The Factors That Influence the Implementation of a BYOD Program.

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1st September 2014

Declaration

I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work, and has not been submitted as an exercise for a degree at this or any other university. I further declare that this research has been carried out in full compliance with the ethical research requirements of the School of Computer Science and Statistics.

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Abstract

The research question focused on the factors that influence the implementation of a BYOD program within an Irish utility company. The objective of the research was to examine and elaborate on the factors that need to be present within the IT Function of the company to ensure that the adoption of such a program will be a success. It also sought to examine whether the implementation of such a program would have strategic benefits, both for the organisation and for the IT function, as the owner and implementer of the service.

Using an interpretivist methodology, a case study approach to the research was taken. Qualitative research and analysis from the interviewing of senior management, key decision makers and strategists within the IT function was used to validate findings that emerged from the literature review.

The findings from the research shows that while a BYOD program presents challenges at both a technical and organisational level, it can also bring new opportunities to the organisation through improved employee communication and the automation of work practices. Furthermore, there is general agreement that the IT function is in a position to be able to deliver a program that meets the needs of the organisation. Issues surrounding data security, data privacy and technical skills must all be considered before developing the BYOD program. The relative immaturity of many of the technologies used in BYOD and a changing technical landscape in how IT services are delivered are adding to the uncertainty that surrounds such programs.

The findings also show that developing such a program provides a compelling opportunity for the IT function to demonstrate its strategic benefits to the organisation.

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List of Abbreviations

BYOD	Bring Your Own Device
CIO	Chief Information Officer
COPE	Corporate Owned Personally Enabled
EMM	Enterprise Mobility Management
ERP	Enterprise Resource Planning
ICT	Information and Communication Technology
MDM	Mobile Device Management
PaaS	Platform as a Service
RFID	Radio Frequency Identification
ROI	Return on Investment
SaaS	Software as a Service
SoCloDaMo	Social, Cloud, Data and Mobile
VPN	Virtual Private Network

1   Introduction

1.1   Context and Background

In his book, *The Mobile Wave, How Mobile Intelligence Will Change Everything*, author, Michael Saylor, predicts a future where mobile and social technologies will fundamentally change how societies, businesses and economies are run. His predictions envisage a world where new industries and communities develop due to the increasingly ubiquitous nature of mobile technologies, with other industries ceasing to exist (Saylor, 2012). Many enterprises are now realising that this change is starting to take place and are taking account of this paradigm shift in how IT is delivered.

As a result, an increasing number of enterprises' are opening their IT resources, networks and corporate data to devices personally owned by their employees. Instead of the company providing the required hardware to its employees, by adopting a Bring Your Own Device (BYOD) policy, the employee can choose the device they feel best allows them to interact with corporate IT resources. As the employee is already familiar with how to use this device, they are able to work more productively (Sarker et al., 2012). Research also shows that allowing employees to use personally owned devices in work increases organisational innovation (Bradley et al., 2012), (Brans, 2003), reduces hardware purchase and service costs for the employer (Harris et al., 2012), and allows increased process improvement throughout the organisation through enhanced access to corporate data (Nicol, 2013).

There are predications that by 2017, 50% of the world's companies will have a BYOD program in place, with the majority of employees receiving little or no stipend for the purchase of devices (Willis, 2013). While this reduces the costs inherent in hardware acquisition, refresh and support; the cost of "device security, application security, back-end infrastructure and regulatory compliance" is expected to increase. (Forrester, 2012). There are also increased risks to the organisation as a result of BYOD, with allowing access to potentially valuable corporate data on personally owned and operated devices ranking highest. After many years of owning the device that the employee would use, and investing in security protections around control over the endpoint, the IT Function are having to deliver a service that fundamentally changes how security and security considerations are to be approached (Sathyan et al., 2012).

This risk/reward trade-off is one that must be considered by the Chief Information Officer (CIO) function. While the implementation of a BYOD program has been shown to substantially improve the perception of the IT function within organisations where it is available, the risk of having corporate data leak into the public domain is one that must be considered at every level of the program.

While adoption rates for BYOD programs are lowest among European companies, with companies in the US, India, China and Brazil more than twice as likely to have such a program already implemented, there is a growing acknowledgment that the question of BYOD for the IT function is less of a case of *if* than *when* (Willis, 2013). The research therefore seeks to understand how a BYOD program will be developed within the IT function of an Irish utility, and to expound on the implications for the IT function in developing and supporting such a program.

1.2   Research Question

The primary research question being examined in this study is:

Bring Your Own Device: What are the implications for the ICT Function of an Irish Utility?

The research question presented by this study focuses on three key elements:

- What are the implications that a Bring Your Own Device policy will have for the ICT function of the company in how it provides IT services to its internal customers?
- How can the ICT function of the company manage the people, processes and policies needed to implement a Bring Your Own Device policy?
- Can a BYOD program bring both strategic and innovation benefits to the organisation as a whole?

1.3   Research Interest and Beneficiaries

The case study organisation is a large Irish utility involved in multiple markets. While the case study organisation implemented a service in 2013 whereby certain mandated employees could access corporate email and calendar services on a selection of personally-owned devices, a large-scale BYOD program has not been put in place.

Research advisories show that European companies are slower to develop both BYOD and mobility strategies, with utilities in particular often being conservative in the use of new technologies. However numerous external influences are making the adoption of such a program inevitable (Ellis et al., 2012). There is no research or case study available into the implementation of a BYOD program within a European utility. Therefore the research hopes to present a snapshot of the considerations, concerns and policies that should be considered by decision makers, strategists and other interested stakeholders within the IT Function of an Irish utility when it comes to the design and delivery of such a program. It also seeks to present examples where the development of BYOD can be used within the organisation to improve work processes, or bring about other strategic benefits to the enterprise as a whole.

The research will be of interest to any company looking to develop a BYOD program within their organisation, especially those conducting business primarily within Ireland. It is hoped that this research will provide value in choosing an approach to their program based on the organisational, technical, financial, and security themes explored in the research. It is intended to also prove useful to academics looking for a case study example of how an enterprise mobility initiative was viewed within the IT Function of an organisation about to undertake such a program.

1.4   The Scope of the Study

The research is confined to one organisation – a large Irish utility that has a significant, and growing, overseas presence in the supply of consultancy and engineering services. A single case study approach was considered feasible as it provides a representative sample of a large Irish organisation about to undertake the development of a BYOD program. While the development of a BYOD program will invariably involve inputs from stakeholders across Legal, Human Resource and Corporate Governance functions, the study was limited to examining the implications of such a program as it affects the IT function. Eleven interviews were conducted in support of the research, with all participants being senior managers, key stakeholders and decision makers within the IT function of the organisation.

The research is exploratory in nature, with developments in mobile technologies and economic conditions changing perspectives and industry consensus on how to proceed with the development of such a program.

1.5   Timeframe of Study

The following is the schedule of this research project.

- November 2013 – Research topic chosen.

- December 2013 – Research Proposal presented.

- January 2014 – Approval granted from organisation to use the IT Function for the gathering of research data.

- February 2014 – First draft of the literature review presented.

- April 2014 – Ethics approval submitted.

- June 2014 – Ethics approval granted. Semi-structured interviews carried out.

- July – Transcribing interviews, primary data analysis gathered out.

- July – First draft of findings submitted.

- August – First complete draft submitted to supervisor. Finalising dissertation. Printing, binding and submission.

1.6   Chapter Structure

The dissertation is structured as follows:

Chapter 1 provides an introduction to the study; the rationale for choosing the research question, and the scope of the research. It also provides timeframes for carrying out the research.

Chapter 2 reviews important and relevent literature relating to the research question. It explores the concepts surrounding Enterprise Mobility, The Consumerisation of IT, The

BYOD phenomema, before concluding with examples of where BYOD can be used within utility companies.

Chapter 3 provides an overview on the research methodology chosen, why this methodology was chosen, as well as providing a synopsis of the merits and limitations of choosing such an approach.

Chapter 4 describes the findings from an analysis of the interview transcripts. The findings are compared with some of the themes that emerged from conducting the literature review. Further discussions on a number of the overarching themes that emerged are presented.

Chapter 5 contains the conclusions that emerged from an analysis of the research data. It also provides some recommendations to be considered when developing a BYOD program. It concludes with a discussion of future research possibilities that would enhance and support the research carried out so far.

2   Literature Review

2.1   Enterprise Mobility

The availability of a BYOD program within an organisation is seen as an example of Enterprise Mobility.

Enterprise Mobility has been defined as "the application of diverse mobile information technologies in the context of work" (Barnes, 2003). Another definition that takes account of the increasingly pervasive nature of mobile technology is 'the use of mobile IT for the accomplishment, coordination and management of organisational activities'' (Sørensen, 2011).

Enterprise Mobility, albeit not a new concept, is one that is finding increasing traction within the IT function of organisations, who recognise that mobile information and communication technologies can deliver business value through increased organisational performance. Mobile enterprises can see increased workforce productivity through employees having real-time access to data and by the increased ability to provision ad hoc communication possibilities. Some of the benefits that mobile ICT can bring to the organisation are: increased convenience, efficiency, productivity, decision-speed and process improvement (Basole, 2007).

Enterprise mobility is a relatively new and emergent area of research, especially when compared to the availability of a ''significant body of research on the impact of mobile communications on social life in general'' (Sørensen, 2011). The author goes on to place enterprise mobility within a context where the creation of fluidity in an organisation as a result of mobile technology is balanced with the management of organisational boundaries: collaboration, interaction and control.

Enterprise mobility has been defined as the third great wave of organisational computing. The mainframe helped the organisation to automate administrative processes and was considered the first wave of organisation computing. The second wave brought the development of the low-cost personal computer, which improved productivity by making computing resources available to the employee; thus allowing them to understand complex enterprise data and make local decisions based upon this understanding. It represented a move away from some of the traditional hierarchical structures that had

existed within the enterprise. The miniaturisation and networking of computer resources in the form of smartphones, laptops and tablets represents this third wave. It challenges the assumption of how work is organised and arranged, and how it can be understood as an interaction between participating actors. (Sørensen, 2011). The logic for the organisation adopting mobile technologies is easily recognised, in that the technology can deliver tangible business benefits by making information more accessible (Basole, 2007).

Early research into the benefits of mobile solutions for the enterprise showed an enthusiasm for what the technology could give the early adopters above and beyond the process of using a device to make phone calls (Brans, 2003). Calls to research implored the academic community to revaluate many of the fundamental assumptions underpinning past IS research in the face of new mobile and ubiquitous computing technologies (Fano and Gershman, 2002).

A number of the large IT consultancies such as Forrester and Gartner were reporting that early efforts in deploying mobile technologies within the enterprise were failing to meet expectations. Many of the technologies and standards were immature and the deployments had failed to return quantifiable benefits to the organisation. There were issues with connectivity, access; the physical size and battery life of the mobile devices being used to access corporate information (Gohring, 2006). Similarly, there was a growing realisation that most enterprises weren't ready to embrace mobile ICT and the potential changes it could bring to the organisation. They often lacked the technological infrastructure, access mechanisms, system and business processes, human resources, management understanding, and organisational cultures to support and facilitate the implementation of enterprise mobility solutions (Basole, 2007).

A survey of 3000 IT decision makers in 2010 showed that providing mobile access to enterprise systems, as well as improving enterprise mobility within the organisation was a key objective. 75% of organisations had already deployed basic mobile information technology to improve worker productivity. It has been predicted that by 2015, the number of employees using mobile applications in the workplace will have doubled (Willis, 2013).

2.2   The Consumerisation of IT

IT Consumerisation is the adoption of consumer devices and applications into the enterprise (Harris et al., 2012). Consumerisation revolves around both the use of hardware such as tablets and smartphones, and the use of services such as cloud storage, social media sites and online office suites (Gens et al., 2011). Even though predictions on the increased use of consumer-level IT within the Enterprise have been discussed for many years (Moschella et al., 2004), it has recently became an item of increasing importance for the CIO function .

According to Forrester Research, consumerisation is the dominant force in smartphone and tablet device selection today (Schadler and McCarthy, 2012). It can be defined as:

- The device choice is made by the employee, not the organization or the IT function.
- The confirmation that employees are willing to assume some, or indeed all, of the costs for the purchase and support of the devices they choose to use in their personal lives and in work.

It has been suggested that the introduction of the Apple iPhone in 2007 was a seismic moment in the employee perception of technology. Although not the first smartphone on the market, it delivered an engaging end-user experience that streamlined the delivery of information to the user. The availability of applications allowed the user to extend the functionality of their phone, and created a mobile ecosystem where developers released innovative applications that engaged their users. The phone offered an experience that was far above that offered by an Enterprise IT-provided Blackberry – an early example of a managed mobility solution (Nicol, 2013). The mass-market consumerisation of tablet and larger form factor smartphone devices has continued this trend. The Apple iPad and the Samsung Galaxy range of devices have large market and mind share, and employees want to use these devices in both their work and personal lives (Schadler, 2013).

Enterprises are under increasing pressure to develop and deploy mobile applications to both employees and customers. This is in response to the widely available nature of data connectivity and the consumerisation of IT devices. Mobile services are converging with social media, cloud and big data services into a nexus that is disrupting the ICT function within business (Cerra et al., 2012). Mobility is seen as the number two priority for the CIO agenda in a 2013 report, behind analytics and business intelligence, capabilities that are

themselves becoming increasingly mobile (Basso and Taylor, 2013). Much of this is as a result of consumer level technology innovations outpacing enterprise offerings. There is a growing expectation that offerings by the ICT function of an organisation should have the same design aesthetic, visual representations and ease of use as those that are being offered by companies such as Google, Microsoft and Apple (Pitt et al., 2011).

A survey of 314 technology executives conducted in 2011 showed that IT Consumerisation within the organisation could result in increased innovation opportunities for the organisation, increased employee productivity and increased employee satisfaction (Harris et al., 2011). This correlates closely with an earlier research study (Basole, 2007) which showed the most notable benefits to the enterprise were:

- Increased Flexibility
- Improved Coordination
- Increased productivity through flexibility in time management
- The availability of multiple communication platforms
- Round-the-clock uninterrupted access to information resources

Consumerisation also allows for new patterns of work. Mobile work is the most radical and potentially disruptive form of flexible working. It frees the employee from the traditional confines of a business premises and workstation, and allows them new working arrangements that are geographically independent. The growing reliance on personal devices for work purposes is a contributor to the development of an increasingly mobile workforce (Cerra et al., 2012).

