word is transformation. The dictionary definition of this is:

A qualitative change - A change for the better, the result of improving something.

Where transformation and digital transformation have become mainstream phrases, we also need to consider the word efficiency. The definition of this as per Wikipedia is:

> *Efficiency is the ability to avoid wasting materials, energy, efforts, money and time in doing something or in producing a desired result.*

Often when we say transformation, we really mean efficiency, but the lines between these words have been blurred. Wherever you read transformation in this book, then please also consider efficiency.

1 Cloud Computing

No don’t look up, it’s not there.

Cloud computing is one of those terms that has been thrown around a lot over recent years. It can mean different things depending on which elements of the cloud that you are using. I will cover these off in the next chapter but for now let’s stick with the basics.

In its most basic terms, the cloud generally just means that the part of the computer that does the work is owned and hosted by someone else. Let me break that down further for you. Let’s say you have a personal computer (pc) or laptop. Both these devices have an engine, i.e. something that is powering the work the computer is doing. You may notice if you have a laptop that the bottom gets hot if you use it for a long time! Now imagine that you only have the screen to your pc or laptop and that this engine part was in somebody else's house. You are using their electricity to power it. They are responsible for looking after the engine, ensuring it works and that it is safe and secure. That is the basics of the cloud and cloud computing.

Instead of thinking of the individual laptop or pc engines though, these are much more powerful engines (servers) that are kept in a very secure warehouse type location, referred to as a data centre. Security around these warehouses is very strict, usually requiring passports and multiple forms of identification to enter. Inside there are hundreds if not thousands of these engines running. All that creates heat, so they also have huge air conditioning units keeping them cool. They also all need power and so these warehouses have multiple power links, generators and batteries to ensure that they are resilient in case of power outages.

In reality, this normally looks like rows and rows of locked cages all containing servers stacked 6ft high. Probably nothing like the cloud that you imagined. From imagining fluffy clouds to the reality of a large warehouse with caged servers running, blowing hot air with huge air conditioning units keeping it cool and a lot of noise. You can google data centre images to give you an idea of this.

When you are accessing the cloud then what you are doing is connecting to the internet or web (www. = world wide web). This connects you to the application you are trying to use by typing the address in (gmail, facebook, instagram etc) and being connected to one of those engines in the warehouse that has the application running on it. These web based applications (cloud applications) mean that the day to day running of the application is looked after by the company running the software. Therefore, in the case of Facebook, they own their own data centres (15 currently). They are responsible for ensuring the security of these, managing the ‘engines’, powering them, keeping them cool, upgrading them, and ensuring that you can

connect to them safely and that the application runs smoothly and without any lags for you.

Key to understanding cloud computing is understanding who is responsible for the security and management of these engines and the different ways that you can pay to use them if indeed there is a cost.

If you have the engines in your own room in your building, then this will be described as on-premise (sometimes called a server room). But it also means that you are responsible for the security, management, power, air conditioning and upgrades or replacements of the engines. All of this comes at a cost. It also means that you are self-limiting as you can only use the number of engines that you own. If you need more engines you buy more engines. There may also be times when the engines are idling rather than being at full speed, but you are still paying to power them and keep them cool.

With the cloud model the provider is doing this for you. If you want another server, you pay to turn on another server. You do not buy one as the company will already own spare capacity engines. You are in effect leasing the use of it. This also then means you can turn it off and not pay for it whereas if you have bought it you now own it regardless.

A good example of this is a company such as UCAS (Universities and Colleges Admission Service). For most of the year UCAS can run their service on a relatively small number of servers. Once a year they have a huge spike as students look to see what places they have been allocated. This spike requires many more servers than they have. They could either buy enough servers themselves to manage this spike, acknowledging that for around 360 days a year the servers will be sat doing nothing, or they can ‘rent’ this spare capacity from a cloud provider and only pay for the 5 days additional high usage.

Another term you may come across is Hybridcloud, this is a simple term for having some of your engines in your own server room and some in a data centre owned by a third party, so it’s a blended approach. This will be a judgement call by your IT department as to what is the best solution for your company or business.

Another benefit of these cloud applications or engine warehouses is that the companies that run them often copy or duplicate everything in one warehouse to a second or even third warehouse. Therefore, should the unthinkable happen and a warehouse become unavailable for any reason then all your information is stored in a second warehouse and you will automatically be connected to that one. This means that you can continue to work or play as normal without even realising. Having these additional warehouses also means that companies can load balance. This ensures that the number of customers accessing the warehouses are split evenly so that performance levels stay high. This is opposed to having a hundred customers accessing one data centre and only one customer accessing the other.

For an on-premise solution, you will find that you have some kind of disaster recovery (DR) plan and pay to have servers in another warehouse somewhere away

from your main office. If the power goes down, they are far enough away from your main site to not be affected. You can take copies of your data and store it at the offsite location. Again, your IT department will manage this side of your business and advise on the best solution. You'll still require a DR plan even if you use cloud computing, but it'll be a different model to an on-premise plan.

Security of the cloud is a big topic. This is something your IT department needs to consider. Although the basis of the cloud is that the engines are owned by the cloud provider, the security of the information you put on the engines is your responsibility. As Amazon Web Services put it, they are responsible for the security of the cloud, you are responsible for your security in the cloud.

That is the basics of cloud computing. It has nothing to do with clouds. In its most basic form, the infrastructure and security of that infrastructure that you use for your computing needs is owned and run by a third party. You just connect to it via the internet. Now obviously how it all works is much more technical than this, but we do not need to go into the detail. A high-level understanding is all that you will need.

2 Consuming Cloud Services

So now that you have got the basics of how cloud computing works, we will now look at how you use them and the various terms that are out there.

The most common terms that you will come across are ‘something’ as-a-Service.

There is Software-as-a-service (SaaS), Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) to name just three of many many tens of these.

Realistically the first word of this; software, infrastructure, platform, is going to be largely irrelevant to you, it is the as-a-Service element that is key. In reality this means rent or lease. You are going to pay a subscription or fee to use them.

To translate this into everyday terms then let’s stay at home and think about your electricity supply. In IT terms, this would be either EaaS, Electricity-as-a-service or PaaS, Power-as-a-service. But in essence you don’t really have to do anything with your electricity. Your provider takes care of ensuring you have power. They work with the National Grid. They look after the infrastructure; fix outages and you pay for what you use. Whether you turn all your lights on and use them all day or turn everything off, that choice is largely up to you to manage. The supplier will charge you for what you use. They are also responsible to give you enough electricity to manage spikes in your usage. That is as-a-service in its most basic form.

Remember you still have some responsibilities though. The wiring within your house and the fuse box are still owned and managed by you. Everything up to your front door is owned and looked after by someone else. The same is true in IT. You will still need to be able to access the internet to get to your as-a-service solution, just as you have to maintain your houses internal electrics.

Companies such as Amazon Web Services (AWS) and Google Cloud Platform offer this model of a pay as you use approach. You purely pay for usage and you have control of turning the lights on or off or brighter and dimmer. You are then billed monthly for your use. Remember not to leave your lights on all day every day!

Using companies like this have other benefits. The speed at which you can set up servers (seconds, compared to weeks if you were to buy outright) have allowed companies to grow and scale very quickly. Think about how quickly companies such as Airbnb and Uber have spread around the world because they have not had to invest in their own infrastructure. They pay to use someone else's! This is generally referred to as Infrastructure-as-a-service.
I will take a deeper look at Uber and Airbnb in the Disruption chapter.

From a financial perspective then what these infrastructure-as-a-service companies have done is to move from a capital cost (purchasing hardware) to a revenue cost (renting or leasing hardware).

When we look at Software-as-a-service, the model is slightly different in that you don't pay for consumption. You normally pay what is a per user per month (pupm) licence or subscription fee. You are free to use as much of the software as you like, subject to licencing terms, each month and normally have the option of paying monthly, or annually for a small discount. This means that for the price of a coffee, in a lot of cases, you can buy a single licence, go the internet, and start using their software and if you don't like it you can cancel.

You have not had to buy hardware then have your IT team configure the hardware, buy and install the software and only then decide you don't like the software. Look at Xero finance. For £10 a month you can have access to a finance system set up in minutes. It also means that the vendor will provide upgrades as part of the monthly fee you pay. Think about Facebook. You have never had to pay for an upgrade, it happens seamlessly in the background. Whereas most of you reading this will have experienced times when you cannot access your on-premises software for essential maintenance or upgrades. Some of the SaaS companies provide weekly upgrades and continuous improvements whereas some will have a number of large upgrades per year. All normally included in your licence fee so not only can you improve your services you will be able to continuously improve as the software does and benefit from a subscription model.

Often your IT department will block you from accessing software-as-a-service solutions and enforce your use of company approved software. Often this approved software is dated or not fit for purpose hence you are looking at other solutions. Using software without your IT department knowing is referred to as 'Shadow IT' and in some places its recommended and some it is frowned upon. But you are the best judge of finding technology that works for you and your role. In my view it is a good way of finding tools that could be rolled out across the company (in a controlled manner) rather than relying solely on big procurements or the IT department to find and recommend them.

Platform-as-a-service sits in the middle of these two models. Here the infrastructure is managed by the third party. They have then given you the tools and building blocks to build you own applications. So in simple terms, if you want to build a house, the provider will take care of connecting the house to the grid and utilities. They will build the foundations and will then provide you with the bricks and mortar to configure your house as you see fit. Everyone in the world gets the same foundations and the same bricks and mortar, but each will choose to build their house slightly differently to suit them. Once built you then manage what you have built. The infrastructure will always be managed by the third party. In real terms this means that very small companies are using the same tools and have access to the exact same infrastructure as very large multinationals. It gives you a solid 'platform' to start your build on by taking care of the fundamentals for you.

There are many other versions of -as-a-service out there, but if you apply the general principles above around utilising a third party infrastructure and paying for usage

then regardless of what the first word is you'll have a basic understanding of what they are offering.

3 Digital Transformation

Now that we have touched on cloud models then it's time to dig a little deeper into Digital Transformation. There are many different definitions of this, mainly written by the technology companies and the products they are trying to sell, but here's the truth:

There is no such thing as digital transformation. There is only transformation.

However, the term digital transformation is in everyday use and is widespread in its use and as such it sometimes makes sense to use it. Even most digital transformation experts will now tell you that it is not about the technology but the people and culture change. In which case the use of the word digital is irrelevant.

Some of this transformation is possible because of digital tools and cloud software but it is still just transforming services. I focus on making services more efficient through using digital technology.

The issue with it being labelled as digital transformation is that the focus becomes on the technology or the IT department. Without understanding the services that they are looking to transform then this is the wrong starting point. Transformation must be led by the service and the people within it. Yes, they may need some help and support and to be nudged in the right direction. You probably want an expert in digital there to understand what is possible and what is not. In my experience the minute it becomes an IT project is the minute you lose the end users and the buy-in on the transformation. If the service are the ones leading it then buy-in to the project is much easier.

Too often I read digital transformation strategies talking about what they are going to do from an IT perspective. Almost as if making IT the focus is what it is all about. What needs to happen is that you bring together the other strategies and plans from across the business and then define how IT are going to help accelerate or deliver those. The IT Service is just that, a service. They are there to make people's jobs as easy and as efficient as possible not to dictate service delivery. Any digital strategy must outline how the IT service is going to help deliver services against the larger business plan. Part of the reason that a poor digital strategy leads to problems is that the hardest part of any programme of work is people and culture change and that is not a role IT should be playing. Service led IT with clearly defined business goals will help avoid this.

Of course, IT itself can have its own strategy. It will need this to ensure that the infrastructure and core systems that they have in place are stable and functional for use across the business. Whether this means they move all your servers into a data centre or move you on to Office 365 or G Suite then this is part of their overall IT

strategy. Decisions such as this will cut across every area of your business and are therefore fundamental in setting the core platform for you to build upon. Getting the fundamentals right is crucial as a starting point for many of your transformation projects that will follow. A lot of this IT is hidden from the business but is the fundamental to ensuring you have the right foundations in place.

When looking purely at the transformation projects, with digital technology being used as the enabler, then IT should be acting as an advisory role and not leading on this work. Having an IT department that understand modern technologies and have their finger on the pulse but also are aware of the wider business requirements is crucial to move forwards and accelerate efficiency. Bringing the business and IT closer together will help this.

Another problem with so-called digital transformation projects is that this conjures an image of companywide, large scale programmes of work. The reason I focus on efficiency is because this can be large scale but can also be very small changes. Simple changes may be as easy as using templates or template builders across one of your services that use the same consistent information repeatedly or using a small application that helps your team communicate better. Help your colleagues be more efficient at the work they do.

Another form of digital project that is currently very popular is the use of online or mobile accounts. These will often be in the form of apps that you can use on your mobile phone. Some of you will have used these across many services such as banking, shopping, or flying. When looking at the airline industry, it is common practice for you to use an app on your phone to not only book your travel but to also use as your boarding card. This app is sold to you as an easy way for you to manage your booking and then complete the process of flying. Before the app many companies had moved away from sending you tickets or boarding passes in the post to the concept where you were allowed to print your own at home. Again, this was sold to you based on it being convenient to yourself and good customer service. However, looking at this from the airlines point of view you, what they have done is to cut down their costs on printing, paper, and mailing by using digital technology.

There is a similar concept happening in our supermarkets with self-checkouts being an option and sold as being for your convenience. Whilst this may be partly true it is clearly a way of companies saving money on staff costs. What these companies are doing is selling you a convenient and simple way to carry out tasks by yourself, utilising technology, whilst saving themselves money, often against staffing costs.

The concept of saving money is often not discussed or advertised as you would expect. The story given is more about the convenience that these new tools offer you as the customer, but we need to view this from both sides. It is therefore imperative that these tools are simple and easy to use as well as being reliable. In real terms, in the case of the airline industry, this does mean that you could take multiple trips to multiple cities without ever having to speak to an employee of the company. The only exceptions are when you are on the plane itself, or if there is an issue. You have searched for the flights, booked the flights, paid for the flights and checked in online,

travelled to the airport, dropped off your luggage and made your way through security without speaking to a single person from the airline itself.
As a consumer we often see this as being convenient and are therefore happy to go through this process whilst the airline company is also happy as they have reduced costs against several factors. Therefore, the airline industry is often held up as a good example of transformation through digital for customers. It is two way though, the customer benefits but so does the airline.

Whilst there is still work to do with these apps and the industry as a whole, it is a good way of starting to think about the services that you provide. There are examples that you will come across in your everyday life that you may have previously ignored. If you start to think some of these in a slightly different way you will start to understand how technology can benefit you. This could be very simple as in satellite navigation tools for your car that now update instantly with traffic ahead, rerouting you around any problems. It may be online shopping that you now do with an account or one click purchases as your card details are stored securely or as mentioned above those of you who self-serve at a checkout in a supermarket. Always look at the ‘what is in it for me’ and ‘what is in it for them’ angles.

If we stick with the airline industry there are obviously still improvements to be made and there will be systems in use by the airline that are still deemed legacy. Many of you will be aware that they are still doomed to fail occasionally causing massive disruption. It is therefore important that IT projects and digital projects are separated out and you understand the differences.
You could think about this as are you replacing a system with a more modern one (IT), or are you bringing in a completely new system to maybe automate something that did not exist before (digital).

The banking industry is another good example of an industry that uses a lot of legacy software to run its core business but it is now trying to implement digital tools over the top of this for the assumed benefit of its customers, all the while closing down more and more high street banks. The banks will suffer from the same issues and failures as the airline industry until the legacy systems are replaced. This could take years to do depending on their complexity and is not actually always possible. There may be a lack of suppliers of modern technology that does the same job as the legacy technology or the cost of change is prohibitive.

However, there is a new wave of banks and financial institutions that are breaking this mould as they are coming at the industry fresh without any of the legacy systems in place. These banks such as Monzo, Revolut, Starling and Tide started from the perspective of the customer and have turned the industry on its head. Not only do they not have legacy systems and infrastructure to deal with, they also do not have legacy processes. It is often these processes that cause the problems and are something that we can improve through transformation if you are willing and able to change. Process improvement does not always need technology though.

What these new banks have done is not to undertake transformation of a legacy system. They have reimagined what customers want from a bank service in the modern era. The starting point therefore has been very different to today's banks trying to overlay technology on that legacy process and infrastructure. Now, there

are still benefits to the older banks in overlaying technology otherwise they would not be doing it but they are hindered by these processes. If you can reimagine the service completely and understand some of the tools available to you then you can truly transform the delivery of the services that you offer.

This really is where are you need your IT department to have their finger on the pulse of the modern tools available to them and ensure that they are part of the programme team that you put together. They will give you an understanding of the art of the possible when you try to reimagine your service from what your customers want from you.

When you look at the services you offer you may have three tiers of complexity that you need to address. There will be those elements of the service that are legacy and that you may need to keep for the time being and they should be fed and watered and kept alive for whatever time period you need to keep them for. This tier is called Manage.

The second tranche of services are those that you can look at improving with digital tools such as the bank industry overlaying individual accounts on smartphones and apps while still having some legacy processes in the background. You may be cutting down on paper and printing costs in the same way airlines have. This tier is called Improve.

The third tranche is there for those services that you can completely reimagine from scratch whereby you can completely remove any of the legacy elements, whether they be processes or software, completely. You have a blank piece of paper. This tier is therefore called Reimagine.

If you can put services into one of these three tranches then not only can you pull together a good programme plan, you can quickly see which processes and systems will hinder you in transforming. You should then be aiming for those in the first tier to move into the second tier and those in the second can move into the third and establish a complete change across your business. Establishing what is blocking something moving from one tier to the next is a vital element of your programme.

The key takeaway therefore is to ensure that you understand which projects are IT projects and which are digital. That your IT department is engaged in those digital discussions but not leading them. Changes they are making to the IT infrastructure do not inhibit future change or keep legacy technology longer than required.

Every service that you use is chnaging and becoming more efficient and there are lessons that you can learn from every industry if you stop to really think about the changes and perhaps why they’ve been implemented. Is it for you as the customer or them as the seller?

Manage, Improve, Reimagine!

4 The Internet and Fibre Connectivity

Let us start with the very basics - bit = speed, byte =size.

Therefore, when talking about the speed of your internet connection it will always be a ‘bit’. Whether that is a megabit or a gigabit. A gig is roughly 1000 meg.