2.3   Bring Your Own Device: BYOD

Bring Your Own Device has been defined as

- "a corporate policy that enables employees to use their personally owned devices for business use" (Nicol, 2013).

- "the strategy that allows employees, business partners and other users to use a personally selected and purchased client device to execute enterprise applications and access data. It may or may not include a subsidy" (Willis, 2013).

The BYOD phenomenon comes about as a result of consumerisation. A number of competing perspectives on the emergence of BYOD within organisations are seen in the literature. The first perspective is that BYOD is an employee-driven program, with IT responding to an increasingly engaged and demanding workforce (Györy et al., 2012) (D'Arcy, 2011). A second perspective is that IT are seeing the benefits of allowing personally-owned devices access corporate IT resources, and are enabling the program to drive efficiencies and process improvements (Harris et al., 2012, Nicol, 2013). Other perspectives show that the development of BYOD as a mutually beneficial development, with both employer and employee seeing tangible benefits (van Heck et al., 2012). The researchers see programmes such as BYOD reducing internal operating costs through reduced requirements for office space, hardware and telephony systems. They also saw an increase in employee productivity. Using measurement metrics developed in an earlier paper, they asked employees of the case organisation to measure the perceived increase or decrease in the quality, quantity and efficacy of their work as a result of mobile technology (Staples et al., 1999). The overall improvement in perceived productivity as a result of mobile technology such as BYOD being made available was measured at 2.5% over a three year period. There were also substantial decreases in the organisation's carbon footprint and in travel costs for employees (van Heck et al., 2012).

2.3.1   The benefits of BYOD

There are many reasons why organisations have either embraced the concept of BYOD or are exploring the possibility of allowing employees use their personal mobile devices for work. One of the main benefits is that there are substantial savings to be made due to the decline in hardware investment. The support of the device in no longer carried out by the IT Function, but instead falls to the employee who purchased the device (Gatewood, 2012). Furthermore, the organisation can respond to the increasing desire by employees to have cutting-edge technology, and a single device that can be used in both the corporate and personal spaces (Calder, 2013). This can also have the benefit of driving operational efficiencies by having employees carry out work using hardware that is quicker, more responsive and easier to use than those traditionally supplied by the employer (Pitt et al., 2011).

2.3.2   Concerns surrounding BYOD

The cost of purchasing a physical device is but a small fraction of the overall costs of delivering such a service (Willis, 2013). Savings made by allowing employees to choose and purchase a smartphone or tablet, and then use these for work purposes are offset with increased costs in security mechanisms, mobile device management software, middleware, network connectivity and ancillary services (Nicol, 2013). Integrating mobility solutions with legacy and backend systems that weren't designed with a mobile presentation layer can also be a significant cost (Murdoch et al., 2010).

The consumerisation trend has created a number of new security challenges for the ICT Function of organisations. The diversity in the number of services, devices and standards that are now available to employees, and the resultant risk of confidential corporate data entering the public domain if allowed on personal smartphones and tables, means enterprises have to ensure that the smart devices are adequately secured and managed. They also have to ensure that the overall integrity of the corporate network is not compromised as a result of BYOD (Scarfo, 2012), (Thomson, 2012).

In a survey of 4017 employees conducted in 2011, 23% of respondents were already using personal technology devices and tools for work on a regular basis. 36% of them claimed they didn't worry about their organisation's IT policies and standards when using their personal devices to carry out work. What was considered most telling was that 45% of participants felt that their own personal devices and software applications were more useful than the ones provided by their employer (Harris et al., 2012).

2.3.3   BYOD and the Employee

"Mobile Working" has been characterised as having four dimensions (Garrett and Danziger, 2007). These are:

* Work Location: referring to a location other than a central and organised work space provided by an employer.
* The usage of Information and Communication Technologies – the infrastructure, support and access provided by the employer to an employee who engages in mobile work.

- Time Distribution: a comparison which measures the replacement of working time out of the traditional office versus one spent in the office or place of work.
- The Contractual Agreement that exists between the employer and employee in allowing and providing for mobile work.

Dubé and Robey state that flexible work practices brought about by mobile working signify new ways of conducting, co-ordinating, managing and measuring the enterprise work effort. These changing practices help resolve organisational paradoxes by making teams and employees both more independent and mutually interdependent (Dubé and Robey, 2009).

However, this must be tempered with the results of other studies that show that this increased access to mobile technology as part of an employees' work can have negative consequences. A sustained lack of work-life balance which comes about through continuous access to corporate information can, over time, lead to a deterioration in emotional and psychological well-being, commitment and productivity (Ahuja et al., 2007). Furthermore, advances in technology that facilitate remote working can blur the lines between work and the perceptions that employees have of personal time, eventually leading to higher levels of stress and employee turnover.

A series of semi-structured and unstructured interviews of IT professionals engaged in distributed work, all of whom used mobile technologies to carry out their work, showed that using mobile technologies could have adverse effects on their concept of a healthy work-life balance (Sarker et al., 2012) The researchers categorised the effects into four areas.

- The use of mobile technologies provided by the employer revises the psychological contact between both parties by raising the expectations (either actual or perceived) of availability and ability to respond.
- Although mobile technologies can facilitate flexibility, both in terms of physical location and time, they also blur the boundaries between work and personal time.
- The flexibility that is in inherent in the use of mobile technologies can have the unintended consequence of making co-worker coordination more difficult to achieve.
- It can feed into an employee's personal compulsions. Continuous access to information leads to a tendency to constantly be 'clocked in'. Having a mobile device that provides instant and streamlined access to information makes it difficult to define

the boundaries between work and personal life. The work-life balance can move from a compartmentalised view, where both are separate and discrete functions, to one where the work view becomes all encompassing.

The researchers are of the perspective that enterprise mobility solutions will always lead to an overlapping of the work-life balance relationship, and that a clean separation of the two domains is neither feasible nor necessarily desirable. It also found out that co-workers will have different perspectives on what a healthy work-life balance is, and that natural tensions may arise when those who hold different preferences interact using mobile technology (Sarker et al., 2012)

2.4   Organisational Mobility Requirements

Different organisations will have varying levels of enterprise mobility requirements based on the jurisdictions, industry and markets in which they operate (Barnes, 2003). These enterprise mobility requirements can be dividing into three categories:

- *Industries with High Mobility Requirements.*

This category involves organisational settings where users and assets are geographically dispersed or moving constantly. Examples given include the utility and shipping industries, where either physical assets such as shipping containers, or employees such as field workers and engineers are placed within a broader temporal or spatial boundary.

- *Industries with Medium Mobility requirements*
This category includes organisations where users are highly mobile within a restricted and easily defined perimeter. This may involve an employee using a mobile device or service within a building, for example, within a warehouse or in a hospital setting.

- *Industries with Low Mobility Requirements*
Some industries will have lower mobility requirements and the use of mobility ICT will not have a significant influence on how work is completed. Examples included small shops such as newsagents and butchers.

Using these categorisations as a starting point, the author presented a conceptual framework for understanding the potential of mobile applications within the enterprise.

This model is often referred to in later literature as a foundation for measuring the requirements an enterprise has when developing a mobile strategy (Basole, 2008). This can then be placed within the context of the development of a mobile strategy or when deciding on the scope and scale of a BYOD program.
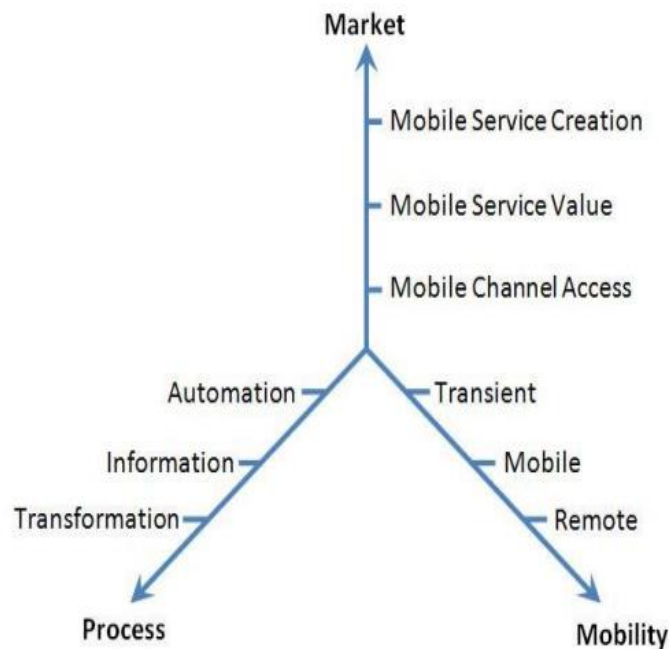
Figure 2.1 - Stages of Mobile Enterprise Model. (Scornavacca & Barnes, 2008, p. 232)

2.4.1   Mobile Independence

Mobility describes the type of spatial independence enabled by the mobile data solution. The first level is *transient* which describes basic mobile support for employees as they move from one location to the other. The second is *mobile* where the employees have a much greater independence from the enterprise as a geographically-bound entity, and for longer periods of time. They will however return to corporate locations to perform certain functions. The highest level of mobility is *remote,* a situation when employees are almost completely removed from the enterprise location and therefore have the greatest need for mobility solutions that allow them to access enterprise information and to have the required toolset to carry out their work.

2.4.2 Processes Enabled by Enterprise Mobility

The *Process* axis describes the change in the processes and methods of how work is performed as a result of the adoption of mobile ICT technologies.

The first level is *automation,* referring to efficiencies gained in existing processes by the implementation of new technology. Automation has always been considered one of the fundamental requirements of technology and its effect on work has long been a topic of interest to researchers across a broad range of disciplines.

Information brings in further efficiencies through the use of mobile ICT by allowing for rapid access to information and changes in how knowledge work is carried out. Decision support functions are enhanced by the availability of relevant organisational data on a mobile device.

The final level, *transformation,* describes how the use of mobile ICT can bring about fundamental changes in how organisational processes are carried out. The Mobile ICT solutions offered by the enterprise can radically change how the entire organisation carries out its work.

2.4.3 Markets Opportunities for Mobile Services

The *Market* explores the dimensions and stages of using the mobile ICT solutions for bringing value propositions to the marketplace. While in the context of mobile solutions this can often refer to the development of products, services and relationship channels with customers, it can also be used to refer to alternations in the market experiences of supplier and partners.

Mobile Channel Access indicates that the mobile medium is largely being used as a conduit for the dispersion of information to mobile employees, without offering differentiating services or new methods of accessing and analysing information. Initiatives such as mobile access to corporate email or the development of applications displaying employee resource information are often the early stages of a process that will eventually lead to a more cohesive and wide-ranging mobility strategy (Sathyan et al., 2012).

Mobile Service Value represents the next stage in the mobility journey. It is where the mobile solution is being used to add measurable value to the market offering. The mobile ICT offers greater access to corporate information or brings about change that is significantly enhanced by the technology being used.

Mobile Service Creation indicates that not only is the technology being used to bring about enterprise transformation in existing processes, but that the Mobile ICT is being used to create entirely new products or service offerings.

2.4.4   Mobility Solutions for Utilities

A 2005 study showed that utility companies tend to have a large mobile workforce and therefore can derive large benefits from implementing mobility ICT solutions that support these workers as they carry out their core functions (Nah et al., 2005). Mobility solutions can be deployed across many aspects of the generation, service, distribution and transmission areas. The consumerisation of IT means that specialised computing devices are no longer required, and that the economics of BYOD allow field workers to use this own devices, if such a service exists (Sathyan et al., 2012).

In support of the generation of electricity, smartphones and tablets can be used to assist in:

- Equipment Installation and Maintenance – the adaption of mobility solutions can aid in the installation and tracking of new plant equipment; can assist in real-time data capture and allows for real-time communication to backend Enterprise Resource Planning (ERP) systems. It allows for comprehensive safety and auditing checks to be captured in a more thorough and accurate manner.
- Inventory Management – electricity generation plants operate within strict control and maintenance guidelines and there is little room for unscheduled downtime. Identifying equipment and components with barcodes and RFID (Radio Frequency Identification) tags allows a plant worker to use a mobile device for asset tracking, and to quickly interface with the Asset Management System for reordering parts.

The transmission and distribution segment deals with end-user interfaces, commercial and residential customer management, service request management, logistics, and end-to-end distribution system management. Amongst the services that can be mobilised in this area are:

- Dispatch and Customer Service Management – Due to the large number of customers, and the strategic importance of the electricity network, it is imperative that utilities have effective processes and procedures for dealing with customer requests. Mobile Solutions can automate the capture of customer requests from mobile applications or web interfaces. Field Service workers can then receive customer information, appointment times and work that are geographically proximate using either personal or corporate owned devices. Both the customer and employee mobile solutions can interface with the utilities' ERP system to automate many of these functions (Nicol, 2013).

- Metering and Spot Billing – Mobility solutions are already widely used within electricity distribution and supply companies to automate the capture of meter data. A mobile device can be used to capture a meter reading and submit it in real-time to a backend billing system. The next generation of metering technology allows meters to transmit data to an employee with a mobile device that is walking in the area. There are also developments in the use of cellular devices in meters to completely automate the process of gathering meter data (Jagstaidt et al., 2011). When implemented for service management, BYOD be used for assigning meter installation and maintenance service requests to field service staff in real time.
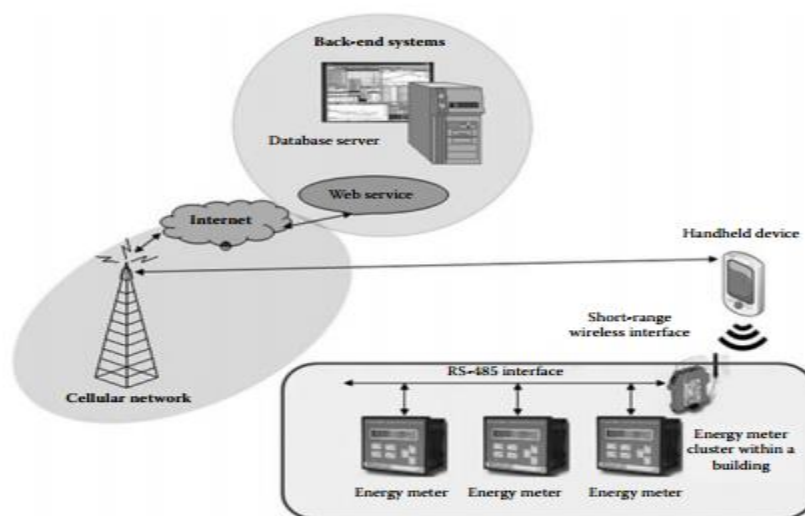

Figure 1.2 - Automated Meter Reading - (Sathyan et al., 2012) p230.