But what does that speed mean? Well in the most basic terms it is the number of data packets (bits) that can travel along a network in a given time. In most cases speed will be measured per second. Your home internet might be something like 35 megabits per second (or 35Mbps).

The internet and most computing is based on binary, which I’ll let you look up in your own time, but it does explain what a bit is, and why all computing numbers are divisible by 8 (there are 8 bits in a byte), so you’ll see the numbers 32, 64, 128, 256, 512 up to 1000 (which is generally rounded) keep coming up when looking at computing.

However, the higher the number, the more packets of data that can travel and the faster the internet connection you will have. You can think of packets of data as cars travelling on roads. The wider and better the road you have, the more cars that can travel down it and at a faster speed.

That brings us onto the first set of acronyms that you may have heard of in relation to the internet; Fibre-to-the-Cabinet (FttC), Fibre-to-the-Home (FttH) and Fibre-to-the-Premise (FttP). FttH and FttP are generally the same except Premise relates to businesses and Home to residential properties. Before we break these down it's important to understand that historically the ‘internet’ was based on the telephone network of copper wires running up and down the country and to each house. Some of you may remember having to unplug your home phone to plug the internet in back in the 90’s and early 2000’s.

As demand for the internet has grown companies have been working to replace this copper infrastructure with a fibre optic network. With fibre optic these packets of data (or cars) travel at the speed of light and have more capacity than a traditional copper line. You can view this very much as the difference between driving on a motorway versus driving on an A road. The number of cars that can pass down a four-lane motorway is more than a single lane A road. And those cars can travel faster too.

Coming back to FttC. All around the country there are green telephone cabinets on the end of streets in cities, towns and villages. You will have walked past these many times possibly without noticing or paying any attention to them. However, these are the cabinets in question. Fibre-to-the-Cabinet therefore means that that cabinet is

connected to the rest of the national infrastructure by fibre. A motorway to the cabinet if you like. This invariably gives you a very good connection speed, however, this is also where things start to slow down. From the cabinet to your house will be a copper cable (A road) that then splits off to each home (B road). This is where the speeds slow down and become throttled. Imagine motorway traffic all being filtered onto an A road and then onto a B road and you will understand why there are internet speed limitations to your home. Most of you will have been driving on the motorway and been diverted onto an A road and seen the slowdown that occurs to the traffic as it queues onto lower capacity roads. If you neighbours are heavy internet users, then your speed may suffer as a consequence as these packets of data travel down the copper.

On the flip side a lot of internet service providers (ISP) are now looking at offering Fibre-to-the-Home (FttH) or a motorway all the way to your front door, where speeds and traffic aren't throttled or subjected to A and B roads. This is where you may now see speeds to homes in the 200Mbps bracket or in some businesses up to 1Gbps (1000Mbps).

Tools built for the internet era must not only be usable by the end user, but they must also be accessible and run at a good speed. Delays and buffering of systems will cause users to turn them off. This is why the government is helping to fund fibre roll out, which ultimately will help deliver central and local government digital services to more people in a cost-effective way.

Improving internet speeds for businesses means that towns and cities can not only provide more online services, but potentially reduce having to commute, and can look to create digital industry sectors improving the local economy. (This was written a year before covid – I may have been right!!)

There are many studies about the growth of digital and smart cities and how much money this will bring to the economy. It is vital that all cities and towns look to see how they can support and enhance this growth. Without an active digital economy then many towns or cities may suffer from talent drain where the younger generation are looking to live where a digital economy is thriving. Good connectivity is just one element that can help you with this. I have seen companies that have had to move elements of their business to where they can readily find talent in this sector. There are of course many other benefits, but this book is not about explaining all of those too!

Whilst we are on connectivity, we should also cover 3g, 4g and 5g. In this instance 'g' simply refers to 'generation'. So 5g is now the 5th generation of mobile phone connectivity. With each new generation not only do internet speeds get quicker, but also the number of devices connected can increase. Think back to the analogy of fibre and motorways and A roads, this is essentially the same. Many of you may have been to a crowded area, maybe a concert or football stadium and despite having a 3g or 4g signal cannot open or use your social media apps. This is because too many phones are connected at the same time and the network cannot cope.

Although some areas still struggle to get a decent connection on their phone there has been heavy investment in 5g. Most mobile phone providers now have networks that are now 5g enabled. The biggest change here is not just the amazingly fast internet speeds (downloading movies in seconds), but the number of devices that can be connected to the network will also increase massively. This is vitally important for chapters 7 and 8 where we look at the Internet of Things and the Smart City. It should be noted though that the main benefits of 5g will not be to mobile phone users.

It’s also worth noting here that most mobile phone towers that transmit the mobile phone network are all connected back to a fibre network, hence the need for the improvements required across the country that the government has funded over the last decade.

5 Data / Big Data

Big Data - sounds impressive doesn't it? Less so if we call it quite a lot of data, or maybe even lots of data. I don't know at which point data becomes big data, but there must be one somewhere. But it really does just mean lots of data (this could be a short chapter…)

The definition of big data is not really the point here. There has been a lot of studies talking about how much data we create daily from social media sites to businesses and it's a lot! Big Data is really about what we are doing with this data and how we can use it to make better informed decisions.

So why is data so important? Let's imagine you having two filing cabinets. Each contains information about the same people or topic. Person A in your company can only look in one filing cabinet and person B can only look in the other. Now imagine they are never allowed to share any of that information. This is the same effect that two computer applications that do not speak to each other have. If information is updated in one filing cabinet and not in the other, then your data is incorrect in the second filing cabinet. If person B relies on the second filing cabinet, then they will be working from the wrong starting point with the wrong information.

Now imagine this across a business where you may have multiple teams and multiple filing cabinets. A person's information may be in a dozen of these separate filing cabinets. At no point does the information within each get exchanged or shared. In this instance you can end up with twelve different versions of information about the same person. How are you meant to make good decisions when you have the wrong data?

A phrase that you may well hear in relation to data is 'golden record' or 'single view of the customer'. What companies using these phrases are achieving or trying to achieve is that there is one record per customer in one filing cabinet. If there is still a requirement for twelve filing cabinets, then there is a master filing cabinet that is updated and holds the correct or 'golden' information that is filtered down to the other twelve. If this process can be automated, then that filtering down process becomes simpler.

We are taking single sources of data and trying to join them together to give you a fuller insight into a person or business across all the services you provide. This is the beginning of moving from data to big data.

The benefits of this are usually around the companies or the public sector that provide multiple services to people. If you want to see how people are interacting with you across your whole business then the best way to do this, without manually trawling through the 12 filing cabinets, is to introduce the golden filing cabinet that

holds the full record. All of the updates (change of address, job, email address, phone number, complaints, phone calls, purchases, complaints etc) all go against the golden record and this information is filtered to the other filing cabinets, automatically. If one of the twelve filing cabinets is updated, this information is also passed to the golden filing cabinet and once validated, is passed to the other 11 filing cabinets. Would you prefer to do this manually or with an automated process?

Hopefully you can start to see some of the benefits of breaking down data silo's within your organisation. Ensuring that having that single view of your customers will help you make decisions about the best way to serve them rather than 12 individual services all deciding their own best way. It will give your customers a more consistent service. This is just one small example of how joining up small bits of data can be of benefit to your company. The way data flows around your business is more important than the software you use.

When looking at the single view of the customer, you can see how expanding this concept can scale up to what would be deemed as big data. Not just looking at the information that you hold against the customer but also looking at information that may be publicly available about them. In the case of local services this may be some of the governments published data sets around deprivation, poverty, or public health information. Join this information with the information you hold in one of your filing cabinets or even better from your golden filing cabinet. In doing this, what you're trying to achieve is to understand and interpret the interactions that you're having with customers based on some of those other experiences, social background or maybe even such things as the weather.

When thinking about this information from a customer service point of view, maybe in a contact call centre you can look at the number of calls or the types of calls received measured against something as simple as what the weather is like that day. This can give you an insight into the tone or type of calls that you may receive over time based on future weather patterns. Therefore, if you know that Monday morning is going to be a cold and drizzly day you might be able to get your team better prepared for the day knowing that they are going to receive more calls of an angry nature based on historic trends.

The following week you may find that the Monday morning is a beautiful sunny day and not only are the people you are speaking to in a much better mood but you're also receiving less calls than normal. Perhaps more people are outside enjoying the weather rather than being cooped up at home. This is a rather basic example but gives you a kind of idea into the insight that you can start to visualise under the guise of big data whereby bringing multiple datasets together can give you a greater insight into your daily life or work routine rather than just looking at the data within your own company's overall service. What data do you already hold that you do not use in a smart way?

What this allows you to do is to pre-plan, or predict, what you believe the following week or month will be like. How many calls and the types of calls you think you will receive. Ensuring that you have the right staff, and the right skill sets available to be able to answer those queries as quickly and as simply as possible. What additional data do you think would be useful to your company?

Without going into a huge amount of technical detail about how to do this, we can refer to some of the cloud systems discussed in an earlier chapter. We established that there are many different cloud systems or tools. Many of these will enable you to do this and they will have tools available for you to take copies of data to bring it together with the data that you hold. You can then run some business intelligence (chapter 6) tools over the top of this data to give you an understanding of what that data is then telling you. This is something that your IT department should be able to do. They will just need to know what data you need.

I often find that in companies that I speak to, and in particular local authorities, are still in the very early stages of looking at the best way of bringing this data together. There is no requirement to do all of this in one go. Start small and just bring two datasets together and then add to that over time and build a picture up.

The cloud models work by paying for the actual consumption of a service that you're using so a small amount of data which may only cost a few pounds a month can then grow as you prove the concept. The business case behind this is then the savings and service improvements that this insight will give you from utilising the information in this data repository. This repository of course has its own terms and where this is deemed to be unstructured data then this is often referred to as a data lake.

Where the data is more structured, and you understand what you are going to do with this data then you will find this is generally referred to as a data warehouse. The two terms data warehouse and data lake are similar and different in that one contains the structured data and the other contains lots of unstructured data, but both just contain data. Think of a warehouse neatly stacked with boxes in a system versus a fluid lake with no visible system.

You can also think of this as being the difference between an Excel spreadsheet with all the information typed in nicely and a Word document that just has a random list of things you need to do. Both contain data and information, but one is in a structured format that you can then use for other things and the other is just a list of words that cannot be manipulated or used easily.

Many digital projects that you may come across focus purely on bringing together this data from these disparate systems into a single structured view. In many cases this will be done by implementing a customer relationship management tool or CRM for short. In this instance, you need to think of the CRM system as the golden filing cabinet. It is the CRM system that will be used by your customer service agents when they are speaking to customers or citizens. There are other ways to achieve the same end goal, but a CRM is a very popular way.

There are many different types of CRM system on the market and again the choice that your IT team decide to work with will be dependent upon many factors. The important thing to understand is that the key benefit of these systems is being able to hold data about your customers or citizens in a single place. Ensure that you have easy access to the data and that the data is kept up to date. What else you want the CRM system to do, and they are very advanced these days, is then down to what you want to achieve as a business or a service. Always focus on the data, what you

hold and why, and the journey of this data. Look at product ecosystems that have prebuilt connectors to join your systems together to ensure your data can flow between departments. Data becomes information and it is this information that is critical to your business.

Looking slightly wider and broaching the smart city topic, the use of data across cities is being used in many forms. This may be information that keeps traffic flowing smoothly. Applications that help find you parking spaces quicker. Systems that monitor air quality outside of our schools. I'll talk more about smart city concepts in a later chapter but it's important to note that whatever system that a city is looking at to improve services the key element will come down to the data that they collect and how they then use that data. In fact, if you think back to the fibre chapter then everything in IT comes back to data. How you collect it, use it and how fast you can move it!

Open data is data that is published and available for all to access. Government departments and local authorities publish a lot of data that is free to use by anybody. Things such as spend data, deprivation indexes and high-level public health data is all published as well as lots more data sets. The term ‘open’ just means that its published and available to use. Knowing what these data sets are and whether they’re of any use to you in helping you to make decisions is something businesses should be looking into. Public Sector data is also generally published via spreadsheets so that it is simple for you to take copies and utilise.

Data, big or small, is just data. Are you using your data wisely or wasting it? What insights can you see from it? Any digital project should always start with a data first approach.

6 Analytics / Business Intelligence

The next steps in looking at your data is how you then interpret visualise this data for other people to see. This is where business analytics and business intelligence come in. There is a crowded market of vendors supplying software of this type and many will do this as-a-service. You will therefore find business intelligence-as-a-service (BIaaS) as an option. Again this means the same as the other as-a-service products in that the company providing the software who will look after everything that sits behind the application so that the engine and the infrastructure will be owned by the provider.

Today's tools are extremely powerful and in the right hands can translate a piece of data into a very informative picture. The use of graphs, pie charts, maps and heat maps etc can make data much more understandable than simply seeing it in a spreadsheet. How many times have you heard the phrase that a picture speaks a thousand words? The same is true of visualising data. The new tools not only enrich the data by giving you a simple and easy way to see it, but they also will work with what is termed real-time data.

Real-time data is, as the name suggests, data that is current and up to date. It is not unheard of for a business analyst to create a report using data that is a month or more out of date. Teams that I have worked with often have to extract data from systems into a spreadsheet. They then spend days cleaning the data to make sure its correct. Add new data sets to the spreadsheet and finally send a report a week after it was requested. These reports are often not even looked at or are of limited use due to the data not being current and are only giving you a historic view.

These new business intelligence tools allow data analysts to create reports that can be looked at with the data being only a few minutes old. Anyone looking at this data and looking at how they need to be delivering the service can do this based on the real information that they hold at their fingertips. Not old data telling them what they needed to do 3 weeks ago.

If you think about football and the league tables. These tables are updated during games giving you a live view of the table as scores across games change. You can also view the league tables on your own device, be it a computer, tablet or phone. You don’t have to wait until Monday morning for someone to send you an updated report via a spreadsheet. In fact, most people would be quite annoyed if this was the case. Yet in business this happens all the time. Similarly, think about a car dashboard, you immediately receive visual data back to you about speed, revs, fuel levels or warning lights. Imagine if there was a delay in receiving this information?

Investing in good business intelligence software is vital to ensure that you are making decisions based on current data that is viewed in a simple and easy way to understand. Back to ‘a picture paints a thousand words’.

However, more important than the visualisation is ensuring that you have the right team of data analysts who can interpret this data into something meaningful. Having the data and all the tools to look at it is meaningless unless you have someone who can interpret that data. Who can ask questions of the data. Explain to you what it means. Then tell you or give you suggestions as to how you can improve the service based on the information you hold. Investment in a good team of data analysts is crucial in today's world if you want to improve as a company.

Going back to the previous chapter where we mentioned CRM systems. Many of these systems will have business intelligence built in. Where staff and managers can have their own individual dashboards with their own custom reports for what is of benefit to their roles. This is also true of many modern applications. This means that they have the right information at their fingertips in order to run an efficient service. They are not dependent on asking another team to provide them reports that may take a week to receive. With a small amount of training, the staff and managers will be able to run their own reports. These can be run when required, to improve their knowledge of their own service, which should lead to further improvements. The analysts can then focus on a much deeper dive into the data and provide you with a more in depth look at how your services are being delivered. Historically a good BI tool required the IT team to set up and run them. Today’s tools are very intuitive and much simpler to use.

Taking the football analogy above one step further. We can now take the results, and use information on current form, past win ratio’s against other teams and predict what we believe the table will look like at the end of the season. Something bookmakers have been doing for years. The better the data we put in, the more likely the result will be accurate. This is now what is referred to as predictive analytics. Instead of just looking at historical data, we can use the tools available to us to start to predict how we think things will turn out in the future. This is essential when we look at forward planning and ensuring that our strategies are based on the data we already hold and are not just opinion based. Decisions should be data driven where possible, as long as the interpretation of the data is as accurate as it can be.

We are now able to look at historical data, real time data and predictive data giving us a far better insight into performance and trends than we ever had before in a much simpler way. The key is being able to interpret it.

7 Internet of Things / IOT

The Internet of Things is another phrase that is becoming more prevalent in everyday language. Breaking this down into very simple terms it basically means ‘things’ that are connected to the internet. We are not talking laptops, computers and gaming consoles but more sensors that can monitor information and devices such as Amazon Alexa or Google Assistant. The ‘thing’ in the internet of things merely refers to the device.

Where this is becoming commonplace is in the home. Not only do we have these smart speakers mentioned above but we have lights that can be controlled from your phone, fridges that can hold your shopping list, smart meters that can control your energy use, televisions that you can speak to and change the channel with your voice. Even sensors that can monitor temperature within the home and adjust your heating. In fact, there is very little in your home you now cannot control with your phone or voice.

There are many more examples but each of them is purely a ‘thing’. In most cases though, the ‘thing’ is not actually the important element, the important element is the data that is transferred by the thing to its end destination via the internet. In all cases of the internet of things, data is key and it has been referred to as the Internet of Data rather than the Internet of Things previously (mainly by me) as this takes the focus off the thing and more to the data that it is collecting and sending which is the right way to think about it.

You can think of this in terms of Alexa. The Alexa device is largely irrelevant when compared to the questions you ask it and the information it needs to go and collect from the internet. Whether this is what the weather is doing or to play you your favourite song. It is only relevant when you’re looking at things like sound quality of the music it plays or the variety of tasks it can perform. It is a device that transfers data.

Similarly, smart meters within your home are useful in providing information to your electricity supplier in how much energy is being consumed. Not only for suppliers to manage supplies but also to ensure you are billed correctly. The actual smart meter is largely replaceable, and you can find many other types that do the same thing. What might be important to you is size and how clear the display is. Going back to the airline examples and their boarding apps, is the smart meter for your benefit or the suppliers?

When two, or more, of these devices can talk to each other and update without human intervention then they are referred to as ‘smart’ devices.

Therefore, when we start referring to smart devices we are talking about devices (or things) that on their own would be an IOT device but together with others they become smart. What this can mean in real terms is that in your home you could have an internet of things thermometer. It measures the temperature and when it hits the right temperature it speaks to your boiler to shut down the central heating (usually over Wi-Fi) but may also show you how much you have spent at the same time. It really is as simple as that. Where this can become really useful at home is when we look at using IOT devices to ensure that elderly or vulnerable residents can be monitored whilst continuing to live their lives in their own home. This can be anything from technology that can monitor falls and trips to technology that can check that the medicine cabinet has been opened and the right medicine has been taken at the right time.