- Field Force and Fleet Management – utility companies have a large field force, often made up of both employees and contractors. Field Service Management software can use

algorithms, business value objectives and GIS data to ensure that the field force resources are used optimally. Mobile solutions allow the field worker to receive work requests that best utilise their day, while minimising the travel between locations. It also allows the field worker to update a work order upon completion, or to arrange a rescheduling of an appointment with a customer (Sathyan et al., 2012).
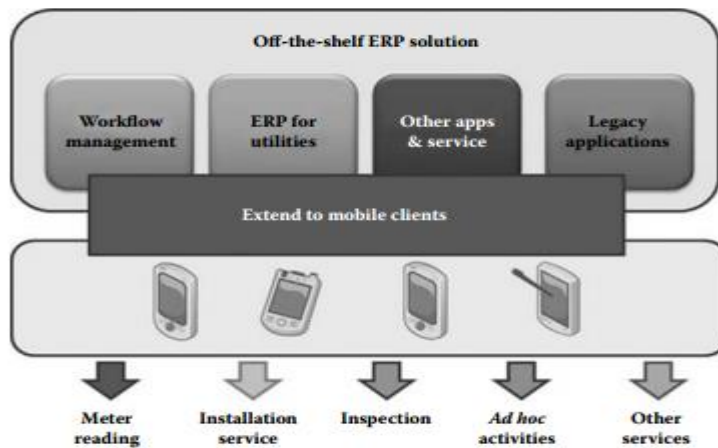
Figure 2.3 - Extending ERP Systems to Mobile Devices – (Sathyan et al, 2012, p227)

2.5   Enterprise Mobility Strategies

Developing a corporate mobile strategy allows the organisation to best prepare for these mobile technologies, and to provide solutions that best meet their needs. The strategy needs to consider the people, processes and technologies involved in mobilising the organisation's IT assets. Even in 2014, 60% of the top 1000 listed companies in the United States will have failed to put in place a comprehensive mobile strategy (Willis, 2013)

This failure to develop a mobile strategy will typically lead to higher costs, lower levels of security, piecemeal implementations, siloed solutions and the unnecessary duplication of services when mobile solutions are developed. The importance of aligning IT strategy with business requirements to derive maximum return on investment has been widely covered in academic literature (Peppard and Ward, 2004) (Bharadwaj, 2000). IT can also create business value by increasing the overall operational performance of the organisation in areas such as productivity, inventory management, competitive advantage and controlling cost (Melville et al., 2004).

2.5.1   BYOD Methodologies and Frameworks

While there are many frameworks and templates available that seek to guide organisations during the development of a BYOD program, the majority of them are developed by companies actively involved in the provision of software and services used to manage such a service. However, there are a number of frameworks or methodologies relating to the integration of mobile services (of which BYOD is one) into the enterprise that have been published by academics.

Soh and Markus state that converting investments in IT to IT assets that effectively and efficiently create business benefits requires three processes. They are the *IT Conversion Process,* the *IT Use Process*, and the *Competitive Process.* (Soh and Markus, 1995)*.* Building upon this construct, researchers adapted the process model to form the "Mobile IT Conversion Process". Using the results of a survey of 192 German CIO's, they developed a framework that claims to achieve business value from investment in Mobile IT (Stieglitz and Brockmann, 2012).
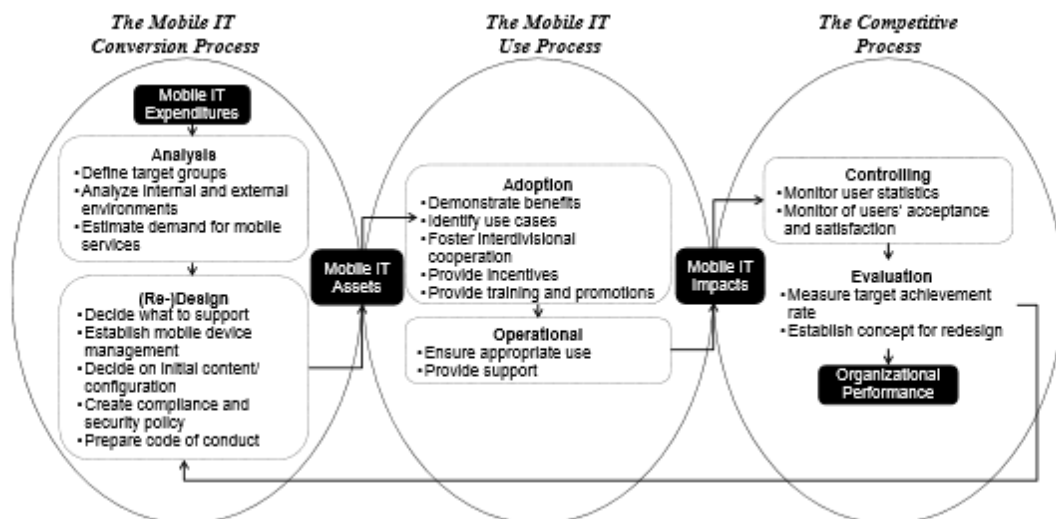
Figure 2.2 Lifestyle Tasks to Increase Organisational Performance by using Mobile IT (Stieglitz and Brockmann, 2012).

Nicol's framework (see Figure 5) delivers an assessment of the functional elements that are needed when creating a mobile strategy. The framework starts with an overview of the anticipated business cases results that are creating the need for a mobile service such as

BYOD. It then asks what the service should offer the enterprise, and the functional or strategic area that it will affect. The transformation portion of the framework asks the IT Function to deliver on the business need by providing overall context, development, management and security services (Nicol, 2013). The author then elucidates on the changes need at an architecture and policy level within the IT Function to deliver on the outcomes proposed in the business case.
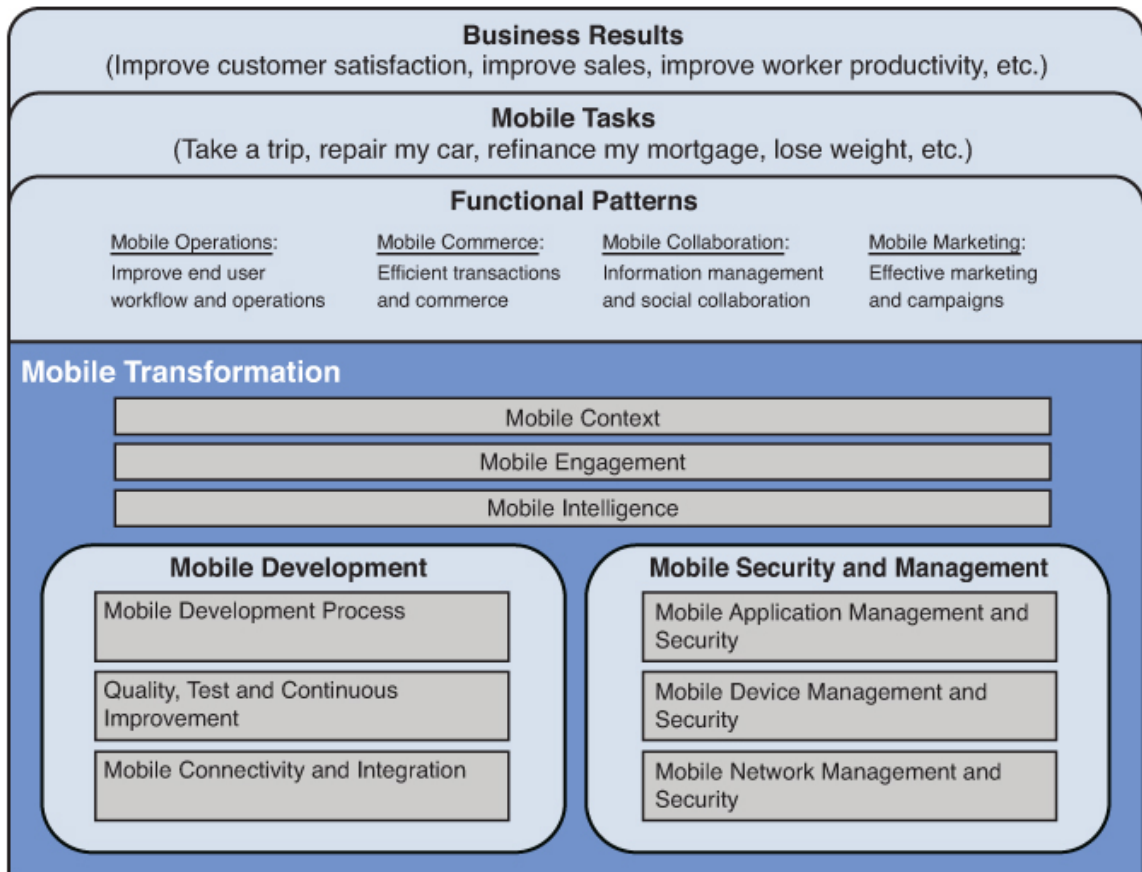
Figure 2.5 Nicol's Mobile Framework (Nicol, 2013, P51)

A more detailed account of the changes needed at an IT Architecture level to deliver mobile services shows that redesign spans several dimensions (Godinez et al., 2010). The physical architecture needs to consider the overall topology of the solution, and the assets needed to deliver the solution. The logical architecture defines the systems, interfaces and relationships needed to deliver BYOD. The usage architecture defines the behaviour and usage patterns of the customer, and how they will interact with corporate data using a personally owned mobile device.

Figure 6, the Basole Model of Readiness for Enterprise Mobility is one that can be applied to the implementation of a BYOD program. It places the development of such a program into two categories, those of a social and those of a technological perspective. Technology and leadership are vital components of the strategy, with the skills required in both areas increasing as the initiative develops and moves through its iterations.
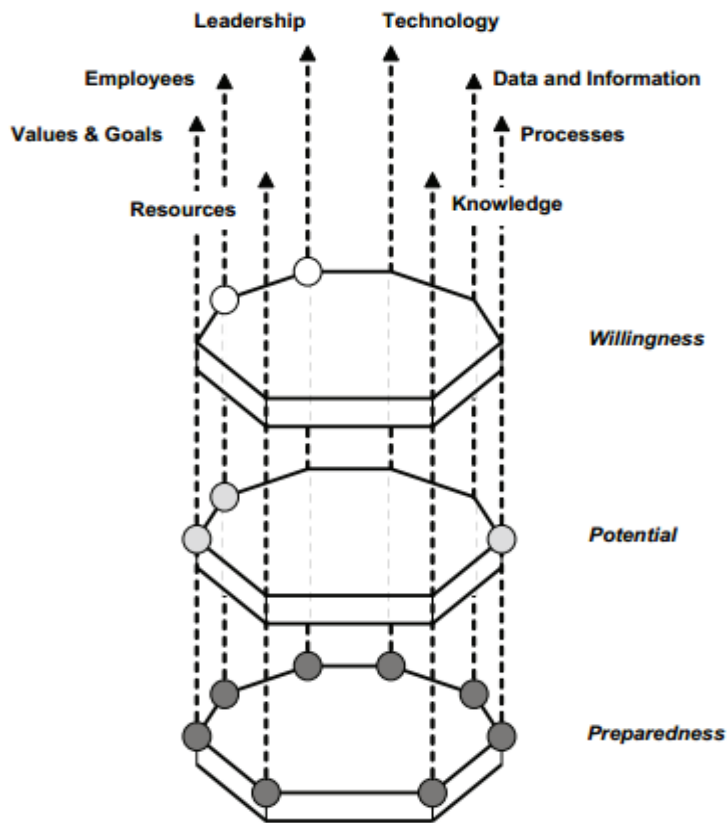
Figure 2.6 - Dimensions and Layers of Enterprise Readiness for Mobile ICT (Basole, 2006).

2.6　Summary

Bring Your Own device is a policy whereby the employer allows employees to use personally-owned devices for work purposes. Exact implementations vary based on the willingness of the organisation to allow such a program, their ability to implement such a program, their mobility requirements, and the desire of employees to have such a program. BYOD has the ability to deliver many tangible and intangible benefits to both the

organisation and the employee. These include improved productivity, new and innovative uses of mobile technologies, and increased employee satisfaction. Concerns around data privacy, cost of delivery, and employee perceptions of the program must all be considered during the planning stage of such a program. The program should also encompass the HR and Legal departments, and the laws of the jurisdictions in which they operate. Utility organisations are traditionally slow to adopt new technologies, despite the literature showing that they have mobile technology requirements that exceed those of many other industries. A failure to have a BYOD strategy that forms part of a larger mobility strategy leads to failed implementations, piecemeal services, higher operating costs, and decreased satisfaction with the service. Aligning the service with the requirements of the organisation is seen as vital if the program is to be successful. A number of frameworks have been developed that guide the enterprise through the steps required to implement such a program. The readiness of the organisation to implement such a program is the most important factor in ensuring the success of the program. The readiness metrics encompass technology, leadership, enterprise mobility requirements, resources and skills.

3   Methodology and Fieldwork

3.1   Introduction

This chapter uses the research methods demonstrated by Saunders et al to produce a research philosophy and strategy appropriate to the study being undertaken. The work of Saunders et al is considered a seminal text when deciding on a research method to support the research objectives.

This chapter seeks to provide a brief overview of the various research methodologies and philosophies, and to give a justification for the selection of a particular approach. A description of how the research was conducted and the manner in which it was gathered is given, before concluding with a synopsis of the ethical considerations pertinent to the research methodology used, and the lessons that have been learned by choosing such an approach.

Using the metaphor of the 'Research Onion', a process is followed to justify how a chosen research method is placed within the context of the other design decisions that are available as valid selections (Saunders et al., 2012)

3.2   Purpose of Research

The purpose of the research study is to understand how the implementation of a BYOD program within the utility can influence decisions, technologies, strategies, impacts and other factors within the IT function of the organisation. A BYOD program brings with it greater opportunities for the enterprise as a whole, but also new challenges for the IT function in how services are provided to its internal customers and other stakeholders. It also hopes to explore how the IT function will respond as consumer-level hardware and software technology reaches parity, and even exceeds business technology in its functionality. The study may also give context and insight into how a BYOD program can contribute to innovation in both the IT function, and within the organisation as a whole.

3.3   Research Methodologies

The body of literature related to the selection of a research method is broad, and a number of prominent contributors to the field have suggested that the researcher should

select a method which best answers the research question, or which best fits the purpose of the research being undertaken (Bryman and Bell, 2011). The decision to select a research method will invariably bring its own advantages and disadvantages, and it has been argued that a researcher cannot summarily exclude a method without having first considered how it could be used to address the aims of the research question being investigated. An often cited work by Saunders et al (2009) divides the research process into a number of discrete subsections that can assist in deciding on a valid research methodology. In the research onion, there are six layers, namely: philosophies, approaches, strategies, choices, time horizons, techniques and procedures.
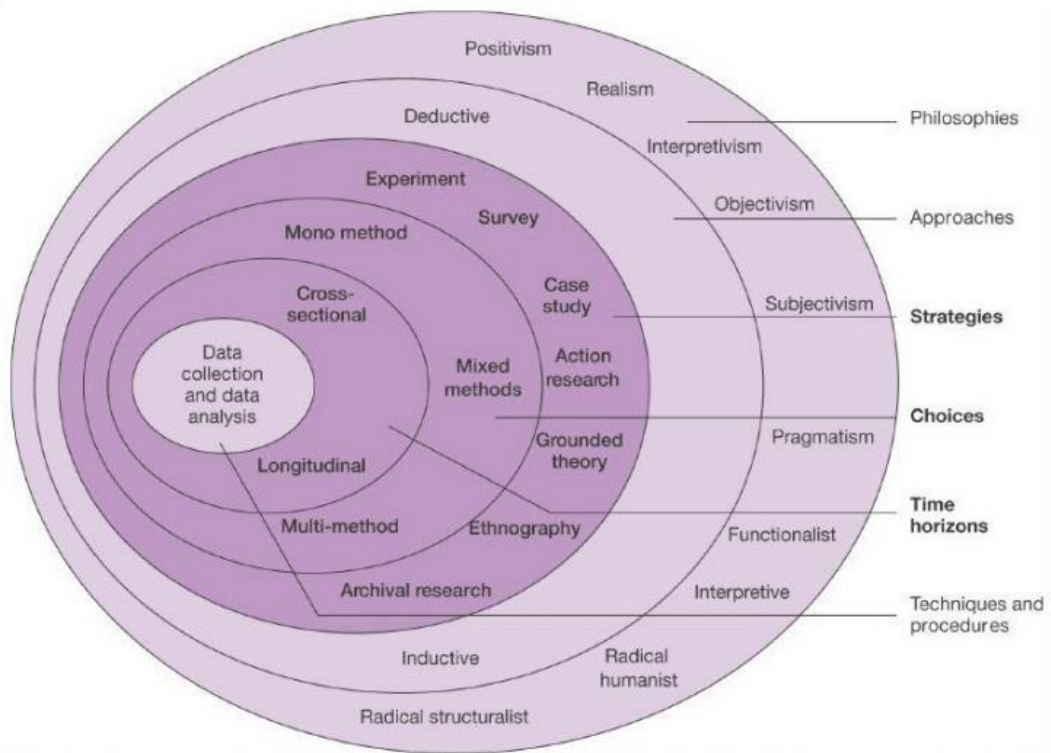
Figure 3.1 - The Research 'Onion' (Saunders, Lewis & Thornhill 2006)

3.4   Philosophies

Saunders et al identify three philosophies relevant to the study of business or scientific processes: epistemology, ontology and axiology. Epistemology is the branch of philosophy "concerned with the study of the criteria by which we determine what does and does not constitute warranted or valid knowledge" (Gill and Johnson, 1991). Ontology is the study of being or existence, or if reality is "the product of one's mind" (Morgan and

Smircich, 1980). The conceptualisation of what epistemology, axiology and ontology mean to the researcher can be viewed from four broad perspectives. A research philosophy describes how the data within a research study is collected, analysed, interpreted and presented (Yin, 2013).The four prevalent research philosophies amongst researchers in the study of information systems are:

- Positivism

- Realism

- Interpretivism

- Pragmatism

3.4.1   Positivism

The positivist approach comes from a belief in the possibility of observing and describing reality from an objective viewpoint. It subscribes to a belief that the world follows generalised laws which allows the researcher to observe and measure predictable patterns of outcome. Positivism has been defined as "working with an observable social reality and that the end product of such research can be law-like generalisations similar to those produced by the physical and natural scientists" (Remenyi et al., 1998). The positivist approach is usually, but not always, associated with quantitative research methods.

If someone was to state that a BYOD policy had led to greater workplace efficiency, then this would need a measurable indicator as to how it had led to this greater efficiency. While the positivist approach works well for the sciences, the reliance on measurable outcomes, large sample sizes and hard numbers can have limitations when applied to research that involves a human stakeholder. A 1991 paper showed that in a study of 155 papers published across 7 prominent IS journals, 96.8% used a positivist epistemology. This led the authors to suggest that using multiple methodologies would be better suited to IS research that involved human factors (Orlikowski and Baroudi, 1991). However, the emergence of unanticipated outcomes when applying a mixed-methodology approach, especially using a small research frame, has been cited as a reason to apply caution when considering such an approach (Bryman and Bell, 2011).

3.4.2   Realism

The *realist* philosophy is another which is used in the development of a research methodology. It shares many of the same epistemological perspectives as those of *pragmatism* in that it assumes a scientific approach to the development of knowledge (Saunders, Lewis, and Thornhill, 2009). There are a number of competing perspectives within the realist philosophy, but at its heart it seeks to ascribe a perspective of reality that exists independently of the observer, while recognising that the way these perspectives are measured is influenced by social conditioning (Saunders, Lewis and Thornhill, 2009).

3.4.3   Pragmatism

The pragmatic approach is based upon the assumption that no philosophy can ever adequately describe all the factors and variables inherent in the undertaking of a research project, and that choosing a purely interpretivist or positivist approach is neither practical nor feasible. The pragmatist will argue that the most important determinant in the selection of a research philosophy is the question itself, and that the use of mixed methods can be beneficial when attempting to gather research as part of the study. As such it can use both a quantitative and qualitative approach.

3.4.4   Interpretivism

The interpretivist approach comes from a belief that the creation of knowledge is through one's own experiences, belief systems, ideological viewpoints and biases. It holds that business, management, and the influence of human actors are too complex to be reduced to 'law-like generalisations' (Remenyi, Williams et al. 1998). It challenges the researcher to take an empathetic approach to the social actor by emphasising the need to understand, analyse and interpret their motives, opinions and belief systems. It is a philosophy that is increasingly used in the sphere of business and management research, and is considered especially useful in research that may involve multiple realities which have been socially constructed (Saunders et al., 2012). Interpretivism uses qualitative methods and is linked with the theory building or inductive approach to research.

3.4.5   Philosophy Chosen

While the positivist approach works well for the sciences, the reliance on measurable outcomes, large sample sizes and hard numbers can have limitations when applied to research that involves a human stakeholder. However, the emergence of unanticipated outcomes when applying a mixed-methodology approach, especially using a small research frame, has been cited as a reason to apply caution when considering such an approach (Bryman 2006).

Given the nature of the research question and the topic being discussed, an interpretivist philosophy is considered most valuable in seeking to ascertain the factors involved in the development of a BYOD strategy by the ICT function of the utility. The research needs to be able to identify the complex series of strategic, economic, technological and regulatory inputs that lead to the adoption of such a strategy. These concepts and considerations are not determined *a priori*, but will emerge through applying qualitative methods based on an interpretivist approach. The literature review has shown that human factors are paramount when considering the implementation of new technology, and therefore this is considered a valid approach as it places the human actors and their cognitive realities at the centre of the research method. The research is being conducted in an organisation where I am an employee and therefore the axiology of interpretivism lends itself well to such an approach as interpretivism lends itself to a subjective view of reality.

3.5   Approaches

The research onion next asks the researcher to consider an appropriate approach to the research study. These are the deductive and the inductive approaches.

The deductive approach involves developing a theory or hypothesis and testing that theory using an explicitly designed research strategy. As such, it lends itself to a positivist approach to the research question. The scientific approach to testing the data will lead to a process that allows for some measure of validity to be applied to the findings. Rules, laws, previous quantitative research and accepted principles are often used when applying the deductive approach (Burney, 2008). Burney also goes on to state that the inductive approach is best applied to situations where the research moves from a specific observation or hypotheses to one where broader generalisations and theories are developed. Saunders et al believe that the inductive approach is one suited to the

interpretivist philosophy. The researcher uses an interpretivist philosophy to elicit data, and then uses that data to develop a theory. This can be contrasted with the deductive approach which moves from a theory to data as concepts and constructs are analysed using structured investigations (Saunders et al., 2012)

Based on this, an inductive approach is considered best suited to exploring the research question.

3.6   Strategies

The research onion next presents seven research strategies that the researcher can consider when undertaking a body of research. Some of the strategies lend themselves to a deductive approach to data gathering and analysis. For example, the experimental strategy is one associated with laboratory based research. It has been suggested that such an approach is less likely to be associated with research pertaining to the study of management. BYOD and the development of enterprise mobility solutions are still areas that are grounded in uncertainty and with numerous stakeholders and actors influencing both the input and design decisions. Many of the technologies and strategies are still considered to be in their infancy, and organisations are reacting to changes in technology that are fundamentally changing the way IT services are procured, supplied and supported. As such, it was decided that using an experimental approach was not appropriate.

The use of surveys within information systems research is common, and can be an excellent way of undertaking exploratory research. It's a deductive approach to data gathering and analysis, and lends itself well to large sample sizes. Wright suggests that one of the main advantages of using a survey is the ability to gather a large amount of responses in a relatively short period of time, and at a lower cost to the researcher in terms of finances and time (Wright, 2005). As the survey methodology applies a quantitative approach it allows for the application of statistical analysis and measured outcomes.

One of the main drawbacks of the survey method is that it often precludes the researcher from asking additional or more in-depth questions about a subset of the research. It also precludes a participant from offering additional information that they feel relevant, being limited by the structure and design of the question set (Saunders et al., 2012). Deploying

a survey strategy to examine the factors and influences that will lead to the development of a BYOD strategy in the utility, in the context of their being multiple external influencers and a small sample set, wasn't considered appropriate. The involvement of multiple actors in the development of such a strategy would affect the ability of the research to obtain data of real quantifiable value.

Case studies are associated with the study of contemporary artefacts and observations within real world scenarios. It is a strategy associated with qualitative research. The approach has been shown to lend itself well to the "why", the "how, and the "what" style questions (Saunders et al., 2012). Saunders et al also note that it's a research strategy that lends itself to exploratory examination of the research question, as it can be used to investigate both the phenomenon itself, and the constructs and contexts within which it is being studied. The outcomes from the case study can then be used as the basis for developing the 'more structured tools' that are needed for survey or experimentation (Rowley, 2002).

(Eisenhardt, 1989) states that case studies are:
"Particularly well suited to new research areas or research areas for which existing theory seems inadequate. This type of work is highly complementary to incremental theory building from normal science research. The former is useful in early stages of research on a topic or when a fresh perspective is needed, whilst the latter is useful in later stages of knowledge".

The initial case study allows for new insights or conclusions to be reached (Stake, 2006). However the author goes on to state the benefits of such an approach are limited if the number of cases selected for investigation is less than four. While a multiple case study approach allows for triangulation and validation by using cross case analysis, a review of the literature shows that the adoption of BYOD programs by enterprises is still an area that is undergoing continual change and development. The technology, processes and strategies leading to the adoption of such a program differ based on a myriad of influences, some of which are: the industry in which the organisation conducts the majority of its business, senior management understanding and support for mobile technologies, main jurisdictions in which the organisation operates, economic conditions, as well as a rapidly changing technology landscape. Organisations' may have very different mobility requirements and abilities to implement, and pursuing a multiple case-study approach of

such an embryonic technology could lead to inconsistencies in findings, or a lack of a cohesive set of themes.

While a single case study method offers no ground for proving the reliability of findings, it does allow for an in-depth examination of the organisation being studied. Yin (2009) argues that the rationale for considering the single case approach is where the case is 'a representative or typical case'. Given that BYOD is entering the workplace at the same that organisations are looking to expand their use of mobility technologies, and that in 2013 it was rated as the second most important technology initiative for CIO's, many of the factors and considerations needed for such a program will share a commonality across enterprises (Willis, 2013).

The use of the single case study can then be used to further develop a theory, or to place the case study within the broader field of research pertaining to the topic.

3.7 Choices
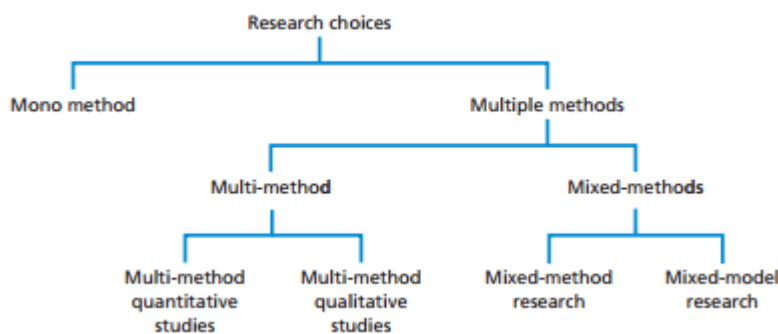
Figure 3.2 – Research Choices (Saunders, Lewis & Thornhill 2006)

The research onion proposes different choices when it comes to choosing a research design. The mono method uses a single data collection technique, with a corresponding form of analysis. A multi-method approach means using more than one data gathering method and using more than one analysis technique to answer the research question. As a case study approach was considered most suitable in seeking to answer the research question, the mono method was chosen.

3.8   Time Horizons

The penultimate layer of the Research Onion next asks the researcher to choose between either a cross-sectional or longitudinal time horizons. The cross-sectional approach is appropriate for shorter duration studies and often uses a quantitative approach for data gathering. It is also considered suitable for the adoption of a qualitative approach to data gathering. As such it's a valid approach when using semi-structured interviews over a short period of time. This can be contrasted with longitudinal studies, which, by their nature, tend to involve studies that take place over longer periods of time, or which may have time as a random variable, thus ensuring that the period of research hasn't been defined in advance. Given the timelines congruent with the research, a cross-sectional approach was considered appropriate.

3.9   Techniques and Procedures

The final layer of the onion involves deciding upon the techniques and procedures to be used to gather research data. Based on the rational used in the earlier sections, the use of semi-structured as a data gathering exercise was considered most appropriate. Interview data can be very rich, and the medium lends itself to carrying out a thorough investigation of a particular subject. Semi-structured interviews are a research method commonly applied to qualitative research in the field of information management research. The interview has a structure, with set questions being asked of all participants, but it also allows for the organic development of the interview, with some areas or points being investigated in further detail. It also allows the participant to provide further detail to questions that they may have a deep knowledge of. Opinions and concerns can be discussed, and it allows for a more holistic perspective of the topic under consideration, rather than being limited by the regimental nature of a set of survey questions; or questions asked during structured interviews. They also enable the interviewer to understand how the culture of the organisation or the ideological perspective of the participant can influence their opinion on the implementation of a BYOD program in the utility.