For those with smartphones you may already have a health app that monitors your steps for your heart rate and can actually send this information to another application or in certain circumstances directly to a doctor. In order for the internet of things devices to work and for them to be smart, they need to be connected to the internet in some way.

This takes us back to a previous chapter about fibre and connectivity. In some places these devices can have SIM cards similar to those in a mobile phone and sometimes these will need a fibre connection whether this be a direct connection or via Wi-Fi, but regardless of how they are connected to the internet, they must be.

Here you can see that as we go through these chapters that everything is interrelated. You cannot have IOT devices without connectivity and IOT devices are only as good as the data they collect and send. But you still need in many cases a person to interpret this data to make it useful and meaningful using business intelligence tools and analytical skills.

Therefore, when we talk about digital there are many layers that need to be considered in order to carry out a proper digital programme. There is no point planning to deliver a digital service using something like devices or sensors if there is no connectivity. Likewise, if you do not have the right skills to utilise the data there is no point in collecting it. You can have the best idea in the world, but if no-one can use it or connect to it then it is useless. Everything in digital is interconnected.

One of my favourite examples of IOT that you may come across in your everyday life, is the use of sensors on the bottom of plates in a well-known sushi chain, that deliver food via conveyor belts to you at your seat. You simply take whichever piece of sushi you fancy as it passes by. However, what you may not realise is that every plate has a sensor that tells the head office what was on the plate and when it was bought. The head office takes this information in real time from every single restaurant. This means they have an exact insight into what dishes are selling well, and more importantly exactly what stock they need to be ordering. Without the sensor they would have to rely on receiving close to a hundred end of day reports from each of their restaurants and then manually go through these. By combining IOT with a good piece of business intelligence software they have the answers at their fingertips within seconds of dishes being eaten.

How could you benefit from having this kind of information in your business?
As an update I should mention Edge computing in IOT terms. This is something that is becoming more prevalent. Where I have talked about the thing or device collecting and sending information back to a central point for it to be used, with Edge computing it is the device that processes the information as well. This reduces the amount of data that needs to flow back and forth across the network. What we are doing is making the devices or sensors smarter than just a collect, send and receive device.

8 Smart City

What then is a smart city? It really depends on who is describing it and what they believe a smart city is. There are actual specifications relating to a smart city, but none really make it any easier to understand. So, let's try and break this down bit by bit.

At a high level and looking at it from a pure technology perspective, a smart city is one that is full of IOT devices that speak to each other for the benefit of the citizens. What this means is that the key fundamental element of a smart city is often missed and only the technology side of it is looked at with a solution found before a problem exists. There are many examples of cities deploying technology in large scale projects and claiming this as smart. There are benefits to doing this, but these need to be viewed as technology cities not smart cities. There are examples of technology cities being built from the ground up and flooded with technology and sensors. Until you add people to a city and see how they behave and move with differing demographics then it cannot be seen as smart.

In my opinion, to be a truly smart city you must identify problems that may be unique to your city or common to many cities and then look at how you can use technology to help solve these problems. All too often the solution to a problem is found before the real problem has been identified. This is because the concept of the smart city is often led by the technology companies. All the technology companies have come up with are generic problem-solving tools that they believe can be deployed too many, many cities. However even in the UK the demographics and socio-economic standards of each city’s makeup are not only different within each area of a city but are very different across cities throughout the country.

Therefore, although there will be some commonality each city needs to look at its own problems and issues. Just implementing lots of technology into your city does not necessarily make it smart in any way. The technology that you implement must be for the benefit of the residents and citizens of the city. A smart solution is only as good as its ability to solve specific human problems.

There are 3 things you need to do with any smart city project. The first of these is to identify the problem. This must be the first thing that you do. The second thing is therefore to find technology or even non-technological solutions that can improve or fix these problems. Lastly the thing you must do is to monitor the effectiveness of these solutions. All too often this element of the project is missed or does not run for long enough.

To give you an example of this, a number of cities are looking at the issue of air quality and how to improve this. The key issue here is that we are looking to improve air quality within cities to improve people's health. Peoples health is the

problem here. Having identified that the air quality is poor and is leading to issues with people's health, we can look at solutions that can improve this. This may be around changing how people travel in cities or changes to traffic flows so that cars are not idling for as long producing less emissions. Once we have implemented the technology to improve this we then need to constantly measure and monitor these improvements. However, improving the air quality and measuring the levels of emissions in the air is not actually enough in this example.

If we go back to the problem then what we are looking for is a solution that improves people's health, probably regarding lung problems or breathing difficulties. So how do we then measure and monitor these improvements over the long term? This is where smart cities and the overall concept are falling short and projects need to be thought through in more detail and with a longer-term outcome model. In this instance it may be years before you start to see these improvements. This doesn't mean that we shouldn't do anything, but we should ensure that the underlying problem that we are trying to fix is measured long-term.

One of the biggest issues with smart cities is the use of the word city. In fact, anywhere can be smart if they are problem solving. You could go as far after say that if you are not solving a problem then what are you doing? Again, a bit like digital transformation marketing, this has been led by the technology companies. This has led to many people being turned off from these concepts which is why I prefer to look at it very much as a problem solving exercise This may or may not include technology but is for the overall benefit of citizens and residents that live in our cities, towns and villages. Some of the best smart city projects and concepts do not include any technology at all nor happen in a city.

Technology companies that sell smart city solutions need to do more to work with the individual cities and towns to identify the problems. They then need to show how their solutions can help solve them and provide evidence of how these solutions can and will be monitored for the long-term. It is not good enough to sell a solution that does not identify the problem nor can then evidence the long-term benefits of it. Technology companies need to do more than just provide a solution. What we need to do is bring together right skills alongside the tech companies that can truly turn our cities and towns smart. This may mean that urban planners, architects, scientists and tech companies all need to work together and not only deliver smart solutions to problems but to measure the ongoing success of these.

Pertinent to a smart city therefore is the use of IOT devices to either help solve problems or to measure the success of these solutions put in place. And what IOT devices need is connectivity to be able to send the data they collect which comes back to the fibre connectivity we discussed in a previous chapter. This really is the foundation for all smart / digital projects. We then need to interpret this data either manually or through automated means which not only brings us back to the Data / Big Data chapter, but also leads on nicely to the next chapter!

Do not be fooled though by the use of the word smart, being put in front of another word. This is a key trend that is beginning to happen and only justified in a small number of cases. Again, focus on the problem that you are trying to solve.

A good example of something that is smart is of a Dutch town that were trying to encourage more people to cycle to work and reduce car usage and the subsequent emissions and health benefits. What their data told them was that when it was raining, understandably, less people cycled to work. However, when they investigated why this was the case, it was not so much just that it was raining. It was having to stop at red lights and wait in the rain. Whilst they were moving, they were happy to be cycling. Hence the first stage of a smart project is understanding what the problem is. In this case it was not necessarily just the weather. In implementing technology, they put sensors onto cycle paths that automatically notifies the traffic lights that a cyclist is approaching. This then automatically changes the traffic lights to green and the cyclist can continue on their way without stopping. What they now need to do is continually monitor the benefits of this for reduced emissions, fitness of cyclists and improved health. A smart example of how to beat the weather. How many people reading this travel using a different method depending on the weather? Is the weather the limiting factor or the difficulty of the journey?

A Smart City starts with the problem!

9 AI and RPA

Let's deal with these two things separately and we will start with AI, or Artificial Intelligence. For most this drums up images from Hollywood, of the Terminator, I,Robot or similar films. Robots taking over the world or turning on humans after years of compliant service. In real terms we are a long way from that (hopefully), but the technology is improving year on year. What we are really talking about is an intelligent machine. This would include things such as Natural Language Processing (NLP) where many of you will have used Siri or Alexa. Indeed, a lot of this book has been written using Google voice, where I sit and speak to my laptop and it types what I'm saying. Well a lot of the time it types what it thinks I'm saying, it's far from perfect, although it does seem to pick up my cursing and ***'s it out!

I had the recent pleasure of sitting in a pub having dinner next to a group of people one of whom had discovered sending text messages using his voice and Siri on his iPhone. He took it in turns sending messages to each of the others around the table and then waited for the look of surprise as each one received a text message with the words he had just spoken. Whilst it was fairly amusing for me to watch, I enjoyed the fact that he had started using this technology and was clearly enjoying it and you can start to think about how solutions could work for people who struggle with hand dexterity.

For this to work Siri has to understand what you are saying and be able to convert this to text and then to understand an instruction to write a text message and who to send it to. Fairly mind blowing that we can take something like that for granted these days. Alexa works in a similar way by understanding what you are asking of it and responding.

There are also apps in a similar vein that you can speak to and ask to translate sentences to a foreign language enabling you to converse, albeit slightly slower than a natural conversation, with anyone from a number of languages available. Likewise, Google Translate can not only translate documents, but if you use the camera function of your phone with it and hold it over text it can translate this is real time on your phone screen. Download the app and try this, it really is very clever!