Potential participants were sent an initial requesting them to take part in an interview. All interviews were to take place on a one-to-one basis in the organisation's head office. Participants were asked to read the Informed Consent form and the Participation Request

form, and to raise any observations or questions in advance of the interview taking place. All the participants were senior members of the IT function of the case-study organisation, and were involved in roles that would be impacted by the development of a BYOD program. Many of the interviewees are key decision makers within the IT function, both in their responsibility for strategy and IT policy, and in their ability to raise budgets to procure new products and services.

Interviews were conducted over a period of ten days in June, following receipt of approval from the Ethics Committee in Trinity College Dublin. The interviews were between forty five and sixty minutes in duration. Each interview began by explaining the purpose of the research and why interviews were chosen as the data collection method. Participants were then read the informed consent form and asked if they had any questions. Participants were then asked to read the Participation form, raise any questions or concerns, before being asked to sign the Informed Consent form. There were no objections to interviews being recorded for the purposes of subsequent transcription. At the end of the interviews, participants were thanked for their input, and informed that they could request a debriefing following submission and grading of the research.

3.10 Methodical Limitations

The use of a single case study doesn't allow for validation and triangulation. Triangulation enables the use of multiple data sources to bring additional validity to findings (Blumberg et al 2005). Given additional time, the use of a multiple case-study approach would be considered, preferably with other utilities involved in the European market. While a number of research organisations have issued recommendations from other BYOD implementations, a secondary data source would allow for validation and assurance that the findings emerging from the research within the organisation are aligned with those being experienced in other similar organisations.

All the interview participants were members of the IT function of the organisation being researched. While the research question sought to explore the factors that lead to the implementation of a BYOD strategy in the organisation, it would have been useful to interview interested stakeholders from other areas of the company or to seek the opinions of end-users of BYOD technologies through the use of a survey.

The participant demographic were all members of the IT function of the organisation, and were known to me. This could lead to answers that were influenced by both the relationship between the interviewer and the interviewee.

The data that is gathered could be influenced by both the perspectives of the interviewer, and by the type of questions that were asked. While care was taken to try and minimise such biases both in the design of the questions, and in the manner in which the interviews were conducted, a tendency for such biases to emerge cannot be ruled out.

3.11 Ethical Considerations

Researchers must consider the ethical considerations and psychological implications of participants taking part in the research (Robson, 2002). The School of Computer Science and Statistics in the University of Dublin have clear guidelines and procedures that must be followed before conducting research. Ethical approval for this study was sought from the Ethics Committee at the school. Permission to proceed with data collection in the form of semi-structured interviews was given by the committee in June 2014.

Given the detailed nature and estimated length of those interviews, the decision was taken to digitally record the interviews. This brings with it additional ethical considerations. So as to avoid any unforeseen circumstances as a result of digitally recording the interviews, the Informed Consent and Participant Information forms both state that:

- The researcher is a fellow employee of this organisation and that the data gathered during this interview will only be used for scientific purposes.
- In the unlikely event that you make illicit activities known, these will be reported to appropriate authorities.
- Electronic recordings can be stopped at any time, and you may at any time, even subsequent to your participation, have such recordings destroyed (except in situations such as above).
- The Interview Consent form declares that the interview will be digitally recorded to allow me to transcribe the interviews. The digital transcript will be destroyed following submission of the research, and no personally identifiable information will be published. All audio recordings will be stored for the duration of the study in accordance with Irish Data Protection Requirements.

Digital recordings were encrypted using industry standard software, and will be destroyed following submission of the research.

3.12 Lessons Learnt

A test-case interview with an impartial participant would have been useful in honing both the method of delivery and the order in which the questions were asked.

The transcription of interviews from audio into text was extremely time consuming, with a forty five minute interview taking approximately six hours to transcribe. A number of methods of accelerating the process using technology were tried, but found to be inadequate. The manual transcription of interviews does, however, allow for a greater insight into common themes that emerge from the interviews. This was of benefit when it came to analysing the data and structuring the findings.

4   Findings and Analysis

4.1   Introduction

Eleven interviews were conducted in support of the research. The participants were all senior managers or key decision makers within the IT function of the organisation, and were selected from across a number of areas within the department. The literature review has shown the implementation of a BYOD program in an organisation will invariably involve the input of actors involved in the areas of architecture, governance, security, and infrastructure delivery. Based on this, the following is the breakdown of participant by area:

Table 4-1 – Participants by Role

IT Function	No. of Participants	Role
IT Security and Data Protection	3	Infrastructure, network and data security. Security and Data Protection policies and directives.
IT Governance	2	Strategy, Policy, IT Management, Project Implementation
IT Architecture	2	Design and Strategic Vision of IT Services
Innovation	1	IT/Business Alignment, Theory and Long Term Strategies for IT Value
Service Delivery	3	IT Delivery to Business, Technical Specialists

The chapter outlines the findings and analysis that were extracted from the interviews. The results of the case study identified several factors that underpin the development of a BYOD program within the organisation. The research also shows that the IT organisation are increasingly trying to derive quantifiable value from their investment in IT, and that merely implementing such a program without being able to demonstrate business value is areas such as business agility, increased responsiveness and competitive advantage against competitors is a policy that cannot be justified.

4.2   Theme Development

The literature review uncovered a number of common themes that need to be considered by an organisation seeking to implement a BYOD program. A number of frameworks and methodologies published by both industry and academia were analysed. These themes can be categorised into two broad areas: Social and Technological.

The social theme is one that touches on organisational readiness, leadership style within the IT Function, skills, core competencies and other human factors. The technical theme focuses on software, the consumerisation of IT, external market forces and the technical delivery of secure IT services. Many of underlying themes that emerged invariably touched on both of the overarching themes.

These overarching themes were used when creating a set of questions to be asked of participants during the gathering of primary data. This allowed participants to explore the common themes pertinent to the implementation of such a program, while providing more information on certain areas that interested them.

These themes were used for manual codification during an initial reading of the interview transcripts. The analysis of the interview transcripts also showed that a number of additional themes were considered important by participants. Some of these themes were highlighted by the majority of participants, while others were seen as being extremely pertinent, but only discussed in detail by a minority of participants. Participants were also asked if they could give examples of specific use-cases where both BYOD and Enterprise Mobility could be used within the organisation.

The main themes that emerged can be categorised into seven areas. These are:

- The Consumerisation of IT and External Influencers
- Device Choice and Platforms Support
- Mobile Services Offered
- Management Software and IT Resources
- Security, Privacy and Data Protection
- Governance
- Innovation and IT/Business Alignment

As the amount of data generated by interviews is broad, the use of a software package can expedite the codification of data. A number of software packages were trialled when deciding on one that would allow for the codification of interview data based on the overarching themes identified during the initial analysis. NVivo was eventually chosen as the software package to be used as it presented a number of features for the analysis and codification of rich interview data. Using NVivo allowed for sub themes to be identified and developed within a main theme, and for relationships to be mapped between themes.

4.3   The Consumerisation of IT and External Influencers

External factors were identified as a central tenet in the development and rollout of a BYOD program within the organisation. All eleven participants were asked a series of questions that sought to understand what these external influences were, and if the participants felt the IT Function should take a leadership position, or seek to temper expectation when it came to the delivery of such a program to employees.

The literature shows that BYOD programs are developing within organisations as a result of a phenomenon known as the consumerisation of IT. While a service was developed in 2013 whereby certain employees could access corporate messaging and calendar facilities using personally owned devices, there isn't a more comprehensive BYOD program available.

4.3.1   Consumerisation of IT

All eleven participants were asked about what the term *Consumerisation of IT* meant to them. Eight of the participants purported to have an understanding of the term Consumerisation of IT, with many of the examples of such consumerisation referring to the use of cloud based and Software as a Service (SaaS) services by employees in their personal lives - and a growing desire for such services to be made available for work purposes. When asked to give examples of corporate IT resources that employees want access to on mobile devices the following were the responses.

There was also an acknowledgement that as technology becomes more pervasive, employees are becoming increasingly IT savvy. One participant stated that: "They're

looking at all the things that are just easy and you can do at home on your tablet or phone or whatever. And there's an expectation that you can use those same services in here".

Table 4-2 – Services to be offered as part of a BYOD program

Number of Responses
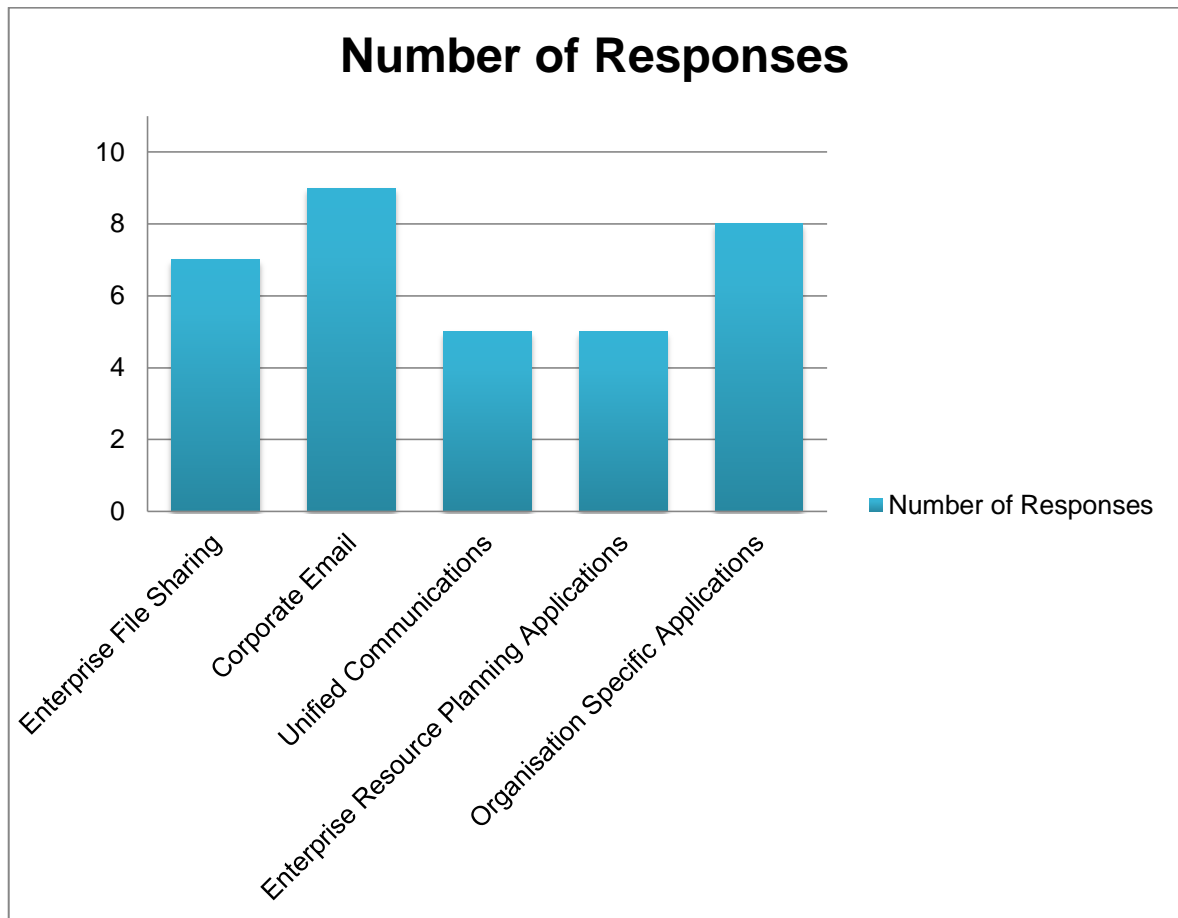
There was broad agreement that while some sense of perspective in terms of timelines, budgets and procurement scenarios needs to be applied by both the IT function and employees when it comes to adopting new technology services such as Enterprise File Sharing; the onus was with the IT function to respond to these changes in market forces. A structured approach to compromise is needed if the BYOD program is to meet its business objectives, and provide true business value to business units and the organisation as a whole.

One participant stated that "trying to control and police this will only go so far; another part of consumerisation is that they will find another way to do it. If they need to have an email on their phone and we don't provide that facility, then they will get the data outside the

building, and we've lost control over that data. So if we don't provide a method, then it really doesn't matter what policy we have around this".

4.3.2 Business Unit Expectations

When asked about other external influencers, seven participants felt that the constituent business units that make up the company are becoming increasingly technology savvy. There are increased expectations that the IT Function will deliver programs such as BYOD to them. Six participants felt that tempering business unit expectations in regards to allowing their employees to use their own devices for the purposes of work is a policy that will not work, and that if services such as Enterprise File Sharing, Document Management and Corporate Messaging aren't provided by the IT Function then employees will simply use external services; or the business units will look to an external service provider for the delivery of those services to their employees.

With more business applications being delivered through cloud, SaaS and hybrid delivery models, business units are not only presented with a greater choice of vendor and payment options, but also with increased choice for how and where the applications are being delivered. Many cloud-based services now offer extremely functional applications for small-factor devices, and there is increasing pressure on the IT Function to allow direct access to these resources rather than limiting access to those employees either physically located in an office, or accessing remotely using a corporate owned and managed laptop.

The deregulation of many of the markets in which the utility operates, and increased competition in those markets was cited by a number of participants as a critical factor in the increased demand by the business units for innovative, cost effective and responsive mobile IT services. A number of the business units are increasingly using mobile and social technologies for capturing, retaining and communicating with their customers, and this was seen as influencing the demand for the deployment of mobile technologies within the organisation.

Three participants cited business intelligence and data analytics as influencing the adoption of mobile technologies. As the business responds to continuous change in the markets in which it operates, advanced business intelligence capabilities are needed to identify business patterns, increase business process efficiency and to support rapid

decision making across the organisation. As this BI capability expands and matures, there is an increased desire from the business units to have this data made available on mobile platforms to support the decision making process.

4.4   Device Choice and Platforms Supported

Of the eleven employees of the IT function interviewed for this research, eight were of the opinion that early iterations of a BYOD program would be a hybrid model which would allow a mixture of corporate owned and managed mobile devices; corporate owned, personally enabled devices (COPE), and personally owned devices. Only one participant felt that the BYOD program would exclusively cater for corporate owned devices, to the exclusion of personally owned devices being able to access corporate IT services (and thus negating the concept of a BYOD program as it is defined in the literature). Two participants felt they didn't have enough knowledge of the area being discussed to offer an opinion on how a BYOD would develop in terms of support for device selection.

Eight of the eleven participants felt that while a BYOD program shouldn't exclude an employee from using a personal computing device for work purposes, they couldn't see wide scale adoption of using a personal smartphone or mobile device for work, at least in the short to medium term. A number of participants felt that there was still an expectation that if an employee was involved in fieldwork or if they needed a smartphone or tablet for work, then the employer would provide it. Current policies allow for the supply of a corporately owned and managed smartphone and/or laptop to employees who need them for work, and there was broad agreement that such a policy would continue to be used.

While all 11 participants mentioned support for both Apple smartphones and tablets, only five people felt there was a need to support Microsoft smartphones and tablets purchased by employees who may want to use them for work purposes. All five participants who mentioned Microsoft Phone OS felt that it was a mobile operating system that would have to be supported under a BYOD program. Microsoft bought the mobile phone arm of Nokia in 2013, and there is a growing acknowledgment within industry consultancies that the Microsoft platform cannot be discarded when it comes to supporting device and platforms in a long-term Enterprise Mobility strategy.

Table 4.3 - Device types to be Supported

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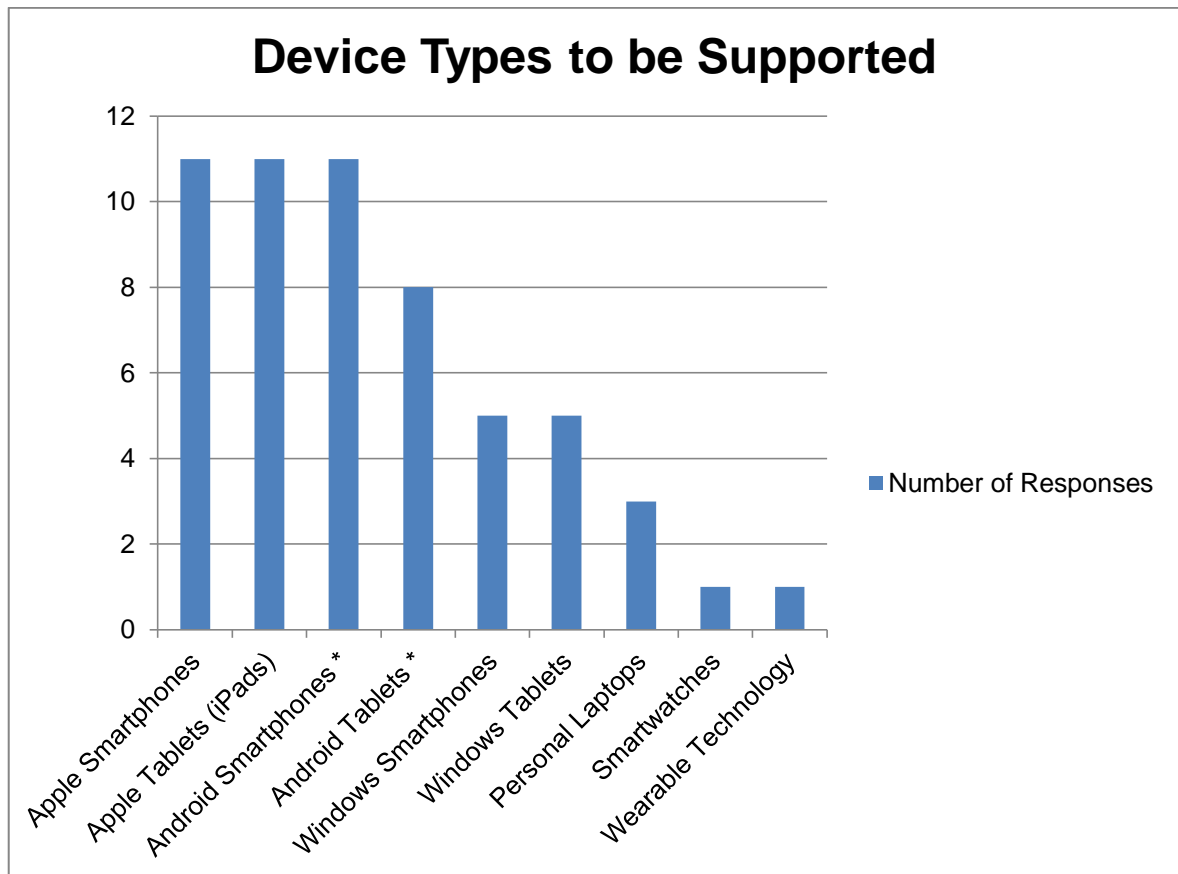
While all eleven participants mentioned Android enabled smartphones, there was some caution expressed by three respondents about summarily allowing Android phones to access IT services and resources using all flavours of the operating system. A member of the IT Security function stated: "we can't allow all these devices to just be able to authenticate. You'd have to control the list of devices allowed to access. Some of the Android devices have very little security at the hardware level. It's the Samsung's and HTC's who are investing in developing the features enterprises want".

Three participants took a longer term perspective on the BYOD program, and their input was considered worthy of inclusion as it illustrates an acceptance of the rapidly-developing nature of enterprise mobility, and an understanding of the implications of these technologies in how IT services are delivered.

One participant stated: "Bring your own device is a term for people using their own device at home. We shouldn't be looking at whether it is your device or the company's device. We should just be looking at it. We need to let mobile devices in and we need to put the

same security around the data, whether I own the device or (the organisation) bought the device. There's no actual distinction between an iPad bought by us or by them".

One of the most salient observations on device selection was made by a member of the IT Architecture function. They argued that the decision over which physical devices to support wasn't one that could, or should, be made by the IT Function, due to the availability of hundreds of devices by multiple manufacturers.

The third outlier response had an interviewee take a longer term view on the consumerisation of IT cycle by suggesting that smartphones and tablets represent a very nuanced and defined perspective on consumer driven IT technologies as they influence business IT thinking at the moment.

"There's benefits to the company and to us (the IT function) is realising this shift and saying 'Listen, where technology was something that was sitting on your desk, it's now shifting more and more to make you mobile and it's almost becoming wearable technology'. So in IT, where you previously had a big mainframe, where you had a big enterprise system, it dictated what that architecture or what that system was; now it's suddenly crossing into personal lives, where it will become part of your clothes. I can't see IT dictating the fashion that they (employees) wear, or the choice of device they want to use".

Seven participants felt that although the availability of smartphones had forever changed the expectation that employees had towards the hardware supplied to them, the IT Function was still in a position to offer advice on personal device selection, along with providing the policies and processes needed to control the corporate data stored on them.

4.5   Mobile Services Offered

An initial analysis of the interview transcripts showed that all participants except one felt that the development and implementation of a BYOD program within the organisation was inevitable. The majority of participants felt that the era of the IT Function purchasing all the devices used to access corporate information and data was coming to an end. However, nine of the eleven participants felt that simply offering a service where employees could use their own tablet or smartphone to access a limited range of corporate applications

wouldn't be of any inherent value by itself. In that regard, the development of a BYOD program is about much more than simply who owns and uses a physical device for the purposes of work, and much more about the series of services, applications and functions made available to the employee on these devices.

While an earlier set question had asked participants what they felt employees wanted from a BYOD program as a result of the consumerisation of IT phenomenon, additional questions sought to find out what services they felt should be offered by the IT Function as part of a BYOD program. While the vast majority felt that corporate email and calendaring applications should be made available to all employees on mobile devices, there was a broad range of additional responses. This shows that there is a considerable difference between what members of the IT Function think should be delivered, as opposed to what they feel the customer base want from such a program.

Seven of the participants mentioned enterprise file sharing as a service that employees and business units wanted. External services like Dropbox, Google Drive and Microsoft OneDrive were given as examples of services being used in the personal lives of employees that were driving compelling business cases within the organisation. As the number of mobile and field workers increases, the ability to be able to share and collaborate on files and documents across a broad range of devices was considered vital.

Five respondents felt a BYOD program should offer services around unified communications. A mobile collaboration client is a mobile application that integrates multiple communication possibilities into a single screen, whether through voice services, text, instant messaging, file sharing or collaboration portals. There was agreement that the business benefits delivered by access to desk workers using technologies such as web conferencing, file sharing and the Sharepoint portal should be extended to workers accessing via mobile devices. When asked to elucidate on the benefits of making such services available the responses included:

- Business Agility
- Workforce Productivity
- Workforce Satisfaction
- Convenience, Flexibility and Ease of Use
- Operational efficiencies

- Greater opportunities for the development of innovative work processes and knowledge sharing

4.6   Security and Data Protection

Issues around security and data protection were mentioned by all eleven participants, with members of the IT Architecture and IT Security functions speaking in some depth around many of the concerns inherent in making corporate data available on personally owned mobile devices.

A codification of the data around IT Security discussions during the interviews lead to the categorisation of IT Security and Data Protection risks into three categories, namely: Legal and Regulatory Issues, Data Confidentiality and Privacy, Cost and Delivery.

4.6.1   Legal and Regulatory Issues

Seven participants spoke about allowing employees to access corporate data and services via personally owned mobile devices, and how this presents unique challenges to the organisation from both a technical and legal perspective.

Enforcing corporate governance standards on employee owned mobile devices was raised as a significant risk. While existing policies exist for the protection of both customer and corporate data on existing computer systems, making this data available on a wide range of devices, some not owned by the organisation, was seen as the greatest concern. There have been a number of high-profile cases where customer data from other organisations have become available after laptops have been stolen and the damage to the reputation of the organisation if such a thing was to happen to the case study organisation was raised by five interviewees. Ensuring continued compliance with a complex raft of data protection legislation as a result of BYOD was also discussed by three participants.

The human resource implications inherent in the rollout of a BYOD program within the organisation were also raised by four participants, with examples given about legal working hours, unofficial teleworking, and the difficulty in making a distinction between personal and corporate data on personally-owned devices from legal, corporate standards

and intellectual property outlooks. Privacy issues relating to employee confidentiality, the processes to be followed for removing corporate data from personally owned devices in the event of resignation, retirement or removal from the company, and the use of logging and tracking of personally owned devices for work were also seen as being pertinent issues by a number of the participants.

4.6.2   Data Confidentiality and Privacy

Risks affecting the integrity, security and availability of corporate data as a result of BYOD were discussed by five participants. Concerns were raised about the potential loss of corporate data as a result of unauthorised access to data held on personally owned devices. While a number of the responses dealt with militating against such risks by investing in MDM and EMM software and insuring rigorous compliance with well-defined corporate policies, there was an overall acceptance that opening up internal resources in such a manner represented a new potential attack vector for unauthorised access to corporate systems. Reengineering or redesigning the external perimeters of the corporate IT network to allow for increased enterprise mobility services was seen by the majority of participants to be a necessity for the long-term development of IT services, amongst them cloud, BYOD and PaaS offerings. Five participants discussed the inherent dangers in making such wide-scale changes without considering all the technical considerations needed to secure internal IT resources. A number of the discussions were outside the scope of the research question as they touched on aspects of IT Delivery separate to those needed for the delivery of a BYOD program.

Members of the Service Delivery and IT Security functions were more likely to raise this as a concern, with one participant stating that: "we really have to stand back and think about this. All it takes is one important email or word document to enter the public domain, and every benefit that our BYOD program brought about is wiped away. We can't ignore this consumerisation trend, but we don't need to be so reactionary about it that we lose sight of what we do as an IT house".

As well as discussing the risk of unauthorised access as a result of devices being lost or stolen and corporate data entering the public domain, three participants also raised the issue of malware, viruses and exploits becoming available that target the mobile device itself. Activities such as spoofing, identity theft, social and human engineering, and the

inappropriate use of the personal device putting corporate data at risk were seen as potential barriers to the implementation of a wide-ranging BYOD program. The subject of device selection correlated with many of these discussions, with scepticism shown towards allowing all Android OS versions have access to IT resources. Four participants felt that Microsoft offered the most compelling long-term vision when it came to an integrated approach to the delivery of IT for large enterprises, with three participants from the Service Delivery and Infrastructure Architecture functions discussing the integration of internal Active Directory services with those offered on the Windows Phone OS.

4.6.3   Security Expenditure and Cost

The literature has shown that the implementation of BYOD programs can bring additional costs to the delivery of IT Services. While the use of personally owned and paid for devices in the context of work may bring about an overall reduction in the need for hardware refreshes, there remains many ancillary costs that will either remain the same, or indeed increase. There are an increased variety of devices, systems and applications that will need to be managed as a result of BYOD and other enterprise mobility initiatives. Seven participants felt that a BYOD program would lead to a significant increase in investment in security, data protection, compliance and mobile management software, as well as increased costs in ensuring the integrity of the internal network infrastructure. Four participants took the view that many of the software systems were already in place, and that any investment in policies or redesign of internal IT systems would need to take place because of other developments in how IT services are procured and managed. These IT services include PaaS and SaaS services hosted outside the organisation's own data centres.

4.7   Management Software and IT Resources

A series of questions were put to the interviewees on how the BYOD program would be managed from a technical and an employee skills perspective. Participants identified a number of technical factors that they felt needed to be in place if the program was to succeed. A number of factors relating to IT staff skills and competencies were also identified.

A key observation is that the majority of participants felt the management of the BYOD program from a technical perspective didn't rank as being a major barrier to implementation. While as the previous theme relating to security showed, there are concerns about the delivery of services to personally owned devices, many of the participants felt that the majority of these could be avoided by developing effective policies and using best-of-breed Mobile Device Management software.

4.7.1   Enterprise Mobility Management Software

All participants were able to offer an explanation of what Mobile Device Management meant, and how they saw the use of such software forming part of a BYOD policy. MDM software manages, secures, monitors and supports mobile devices. Although exact implementations vary depending on the provider; at their core, MDM solutions are middleware products that control access to corporate information resources from mobile devices.

The organisation was an early adopter in the use of MDM software, with a service that allowed some field workers to receive work orders on a mobile device being deployed in 2007. Of the 6 participants who offered an opinion on this service, 5 felt that it hadn't been a success from a technology delivery perspective.

"We had to implement the service. The ruggedised devices are not easy to use, and I hear it is not easy to manage at the backend either. There would still be hostility to those devices by the employees using them. We would have plenty of lessons learned from that project".