Another aspect may be Machine Learning, whereby the computer can learn patterns from the data it holds and then use this data to start to predict outcomes. This can be particularly useful in industries to help them forward plan. It can also achieve this in very quick time compared to you trying to do this manually. There is an advert on TV currently for Microsoft that talks about saving snow leopards and how the technology finds images of them from thousands and thousands of images taken over time. The machine has learnt how to identify a snow leopard by being fed lots of pictures of them and lots not and basically saying yes this is a snow leopard and no this is not. Over time the machine learns which are and which are not, and all completed in

minutes not days. You can see how this technology is useful in a whole host of manual tasks in cutting down the amount of time and effort taken to achieve a goal.

If you think about all the data you hold, and going back to the model of the filing cabinets, would you like to go through that filing cabinet top to bottom to find one photo buried at the bottom of an unknown file? Or would you prefer a robot do it whilst you work on something more productive? Do you want to learn every language in the world, or do you want your phone to translate for you? Yes, it can make you lazier, but it can also open up a lot more possibilities and make you more efficient.

What artificial intelligence is doing, is giving us a set of tools to use to make our lives simpler or to complete tasks in shorter times allowing us to focus or concentrate or more important things. It is not something to fear (Terminator) but to be used to enhance what you are already doing. In order to work well the AI needs to be fed data. It is this data that it then learns from and improves itself over time. No different really to a child growing up. It is the quality of the data input that gives you the best results, again same as a child.

RPA or Robotic Process Automation. Sounds fancy doesn't it? If you're in my age bracket you may remember taking multiple choice tests at school on a specific piece of paper, that you marked in pencil or black pen that was then fed into a computer that told you your score. That is RPA. In basic terms it is taking repetitive tasks and automating them. This can take many forms but there are always repetitive tasks in any business. Utilising RPA can take these tasks and free up staff to be better utilised.

In the multiple-choice example, a single person would have to check every sheet and all answers marking them and scoring the sheet. This not only takes a while but is quite dull and the 'marker' would probably be better utilised doing something else. Feeding these into a machine that can read the correct answers that have been correctly ticked can be completed in seconds. Again, like AI, RPA is there to aid you by freeing up your time. It can also help reduce errors, the marker in the example above, could mis-read an answer or accidentally mark the wrong line or add up the score wrong. The 'robot' can remove these mistakes. Often, you'll hear the robot referred to as a 'bot', or in the case of some automated online messaging services a 'chatbot'.

A chat bot will give automated responses to questions it is asked. For example, on websites you will now often get a pop-up box asking if you would like to chat to an advisor. Initially this is not a person but a robot. It will take keywords and phrases from your message and provide you with the closest answer that it has in its database (filing cabinet). They are not always 100% accurate but they are getting better and better. I recently had a chat with a bot from an energy firm and the initial name, address, account number, type questions were all handled by the bot before being passed to a customer service rep who now has all my details to hand without having to do anything.

Linking this back to previous chapters the key to a good bot, or to machine learning, artificial intelligence and RPA is the data. If you hold good data and can use this data

to ‘train’ your computer then they will grow and learn to do tasks or enable you to see insights into data that you’ve not seen before. Some of this would then relate back to chapter 6 and visualising that data and as always, connectivity.

A quick note also on Virtual Reality and Augmented Reality. Virtual as the name suggests is not real. Therefore, it is like being immersed in a computer game. You may have seen people wearing headsets that cover their eyes that immerse them in this computer world in 3d and you cannot see reality as the headsets block this out. This could be used with a digital twin, which the next chapter will explain, or something as simple as playing a sport such as skiing where you move as if you were on skis on a mountain. There are now even water parks where you can put a headset on before you go down a slide and you follow a computer generated image all the way down the slide that is timed to relate to the movements your body makes giving you a fuller and more enjoyable experience.

Augmented reality is when computer images are overlaid against the real world and are viewed through your camera screen. Pokemon Go is probably the most famous example of this, where you could hunt for Pokemon characters across towns and cities using your camera on your phone or tablet. This technology can also be used in education whereby you can go to a museum and hold your camera up to a piece of armour for example and information about that piece of armour will appear on your phone. It may also allow you to spin the armour 360 degrees to get a complete look. There are many other uses for this, and marketing and advertising are looking at this more and more but for you knowing the difference between virtual and augmented is enough.

Update for 2020 and GPT-3. Or Generative Pre-Trained Transformer 3 for the less catchy full name. This is a very modern and comprehensive Natural Language Processor. In the most basic explanation, it searches the entire internet to bring back the most relevant text based on what you have asked it to do. In fact, my Companies ‘about’ section on Linkedin was written by GPT-3. I gave it a two-line sentence on what I do, and it brought back many examples of text that I could use. That is about as basic as an example as there is. It is also being used to write code and will no doubt become better and more prevalent in the coming years. It is not perfect yet, but it is hard to distinguish between any sentences that I could write, and that GPT-3 can write on a topic. GPT-3 has more ideas and much quicker than I ever could, and I use these as inspiration to write more.

10 Digital Twin

This may not be a term that many of you have come across, indeed it is something relatively new to me too. However, when you understand the term, you will soon see that it is something we have been using for years, just under a different name. A digital twin really is just a simulation. I said this recently on twitter and the Digital Twin aficionados came for me. It is a simulator though. The real difference is that it can take live data and adapt instantly. They do not like it being simplified. The top description on Wikipedia from Grieves and Vickers (2016) is:

“The Digital Twin is a set of virtual information constructs that fully describes a potential or actual physical manufactured product from the micro atomic level to the macro geometrical level. At its optimum, any information that could be obtained from inspecting a physical manufactured product can be obtained from its Digital Twin.”

You can see why I upset them by calling it a simulator!

Simulations have been around for years, pilots learn to fly in a simulator, racing drivers test their cars in simulators and scientists have been simulating events for years to see the consequences of changes in things like oxygen levels in the atmosphere.

Why the digital twin is fast becoming a buzz phrase it’s in use across towns and cities and the drive towards smart cities and the fact that these ‘twins’ are now becoming more detailed and complex on a wider scale than before.

Imagine if you had a complete virtual copy of the city you live in, an exact replica down to the last detail. Now imagine you can run various scenarios across that replica and see what happens. That is what these digital twins or simulations are allowing. No different to training a pilot for a bird strike or an engine failure, in the safety of a simulator, but gaining valuable information in not just how the pilot reacts but also how the plane reacts. With real time data being fed into it you can change the effect on the city immediately. This is also true of machinery that can have a digital twin to view the status of the machine in real time.

Northumbria Water are big advocates of the digital twin and indeed use this to simulate various scenarios such as burst water pipes and the effects of where that water will run off to or flood and also what the effect of turning off the water to that location will be on the surrounding areas, whether they be housing or businesses. This gives them a really good idea of the best way to resolve the burst water pipe issue without waiting for a pipe to burst.

The same technology can be used for traffic flows and modelling what happens if you were to change the timing of the lights or introduce new junctions. You can see immediately the effect this will have and then continue to adapt until you have the best solution, before you make any changes to the real world. It really is like having your own test version in a virtual world to see how scenarios will play out in the real world.

The link here takes us back to the previous chapter of using Artificial Intelligence to learn from these outcomes and for the simulation to suggest the best approach. Again, you can see how fundamental each of the elements is to the next one.

Building digital twins is obviously complex and would need a specialist partner to help you deliver, but if you are looking for a way to strategically plan for future events then a digital twin may prove invaluable. It may also help you to realise the potential benefits of projects and pilots that you are running and give you insights and benefits that you might not have realised. You can again see the links back to smart cities and all things digital that we have covered so far in this book.

How might a simulation of your business or environment help you to deliver services better?

11 Disruption

Or more precisely digital disruption is a theme that crops up and often the two examples used are Uber and Airbnb as companies that have disrupted their industries the most. There are many other examples, such as many of the new wave of banks, but let's take a look at both of these in a bit more detail to explain exactly what they are and why they've been able to disrupt their industries.

We will start with Uber. The taxi firm. Or are they?

For those of you who don't know Uber or haven't come across them, then essentially they are a taxi firm that uses a mobile phone app for you to book, track (in real time) and pay for a taxi ride from one of their drivers. For Uber drivers they have an app that allows them to see who is requesting a taxi, where they are, where they are going and then to get paid.

So, what you essentially have is a platform that allows a person who wants a taxi to find an available taxi and a taxi driver looking for a fare to find someone looking, all through their phones. It is quite a basic concept. Instead of standing on the street waving at taxi's hoping that one stops (waving is an analogue process), you tell the app where you are (automatically) and where you are going. The app tells you how much the journey will be (prices can change based on peak times and other factors) and then connects you to an Uber driver. The Uber driver accepts the job, and you are immediately told who your driver is, what vehicle they will be arriving in, with number plate, where they currently are and how long you will have to wait. You can track the Uber Driver through the map section of the app.

Having already set up your debit card as part of the sign-up process you simply exit the Uber at the end of the journey and the payment is taken care of. You will be asked if you want to leave a tip and rate your driver in the app. The driver also gets to rate you as a passenger. Both drivers and passengers can refuse low scoring jobs.

And that is really it. The app uses various bits of cloud technology to bring you a convenient service, these include the maps, payment service and text message service all brought together under the Uber phone app. By using these cloud apps that can scale and are paid for on a usage basis, the more drivers Uber recruited the more people that used the service and the more the cloud cost, but as a percentage of the money they were generating, but this has also allowed them to expand rapidly across the world without needing their own infrastructure. They are simply renting it from other cloud providers (as-a-service).