However, a participant who was involved in the delivery of the service felt that it had achieved many of the objectives that were identified during the design stage of the project. A number of other participants felt that while it did not deliver on the objectives envisioned at a technical level, it did display a willingness on behalf of the IT function to deliver an innovative service to an important business unit. It also demonstrated an ability to deliver a service in a relatively short period of time in response to changing regulatory requirements. It also confirmed that the IT function had the technical competencies required to deliver a service based on immature and hybrid technologies, and to work with

mobile network operators to deliver a service that ensured that the maximum amount of field workers could now receive and report back on work carried out during the day.

"We took a process whereby workers received work on a sheet of paper and automated it. We could optimise a work schedule and get end-of-day reports on work carried out. The service itself was overly complex, and communication could have been better, but the benefits and Return on Investment (ROI) of that project meant it paid for itself in a matter of months".

When asked what the IT Function needed from a MDM solution, there was general agreement that services like automated enrolment of devices, monitoring device compliance, reconfiguring devices as new policies are created, and remotely wiping devices were considered core functionality. Integration with authentication and authorisation services were mentioned by five participants, with certificate management, multi-factor authentication, and secure communications (such as VPN) considered necessary features by four participants.

As the discussions developed around the use of MDM, a number of participants felt that focussing the questioning on MDM software was limiting the scope of what needed to be discussed when it came to mobile software. Three interviewees felt that any software procured as part of a BYOD, and indeed, a wider Enterprise Mobility solution would need to offer Mobile Device Management *in addition* to other features. Enterprise Mobility Management (EMM) suites offer enhanced capabilities for BYOD and Mobile Information Protection as well as Mobile Application Development.

"We need a product that offers a feature set across the entire stack. So, as you say, it needs to do the mobile management. That's bread and butter. But we also need a product that allows us to develop mobile applications. And to manage how we make those applications available. It needs to be able to separate the personal data on a device from corporate data. We need to be able to keep that corporate data on a secure container on the device and ensure it cannot leak it. That's where the value is. Making useful applications available and making them secure. That's what BYOD really is".

Five participants, two from the IT Security function, two from the Service Delivery area, and one from IT Innovation discussed in greater detail the need for a MDM product to be

able to separate corporate data from personal data on the device, and to ensure that corporate data could be remotely wiped if the device was lost or stolen. This technology, known as containerisation, is becoming increasingly mature in its capabilities, as technology providers such as Airwatch, Kony and Citrix continue to innovate in an attempt to capture market share. However, a number of participants felt the IT Function should use its existing investment in application virtualisation technologies, with all corporate data remaining stored on the server, and access to IT resources being made available to devices using thin client or 'application streaming' technology. Application virtualisation and thin client technology are used throughout the organisation, with desktops and laptops only being provided where a demonstrable business case can be made. Strong technical competencies in the delivery of such a service have been created within the function, and three participants felt that the organisation should leverage these technologies and competencies and extend their usage to both corporate and personally owned smartphones and tablets.

Nine of the eleven participants who offered a response felt a single software management platform should be used for the BYOD program, and for future mobility services. Concerns were raised about technology obsolescence and multiple fragmented solutions being deployed in the management and control of such services, with risks surrounding cost, interoperability and security all highlighted.

4.7.2   IT Resourcing

Participants were asked if they felt were the required skills were available amongst members of the IT function to implement a BYOD program. Seven of the eleven participants felt the necessary technical skills were present to implement the program from an IT Security and Service Delivery perspective, with broad agreement that modern software and platforms drive high levels of process automation and ease of integration with existing systems.

There was general agreement that as the IT sourcing and delivery landscape changes through the use of Social, Cloud, Big Data and Mobile technologies (sometimes referred to in the literature as SoCloDaMO), the core competencies that will need to be established within the function will change.

As was eluded to in the previous section, there was agreement that a BYOD program was not in and of itself strategic. The value to the organisation would come through the development and deployment of applications that enabled the business to achieve efficiencies in work processes, enable new business processes, and to allow for new and innovative ad-hoc communication possibilities. As such, the development of useful mobile applications for employees was seen as the most important component of the program. Eight of the eleven interviewees felt that the ability to develop mobile applications was not a competency that existed in great numbers amongst employees of the IT function. Therefore these skills would have to be sourced from external providers of mobile development services.

The following were seen as being future core competencies required within the IT function. Even though the questions were asked about the development of a BYOD program, many felt that the following competencies would be required in the delivery of many IT services.

- Technology innovation
- Business and Customer Relationship Management
- IT and IT Security Governance
- Sourcing and Procurement Strategies
- Cost Management and Benefits Realisation
- Infrastructure Design and Technical Design Authorities
- Project Management

Five of the eleven participants discussed the need to procure an Enterprise Mobility Management suite that allowed backend and enterprise resource management data to be made available to the mobile presentation layer. The overall design of the backend systems and the process modelling needed to expose this data in a secure and optimised manner was seen as the type of strategic work that would remain within the remit of the IT function. The development of the mobile applications needed to present such data to employees was seen as something that would be carried out externally by companies' with the competencies needed to rapidly deploy, test and package such applications.

Seven of the eleven participants felt that staff numbers within the function would increase within five years, despite many of the non-strategic IT services moving either to a

subscription or cloud based model. The increased use of mobile services and applications throughout many of the businesses that make up the organisation was seen as one of the core drivers in the expansion of staff numbers, with a desire to automate and streamline work processes viewed as a major opportunity for the IT function to demonstrate business value. Developments in a number of the key industries that the organisation is involved in, such as Smart Networks, Smart Grids and Electric Cars are driving a need for advanced IT capabilities to support them. All of these services and offerings will rely on the advanced use of mobile technologies, and the BYOD program is seen as an early initiative in demonstrating how the IT function can work with the business to demonstrate strategic value in these areas.

4.8   IT Governance

Much of the discussion during the interviews related to the IT Governance decisions that need to be implemented during such a program; to develop policies and strategies for its effective delivery, and how the program could be placed within the context of a larger and more holistic enterprise mobility strategy. Eight of the eleven participants felt that IT Governance would become more complicated as mobile solutions became more established within the organisation. The delivery and management of mobile services such as BYOD would require a change in strategy and governance frameworks, as many mobile services may be hosted externally, with concerns about the integrity and security of corporate data mentioned on multiple occasions. Such concerns aren't just limited to mobile services, but the diverse and fragmented nature of mobile services presents new challenges to the CIO and senior management functions.

Six participants spoke about the need to try and find innovative use-cases for mobile technology within the organisation, while also expounding on the need to retain a focus on the core competencies required within the IT function of a utility. While some felt the use of the phrase "lights-on" IT department wasn't appropriate given the breadth and depth of the IT services offered to the organisation, there was broad acceptance that the governance perspective to date had focussed on the delivery and support of complex and reliable systems that underpin many of the services offered by the utility. As such, the use of IT in the delivery of truly innovative services was seen as a secondary endeavour.

"There must be a balance to be had there. I think it doesn't do us much credit to deliver some simple mobile phone apps and to let you use them on your iPad. I think if we want to get a message across about how good we are, then we need to focus that message on what we actually do well, keeping extremely complex systems, some of systemic importance to the country, up and running. If we're going to innovate, then we need to look for use cases".

Two broad perspectives were taken when analysing responses based on the governance of a BYOD program within the organisation. The responses were divided into either BYOD Management or BYOD Leadership.

Table 2.4 - Governance Style to be adopted when implementing BYOD.
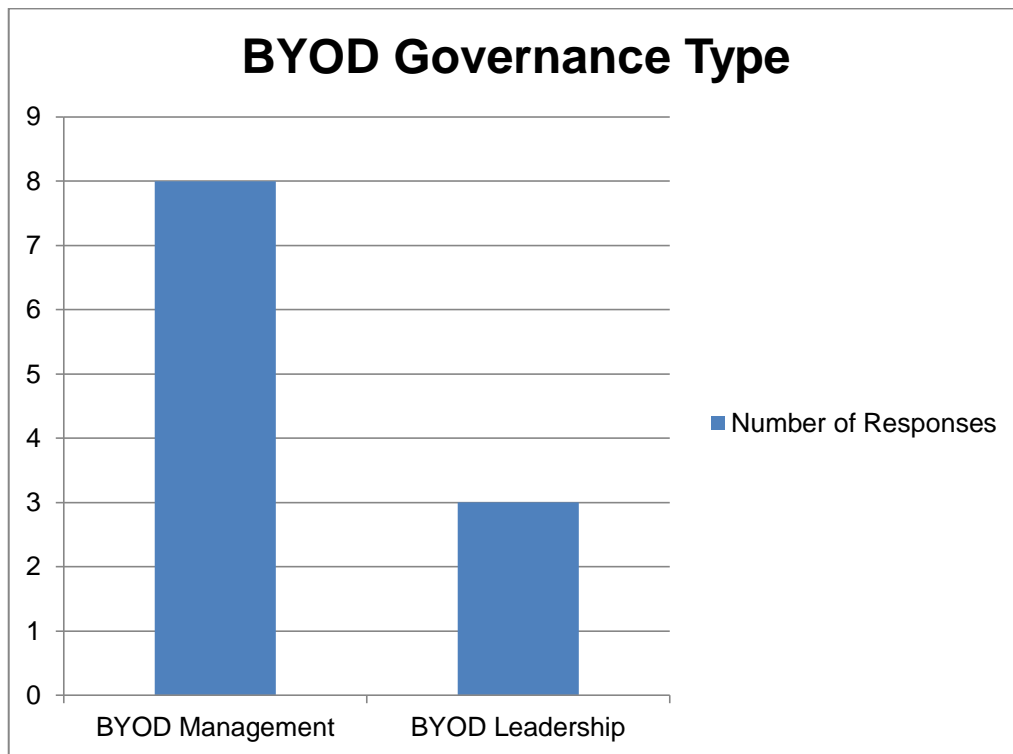
BYOD Management is categorised by an overall approach that can be defined as conservative, with cost control, policy enforcement, restrictions and a command-and-control mentality prevalent. BYOD leadership is categorised as being more visionary and purposed, with aggressive timelines, looser risk/reward trade-offs and shared governance models being the prevailing orthodoxy.

Eight of the eleven interviewees believed that IT Governance and Management policy should take the BYOD management approach to the deployment of a BYOD program, at least during early iterations of the project. This was a perspective shared by members of the IT Delivery, IT Security and some members of the IT architecture functions. Others involved in IT Architecture, as well as those working in the Innovation and Governance spaces were of the belief that the BYOD Leadership approach should be taken from the outset, with IT proactively working with the various businesses to define use-cases and present agile mobile solutions to employees of these businesses.

The customer-facing nature of some of the business offerings was seen as an external influencer in the development of a mobile strategy, with the need to provide mobile applications and services to customers driving the adoption of internal mobile services such as employee BYOD. The need to balance the ongoing support and maintenance of large enterprise systems while being more agile in the development of both internal and externally facing mobile services was seen as both as a threat and an opportunity. Five participants felt that the delivery of such services would take away from the core competencies needed to deliver a reliable IT service to the utility. Six participants felt that offering mobile services such as BYOD represented an opportunity to the IT Function as it worked more closely with businesses now looking for a more strategic and responsive set of IT services. While there was broad agreement that balancing the high-potential opportunities with the continued support of the strategic enterprise systems presented a challenge to the CIO and senior management functions, only two participants felt that such a scenario was unachievable.

The majority of respondents were of the opinion that the seismic change taking place in how IT services are procured and delivered represented a real opportunity for the IT function to show its long-term strategic benefit to the organisation, and to become a leading exponent of solutions that deliver innovation and economic viability to the organisation. This brings with it an acknowledgment that the function needs to move from one that simply delivered IT services based on IT requirements, to one that puts forward innovative and potentially disruptive solutions.

4.9   Innovation and IT/Business Alignment

A number of questions put to participants asked what they saw as the compelling use-cases for BYOD within the organisation. Nine respondents felt that the most obvious and immediate reason for a BYOD program was allowing management to use their own mobile device or tablet to access corporate emails and documents. Four participants also mentioned allowing engineering and supervisory staff to use their own devices to automate and streamline work processes. Three participants gave a scenario when a mobile application could be installed on the personally owned device of a meter reader, thus allowing them to carry out their work without having to use a specially-designed ruggedized device. The same three participants also saw a use-case whereby field workers involved in manual work could use personally owned devices to report back on errors, faults, and work completed. The cost of replacing such a device were it to become damaged would still be a fraction of what it would be to purchase and provision a ruggedized device.

The prevailing viewpoint was that the onus was on the IT function to supply the constituent businesses with mobile services that bring high-value and strategic benefits. While BYOD might only be an early show of agility by the function in the type of mobile services they provide, it presents an opportunity for the function to align their strategies and objectives with those of the business. As nine of the eleven participants felt the businesses had either a negative or neutral impression of the IT Function, there was optimism that developing a cohesive and responsive mobile strategy could fundamentally change this impression. It was also felt that the development of such services could allow the IT Function to fully engage with the businesses in developing, conceptualising and delivering high-value and innovative products to both internal and external customers. The opportunities that mobile solutions would offer the business units was seen as a way of changing the perception of the function to one that was responsive and agile.

4.10 Summary

Transcription of eleven semi-structured interviews took place. A number of common factors that need to be present for a successful BYOD program were identified during the literature review. These factors were used to create themes, which were then used for

initial codification of the data. A number of subthemes emerged during the course of this work, especially those relating to aspects of Security and Data Protection. The findings from the research are broadly consistent with those that emerged during the literature review, with considerations around technology, external influencers, and the consumerisation of IT; Governance, and the integrity of corporate data all considered paramount when thinking about adopting such a program.

5   Conclusions and Future Work

5.1   Introduction

The research set out to examine the perceptions the IT Function of a large Irish utility had about the adoption of a BYOD program, and the factors that needed to be explored when undertaking a project to roll out a nascent service such as BYOD to customers.

The research question that this study seeks to answer is:

Bring Your Own Device: What are the implications for the ICT Function of an Irish Utility?

The aim of the research was to carry out a case study assessment of the factors that need to be considered when implementing a BYOD program. This research was carried out in a utility company in Ireland. As part of the study, eleven semi-structured interviews were undertaken; while a literature review was also carried out to provide a theoretical foundation in areas such as Enterprise Mobility, IT Consumerisation, Bring Your Own Devices Programs; Enterprise Mobility Requirements and Utility Specific examples of mobility solutions.