Now, there has obviously been controversy with Uber and how it hires drivers and what checks they undertake, but that is not for me to comment here. I am purely

looking at how technology has enabled a company to expand across the globe rapidly and disrupt the taxi industry. The question is, are Uber a taxi firm or a technology company? You could argue that they are both.

But what is obvious is that there was a need for a change in the industry and that those people taking taxis wanted a better and more convenient way to locate a ride. This is what Uber gives them over traditional taxis, many of which even today only take cash payments after a frantic arm waving exercise.

In its most basic form, Uber is a platform that connects a buyer with a seller through the efficient transfer of data between the two, that allows for a more efficient taxi experience.

Airbnb, again for those of you have not come across it as actually quite similar in concept to Uber. It is a platform that allows a ‘host’, or someone who has a room, flat or house to rent to a ‘guest’ who is looking for accommodation to rent. In general, this is for holiday lets as opposed to long term rents. Airbnb is seen as a disruptor to the hotel industry. It is again a platform that connects a buyer with a seller.

In its most basic form, it connects one person who wants to buy something to another person who has that something to sell. They do not own any hotels or properties themselves, in the same was Uber do not own any taxis. They are merely the platform that connects buyers and sellers. By using cloud technologies on an as-a-service basis they have been able to scale their company worldwide without the huge expense of buying, installing, and maintaining infrastructure. As more and more people have put their rooms and homes up for rent, more customers have been using the service provided. It is often much cheaper than a local hotel, obviously without the benefits of a hotel. It has allowed people to make money from their homes and travellers to safely explore cities around the world for cheaper than before.

In both cases it is the underlying technology that has allowed these firms to grow and expand as rapidly as they have. Both have disrupted legacy industries using modern technology. Offering a convenient, efficient and user-friendly service to both buyers and sellers that has allowed them to scale globally in a relatively short space of time.

Whether this disruption is good or bad is up to you to decide but it is happening across all industries.

There are smaller scale disruptions though that are equally valid. They do not need to be huge global changes they can be quite small.

If you look at sport you have tools available now that were not just a few years ago. Football has introduced VAR (badly), whilst cricket at tennis both have Hawkeye. All three of these have disrupted their sport in some way, whether liked or not.

Google translate allows you to translate documents into multiple languages in real time. It also allows voice translations and if you use the camera it will translate using Artificial Intelligence and Augmented Reality (computer images that are shown over the top of real world images).

What3words has split the world into 3m x 3m squares (57 trillion of them to be precise) and as the name suggests each square is tagged with three words, each square having a different three words through trillions of combinations. More and more police and rescue services are using the app to pinpoint exact locations they need to attend scene at. For example, ‘could.grants.palms’ will take you to the exact location of the i360 viewing tower in Brighton whereas ‘inhaled.throat.unfolds’ will take you to the Post Office in John o’Groats. The app exists with multiple languages and will undoubtedly be used wider across the world. But cloud technology has enabled it to scale quickly and easily.

Disruption comes in many forms and can be seen as both positive and negative depending on which angle you are viewing it from. Does a London black cab driver view Uber in the same light as a customer does? Probably not. What ways could your industry be digitally disrupted? What can you do to disrupt your industry?

12 Digital and Smart City Strategies

Now that you understand the basics of IT, Digital and Smart Cities we can now look at how we can develop strategies around these three key areas. As with all the items we have discussed up to now it is important to realise that your strategies all need to align.

This is not just true of your IT based strategies but also other strategies that you hold across your company or business. Your IT strategy will in general be based around the infrastructure of the estate. It will be up to your IT department to ensure that the tools and systems that they provide to you not only give you a good core of reliable systems but help to move the IT department away from being a blocker to change. Historically IT has been seen as the department of no, stuck with legacy infrastructure and systems that have been unable to flex as required by the service users as they look to deliver services in a new or different way. Here IT will be looking at your server estate (the engines), the network (how all your computers connect together), security (ensuring devices and systems are only accessed by those with the right permissions) and choices such as which productivity suite to use. Essentially the core of your IT infrastructure.

Then looking at your digital strategy we are now looking at the systems and tools we will be using to help update and improve the services we deliver. These should be based on an overall business strategy working alongside it to deliver the systems that will enable this. If your business strategy is around savings, growth, or better customer service then you will need to really understand how these are being envisaged and plan your digital tools to effectively deliver this. If you are specifically looking at savings, then where are these coming from? Reducing headcount or reducing usage of paper, printing, office space are all examples. It is important to understand this as you may find that your overall IT and digital costs increase with the implementation of these new systems and tools. Understanding where these budgets sit and who is responsible for the change is key. The increase in cost should be directly proportionate to the level of savings that are being delivered. In essence increase the IT budget by 10% to reduce a larger departments spend by 10% and you will still have a net saving and also should have better customer satisfaction.

For those of you who work in a local government setting then the digital strategy may also include the underlying fibre infrastructure. Ensuring that residents and businesses have access to good internet speeds that can be utilised to support economic growth around digital businesses and can continue to deliver services for less. You may also want to look at digital inclusion and digital skills for all citizens and how you can improve these. These should be shown as outcomes though and not meaningless words of phrases in the strategy.

It’s important as a non-IT specialist that you can challenge your businesses IT and digital strategies to ensure that they will help the business move in the right direction. Projects should be business led not IT led and based around the fact that they will help deliver the end results the business wants to see. Digital should be seen as the accelerator for delivering your business goals.

From a smart city perspective then this is generally a local government led initiative. All too often though the smart city team is a siloed team away from the IT and Digital teams. However, there is a huge overlap between what the two departments are trying to achieve, and they should be closely knit. A huge element of the smart city is to improve the lives of citizens, but it is also about data collection. Utilising that data collected by the IOT devices and using it alongside council data to give you real insight into how you are delivering services and how these could be improved. Think back to the example of weather data against a call centre or utilising a digital twin. One thing your smart city strategy cannot do is implement technology for the sake of technology. You are implementing technology to improve the lives of citizens within your area. The strategy needs to reflect that. It is all about problem solving, but in a joined-up way.

For suppliers of smart city solutions, do your research. Each city is unique and has its own problems. One size does not fit all. If your providing a solution to a problem, make sure it is a problem that exists in the cities and towns that your speaking to and make that learning part of your strategy.

In summary, these strategies can be a single strategy, but they must align with other business strategies that you have. You must be able to challenge them as to how they will help you deliver your goals and how IT can be seen as the enabler to change instead of the department of no. Going forwards every business will have an element of being a technology company. Think Uber and Airbnb, where the technology is more important than the industries they are in. As well as having the strategies ensuring that you have the right skills set with the right seniority is also vitally important.

One strategy that is often missed by organisations is their Data strategy. Hopefully, you will have seen throughout the previous chapters how important data is across all areas of IT and digital. So why does it not have its own strategy? We have mentioned the golden filing cabinet in earlier chapters, but you really do need to understand the data you have and more importantly the data you want and then how you’re going to use this data. If not a separate strategy, then it needs to be very clear within your IT or digital strategies. If you are looking at the golden record for example, how are you going to define what actually is the golden record, what gets updated, when and by whom and how do you ensure it stays golden?

With data being key in your business you need to make sure that this is clear and understood across all services. If you need your customer services team to fill out certain information when they receive a call because your finance team need this information, then you need to ensure the customer service team know this and the importance of filling that field in. Take the time to show them why it is so important to

finance. Everybody in your organisation should know the importance of data and why ensuring any data manually input is input accurately and then share the outcomes of how you use that data to deliver better services, be more profitable or be more efficient.

Once you have written your strategies and you have aligned them with other business strategies then it is also important to challenge these on a regular basis. I've seen many 3-5 year strategies that once written remain valid for the full term. Whilst it is good to have a long-term vision, you also need to be able to adapt. Being agile or nimble regardless of the length of term of the strategy is very important. New technologies are appearing every week and you need to be aware of the changing nature of these.

Continually challenge what you are doing with an eye on what else is happening in the market. Make sure that whatever you defined as your outcomes and desired outcomes from these strategies are being delivered and use digital to help accelerate these.

13 The Business Case

The business case for investing in technology is often not straightforward. Where you are replacing one system with another then this is easy, where you are introducing new technology it is not.

If you think back to the airline industry examples, the saving for the investment in technology was against paper, printing, and mailing costs. These probably are not costs covered by the IT budget. This means you must take a broader approach to budgets and savings. I have been in the situation before where I have introduced new technology and then sat with my finance business partner who has asked me which line in my IT budget I have replaced and looking perplexed when the answer was none. I had invested in the new technology because the services were asking me for technology that would allow them to access their documents when on the move. This was all about making another department more efficient. What I had done was increase my IT spend in order to save money and make staff more efficient in another part of the business. As you invest in new technologies, chatbots, RPA, AI, and business intelligence for example then you are buying technology that you do not already have. Therefore, the cost of the IT service will naturally increase. You are not going to introduce these tools to make savings in IT. You are introducing these tools to make savings, make efficiencies, improve customer service or to grow your business. Where you are making savings then you need to be top slicing these savings and adding this amount to the IT budget. As I have mentioned previously, IT is a service department to your company. They are giving you the tools to make the company better at what it does.

Business Intelligence is a good example here. Let us say that you're going to make a £100,000 investment in new BI tools that can-do real-time reporting, predictive analytics and gives dashboards to all you senior staff. That £100,000 is a sunk cost. You are not replacing an older BI tool and purchasing a cheaper version. You are investing that £100,000 to give you and your teams better insight into what they do, how they do it and what they will need to do in the future. These insights are what the investment goes against. Over a period of time the pay back on these tools could easily be 10x the original investment. But it is an investment. It therefore also needs leadership, adoption and change to benefit from the investment. Maybe by investing in BI each of your ten senior managers can make improvements to their service that result in a £100,000 saving per team, or by investing in BI you can provide you service to 10 more companies that you already work with and each of them are worth £100,000 to you. This is where you need to be thinking when looking at business cases for technology investment.

You then also have the dreaded redundancy business case, which is in the news a lot recently. Usually with a title around 'Are robots taking our jobs?'. The answer is probably yes, but then they have been for years. Go to a car factory and see how

many staff work there compared to fifty years ago, it is nothing new. You can even go back to the very first combine harvester taking wheat cutters jobs. The investment in technology may well mean you need less staff or less staff doing that role. In the combine example, people started looking after the machinery and the horses needed to pull the tools. You may have other roles that they can move onto. You may just make them more efficient or give a better level of customer service. However, the point here is that none of these decisions sit with IT. These are business decisions that need to be made. We again come back to leadership and cultural change to deliver the savings against the business case for the investment. You are not reducing IT budgets here. Most of these decisions will come back to your overall business strategy and what outcomes you are looking to achieve.

The main consideration is how is investing in new technology going to accelerate your business plans? Are you trying to make IT more efficient or the services that you deliver? If you are just trying to make IT cost less, then you are going down the wrong route.

Going back to how you consume cloud, the other big consideration you will need to consider is the change from a traditional capex model to a more modern cloud opex model and the impact this will have on your business.

With smart cities then the business case is often even harder. Investing in technology to improve people's health 10-15 years down the line when the beneficiary may be the NHS or the environment with no cashable savings directly to you or your business is hard. Mainly these will come back to the data created and how its then used or will be funded by government on a short-term pilot, but then needs longer term funding and monitoring. With squeezed budgets, particularly in the public sector, then a long-term investment vision is required. There is a lot of funding for short term pilots, but we do need to be thinking long term when it comes to smart cities.

In short, most business cases for digital technology will be investment business cases. Where there are efficiency programmes, then the business case should focus on this and the technology being the enabler and accelerator. Where it is moving technologies to save money on an IT budget then make sure you understand that these changes are not going to be a limiting factor as discussed in the strategy factor. You may have heard that moving to the cloud is cheaper, but this is not necessarily the case. It’s a new way of delivering services, to improve what you do, so budgets may need to increase, or you may have to find savings from elsewhere, do not just assume that you’ll be making an IT saving. If you are then you are missing the point.

14 Some Other Digital Terms

Blockchain
This is something that has been around for a while and talked about lots but is in relatively low usage. It comes across as being very complicated, but it really is not. If you buy a book and when you buy the book you rubber stamp it with your name, address, how much you paid and when. You then laminate this so it cannot be changed. You then sell the book, and the new buyer stamps it with their name, address, how much they paid and when. They then laminate it. The book then sells a further six times and each new owner goes through the process of stamping, adding details and laminating. You now have a chain of events about that book. If each stamp is a 'block' then you have a chain of blocks all securely holding information about the sale and purchase. As an alternative to rubber stamps, each time the book is sold a receipt with the same details are laminated and stapled to the book. Again, you would have a chain of protected information about the sale. This model has been around for hundreds of years, particularly relating to things like sales of expensive paintings. They all have a written down history. Blockchain simply digitises this information in a secure way that cannot be edited. The difference being each block in the chain can be held in different places, but the chain links them together. The actual technology is complicated as you can imagine, but the theory behind it is quite straightforward and something we have always done.

API's
Application Programming Interfaces are a hot topic around business and product ecosystems. Essentially an API is the computer code that allows one system to talk to another. A good example of this is Companies House. They have an API that anyone can use to fetch company information that they hold into your system. If you have a requirement for company registration numbers within your business. You could go on the Companies House website and search for each company individually by typing their name in, then find the number and then enter it into your system. A manual process that is slow and cumbersome. The API will automatically go and find the company number and import it directly into your system when you add the company name. Milliseconds compared to minutes. Multiply that by the number of times you need to complete this task and you will have quite a time saving. The other key element of the API is connecting two systems that you own or use together. If we think back to the filing cabinets then how are you going to share information that changes between the cabinets? An API is how you would do this. If information in filing cabinet A changes then I would like the changed information to be automatically shared with filing cabinet B and placed in the right location. A well written and maintained API will save your business a lot of time. They do need to be managed and maintained though.

Platform Ecosystem
This is a less common phrase but one that should be more popular. We have looked at Platform-as-a-service previously and discussed the building blocks that you are given. Now imagine that there are a number of other companies that have pre-built solutions that work with your building blocks to make your build quicker and simpler. This is the ecosystem. This also removes the need for an API as the two systems are designed to work together. If you have ten systems in your business from ten different providers, then you may need at least ten API's if you want them to be connected. That is a huge overhead and upgrades to individual systems may break your current API's. If you buy from an ecosystem, then the API's are prebuilt and are managed for you when upgrades occur. The best example is probably the Salesforce AppExchange where applications that work with or are built on the Salesforce platform are available for sale. You may find tools that are labelled as X-for Salesforce where some of the hard work is done for you.

On-Premise
Although I have mentioned this earlier, essentially your servers are owned and run by you on your own premises, it's worth highlighting it again. Even if you are pro-cloud, like I am, then you may still have a need for some on-premise solutions, particularly the legacy ones. Where IT are recommending that you remain with on-premise servers and applications it's important for you to be able to challenge and understand this. There may be very valid reasons. Is the decision to remain on premise going to hold you back or is it applicable in some cases? That is the challenge you need to be able to make.

PMO
Programme Management Office. This is not necessarily an IT term, but with more and more digital programmes happening then having a good overview of all projects within your programme is fundamental to the success. Having good tools that can be utilised to monitor and measure the success of this (not spreadsheets) and evidence backed is hugely important. The rolling out of projects in itself produces huge amounts of data, don't let this data go to waste.

Leadership
Leadership matters. It really matters. Changing behaviours, mindsets and culture of your business is much harder than the technology. Strong leadership that can show the value of your digital investments and lead from the front is vital for a successful programme. There are many stats available on the success (or lack thereof) of digital programmes so if you are a leader then it is on you to drive this. If you are not, then you need to ensure you have senior buy-in and a designated leader. Take the emphasis off the IT and let them do their jobs in implementing the technology. Do not make them the focus as well or leave them as the leads as this will lead to failure.

Turn it On and Off Again
Yes, this works and should always be the first thing you do! It is designed that way!

15 Conclusion

So hopefully you have gained a bit more of an insight into some of the words, phrases, and terms we use across IT that may have meant nothing to you before reading this. In truth there is nothing really complicated when looking at these terms at a high level. Obviously how it all works and comes together is where the difficulty lies and why projects can be costly and take time, but that should not be a level you need to worry about.

When your IT Director announces a cloud first strategy then you need to know what he means by that and more importantly what it means to your business and be able to challenge these decisions. Cloud first is a policy and not a strategy and yet I see these all the time. And if you do not understand an acronym used, don't nod your head or switch off, ask them to explain in simple terms what it means. Not only will it help you to understand it but will test the person using the acronym to use non-technical terms to describe what they are trying to achieve.

IT departments have for too long been seen as the guys in the basement, the jokes of have you turned it on and off still do the rounds (mainly because it works) and are not seen as critical in moving businesses forwards. But in today's world they are. More and more businesses are seeing themselves as technology companies, think back to Uber and Airbnb, but there must be a meeting of minds. The business has to have a better understanding of IT and the opportunities that it can bring, but likewise IT have to take a more active role in understanding the business and its plans for moving forwards and be able to explain what they are doing and why in non-technical terms. There is no point having a plan to reduce office costs by allowing home working if your IT department are planning on locking down your IT network so that it's more secure than Fort Knox and you can only access it when in the office.

Think about all those services you use outside of your own company, online shopping, self-service, online banking, booking holidays, using smart meters. Which elements of these bring you delight, and which do you find painful? How can you embed some of these lessons in your own business and deliver better services to your customers? Have you used poor websites where you cannot find the information you require, or online chat where you were helped immediately? What data would help you deliver better services; how could you collect this and use it? Do you want your data to be real time, interactive and forward looking instead of receiving a report once a week on historical information?

There are many ways that IT and digital can help improve your company. Bring IT to the table, speak to them, let them help you find the right solutions to achieve your company goals. Make sure you attend IT conferences with them, there is some really good ones out there, and a lot focus on the business rather than the technology. But likewise invest in their training to understand how your business functions. Having

the right skills in that team is today more important than ever. Challenge them and ask them to challenge you.

The guys that used to be locked in the basement, might just be your knights in shining armour!

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