This chapter summarises the final research findings, places them within the context of the organisation in which the research was carried out, and examines both the implications and opportunities that such a program will have for the IT Function. It also discusses the limitations of the study, as well as providing recommendations for further research in the area being researched.

5.2   Interview Findings

Data gained from interviews shows that the IT Function is in a position to adopt a BYOD program. This research also shows that there is agreement that offering a service such as BYOD can have a significant positive perception of the ability of the Function to meet the strategic and technical needs of the organisation. Some of the benefits of BYOD are

improved employee productivity, an increased sense of innovation, and improved competitive advantage through reduced hardware spend, and through the development of innovative use-cases within the organisation. The BYOD program is about much more than simply allowing an employee to use their tablet or smartphone to access a limited range of services. Developing applications and services that drive business innovation and efficiency improvements are seen as being the true value-proposition for the development of such a service. There is a realisation that the ability to develop such services is constrained by a lack of development skills within the organisation. While software can be purchased that assist in the security and management of a BYOD program, there is an acknowledgement that external providers will need to be used to develop mobile applications that bring value to the employee. Issues relating to data security were continuously highlighted as the main barrier to the adoption of such a program.

The conceptualisation of BYOD is often misunderstood; with a number of the participants believing that the program was just about allowing employees to use their own smartphones to access certain corporate resources. As discussed in Chapter Two, there is a significant body of research showing that BYOD is about much more than supporting such a scenario. It also involves the design and delivery of mobile services that provide true strategic benefit to the organisation. The delivery platform is but one component of such a program (Bradley et al., 2012).

It is clear from the analysis that while there is a broad understanding of the benefits of developing a BYOD program within the organisation, there is a disconnect in both the understanding of what such a program can deliver, and in the business relevance it has to the enterprise. Stakeholders from across the IT Function have different perspectives on the scope of the program, with those involved in the technical delivery and IT Security functions believing that the program should be approached with caution, building upon embryonic initiatives in the space that have already taken place. Those at the management level were more likely to take a leadership approach to the adoption of such a service; seeing it as opportunity for the IT Function to demonstrate business value to the organisation.

The establishment of an integrated shared services model across the organisation has provided a fresh impetus for the CIO to demonstrate the strategic importance of the IT

Function to senior management, both at corporate and business unit level. Reporting structures have changed, with the perception amongst interviewees that IT is now being seen as increasingly strategic to the organisation. A member of the management team of the IT Function remarked that "no matter how we deliver at an operational level in terms of reliability and efficiency; nothing changes the perception of us as much as letting senior management use their iPad at a meeting".

The findings show that the IT Function is moving from primarily one focused on the reliable delivery of core IT services, to one that must also provide innovative mobile solutions to the business. Again, it must be noted that there was a disconnect in this belief between those involved in the technical delivery of IT services, and those involved at a strategic and senior management level, with those at an operational level believing that the core competencies of the function remain inherently conservative in nature. This was a theme that continued to emerge during analysis of the primary data, and may indicate a failure by the CIO function to properly communicate the change in perspective being adopted at a strategic level within the Function. However, one of the limitations of the research method adopted is the impossibility of accurately inferring that this is the case.

The research organisation used in this research is made up of a number of businesses, each focusing on different aspects of the market in which it operates. A number of them now operate with a greater degree of autonomy and are competing with both domestic and international suppliers. This is a particular challenge to the IT Function, who remains the primary supplier of IT services to all the businesses. A number of the businesses are demanding the rapid deployment of BYOD to support key business objectives, in response to moves in the market by their competitors, and a desire to gain competitive advantage. Other businesses, including those seen as being of inherent strategic importance to the overall organisation are adopting a more conventional approach to the adoption of such services. Providing strategic leadership at a CIO level within a multi-service organisation presents many challenges (Peppard and Ward, 2004). The research shows that there is a deep understanding of these challenges by respondents, with broad agreement that the era of the IT Function deploying, managing and operating all IT services 'within house' coming to an end. The proliferation of smartphone, tablet and cloud services within the personal lives of employees has resulted in a different perception on what the IT Function should be offering as IT services. As such, the IT Function should consider a multi-faceted approach to the delivery of the program, with the BYOD program including support for personally-owned mobile devices; corporate-owned devices that are

personally enabled, and, where there are special business cases or needs: specialist ruggedised or data capture devices. The hybrid model allows for multiple use-cases, and doesn't constrain the organisation in the mobile services they offer.

While standards are being developed in the area of BYOD, there remains uncertainty as to how the provision of such services will affect the IT Function in terms of overall IT architecture. Making available applications and services that demonstrate business value are considered core deliverables when measuring the success of such a program. While key services like access to email, calendar and corporate messaging services are seen as early deliverables; the true strategic gain of such a program is in the delivery of applications and processes that improve, or transform, existing work processes. A number of technical considerations emerged during the research, with a need to improve access to back-office services being mentioned on 22 different occasions across all respondents.

The organisation should therefore consider moving to a Service-Orientated architecture (SOA) to expedite both the quantity and quality of corporate data that could potentially be presented to mobile devices. While an era of increased mobile connectivity is driving much of the demand for such data to be made available across a wider range of platforms, it wasn't the only radical change taking place in computing that was pushing this requirement. During the course of the research, the relationship between BYOD and other developments such as Cloud, Social and Big Data became apparent. The traditional architectural design of developing and hosting all IT services on corporate-owned servers is coming to an end. Therefore, any redesign of the IT architecture, both at a hardware and software level, must take account of these changes as well as those required by BYOD.

Security considerations were mentioned by every respondent. This is the central theme that emerged as a barrier to the adoption of such a program when analysing the literature related to the area. Even with the best security, strategies, policies and technologies, the human part of the equation can never be discounted. The research showed that establishing clear and comprehensive policies are considered essential by all participants, with the reinforcement of policy through workshops, online resources and senior management briefs. The development and enforcement of policies can be strengthened by the use of technology to minimise the risk of data leakage. There was much concern expressed at the ease with which it is possible to move data between mobile applications, or to share data between cloud services. A number of senior management figures felt that the IT Function is now in a continual 'catch-up' race with consumer technologies.

However, there was a belief that the integrity of corporate data could be maintained on mobile devices by making investments in mobile security technologies. As mobile software moves towards maturity, there was broad agreement that suppliers of Mobile Device Management and Enterprise Mobility Management services are meeting the demands of enterprises concerned about the integrity of their corporate data.

The scope of the BYOD program is an important consideration, and was mentioned in both the literature and throughout the course of the interviews. At a technical level, there are decisions surrounding the number and type of devices that will be supported; at a strategic level, assessing where the organisation sits when compared to its competitors or peers, and defining cases where the adoption of a BYOD program can best support business objectives. It's a multi-pronged and complex consideration. The research has shown that failing to develop a strategy and execution plan for mobile technology initiatives leads to higher costs, lower levels of satisfaction, piecemeal implementations and increased risks of data exposure. The BYOD program must also integrate with other strategic initiatives both at an IT and business level. To ensure the success of the program, it should be managed using the resources and expertise available within the Project Management Office. Applying a project methodology to the program at its earliest stages will bring structure to the program. It will also have the benefit of bringing together a pool of expertise that can effectively scope the project, decide on budgets, architectures and standards, and maintain controls throughout the project lifestyle.

5.3   Recommendations for the BYOD Program

- Leverage the existing investment in application virtualisation technologies by conducting a proof-of-concept test on a variety of mobile devices and platforms.
- Develop a function with responsibility for delivering mobile and cloud computing services to customers.
- Work with the business units to identify cases where BYOD can deliver both operational and strategic benefits.
- Use the Project Management Office to manage the project through its lifecycle.
- Invest in security software that supports the use of mobile devices as endpoints.
- Develop relationships with external providers of mobile application development.
- Develop metrics and Return on Investment variables to measure the success of the program.
- The IT function should take a leadership role in selling the benefits of BYOD and mobile applications to the business units.
- Educate end-users on the risks of having corporate data on personally-owned devices and create policies and processes that minimise the possibility of corporate data entering the public domain.
- Identify skill gaps within the function and develop new competencies in mobile architecture and vendor management.
- Incorporate the use of mobile solutions into system architecture decisions.
- Benchmark the organisation's BYOD capability against its competitors.

5.4   Generalisability of Findings

As detailed in Chapter 3, the research method chosen was a single case study approach using semi-structured interviews to gather data. The organisation chosen for the study was a large Irish semi-state, who is considering developing a BYOD program to support the needs and desires of business units and their employees. The market in which the organisation operates is undergoing rapid and fundamental change, and therefore the interpretivist approach was considered most suitable. A number of seminal works on the use of research methods have shown that the interpretivist approach is an extremely suitable philosophy to choose when attempting to study business and management, especially when seeking to examine and understand both organisational behaviours and the input of human actors.

The use of BYOD is not confined to any particular type or size of organisation. A number of the overarching themes and constructs that emerged through thematic analysis correlate closely with those being discussed by large IT advisories such as Gartner and Forrester. Certain organisational traits were identified that may not be present in other companies, especially those not involved in the utility industry. The technical considerations and findings that emerged are generalizable to any organisation with a significant in-house IT Function, and with a need to offer mobile services to employees.

While participants were asked for subjective views on the research topics, the pre-existence of opinions and biases on the use and development of a BYOD program cannot be discounted.

5.5   Limitations of the Study and Opportunities for Further Research

While the implications of mobile technology on the social lives of people is a topic researched in some detail, there were relatively few peer-reviewed papers that specifically deal with the use of mobile technology within the organisation, especially from a technical delivery perspective. Papers from advisories, consultancies and software providers were more prevalent. While there was correlation between the themes that emerged from conducting the literature review and those emerging from industry, the adoption of BYOD and mobility services within industry is developing at a rapid pace. A number of standards and technologies have emerged that were not discussed at even a conceptual level within the academic papers.

The subjective nature of the research is useful when conducting an initial case-study. However, while the questions were designed to minimise researcher bias, the introduction of such biases cannot be ruled out. Perceptions surrounding the use of BYOD and how it may affect the IT Function could influence either questions asked, or answers given.

A case study approach makes it difficult to support or reject a hypothesis due to the use of qualitative data. The use of a single case study approach, while allowing for rich insight and perspective, further limits the ability to place the support or reject the findings. Given more time, a larger case study, making use of multiple organisations or a large sample size of participants would be beneficial for analysis and verification of the data. Adopting a

mixed-method approach which also had a quantitative component would increase the validity of the findings by examining the phenomenon in a different way. A more comprehensive study across multiple organisations, using a longer-time frame would improve the validity of the findings.

5.6   Advancing the current knowledge

The dissertation seeks to examine the factors that need to be present within the IT Function to deliver a BYOD program to employees. Mobile technology has been called the third great wave of computing (Nicol, 2013) and promises to have radical consequences for how IT services are sourced, delivered and managed within organisations. By examining themes relating to both the technological and sociological factors a case study of an organisation about to embark on the delivery of such a program is presented. It places them within the context of existing literature on the adoption of a BYOD program within organisations. However, there are no existing case-studies on the development of a BYOD program within an Irish organisation.

The research also shows that the organisation can benefit from increased productivity from employees; new and innovative business opportunities that emerge from BYOD; while decreasing the investment required in the purchase of hardware. This confirms many of the findings of (Willis, 2013), (Forrester, 2012), (Bradley et al., 2012) as to the benefits that can emerge from developing and implementing a well-designed and business-aligned BYOD program. The research also improves our understanding of the concerns that must be addressed around data privacy and data security as a result of the development of such a program. While the research shows there is belief that technology can address many of these concerns, the human input into these areas must be given due consideration. The complexity of the program from a management and human resource perspective, and concerns for how to deal with issues relating to security and employee perception are far more likely to inhibit the development of the program.

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7   Appendices

7.1   Appendix A - Ethics Application Form

TRINITY COLLEGE DUBLIN
INFORMED CONSENT FORM

LEAD RESEARCHERS: David Farrell

BACKGROUND OF RESEARCH: A Bring Your Own Device (BYOD) policy is one whereby employees can use personal computing devices for the purposes of work. Innovations in mobile technology have accelerated the change in the relationship between IT and users. This study will examine the implications that a Bring Your Own Device policy will have for the ICT function of the utility in how we provide services to our customer. It will also examine how the ICT function of the utility can manage the people, process and policies needed to implement such a policy. This research is part of a Master in Management of Information Systems at Trinity College Dublin.

PROCEDURES OF THIS STUDY: The study will take the form of an interview. Each question presented during this interview is optional, and you are free to omit a response to any question. The interview will take approximately 45 minutes to complete and will be digitally recorded for transcription. The data will then be analysed and categorised.

PUBLICATION: The results of this interview will be completely anonymous and not associated to the participant in any way. Due to the nature of some responses, aggregation may not always be possible and may be used for qualitative purposes, such as in the form of a quote. However, irrespective of the nature of any response, all responses will be anonymised.

All results will be used for a dissertation as part of the completion of a Master in Management of Information Systems at Trinity College Dublin.

DECLARATION:
- I am 18 years or older and am competent to provide consent.
- I have read, or had read to me, a document providing information about this research and this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction and understand the description of the research that is being provided to me.
- I agree that my data is used for scientific purposes and I have no objection that my data is published in scientific publications in a way that does not reveal my identity.
- I understand that the researcher is a fellow employee of this organisation and that the data gathered during this interview will only be used for scientific purposes.
- I understand that if I make illicit activities known, these will be reported to appropriate authorities.

- I understand that I may stop electronic recordings at any time, and that I may at any time, even subsequent to my participation have such recordings destroyed (except in situations such as above).
- I understand that, subject to the constraints above, no recordings will be replayed in any public forum or made available to any audience other than the current researchers/research team. I understand that all electronic recordings will be destroyed following submission of the dissertation.
- I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights.
- I understand that I may refuse to answer any question and that I may withdraw at any time without penalty.
- I understand that my participation is fully anonymous and that no personal details about me will be recorded.

- I have received a copy of this agreement.

PARTICIPANT'S NAME:

PARTICIPANT'S SIGNATURE:

Date:

Statement of investigator's responsibility: I have explained the nature and purpose of this research study, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

RESEARCHERS CONTACT DETAILS: David Farrell. Dfarrel8@tcd.ie

INVESTIGATOR'S SIGNATURE:

Date:

TRINITY COLLEGE DUBLIN

INFORMATION SHEET FOR PARTICIPANTS

Dear Participant,

I am currently completing a Msc in Management of Information Systems in Trinity College Dublin. In partial fulfilment of this masters, I am required to conduct a research dissertation, which I have titled: "Implementing a Bring Your Own Device policy in the Utility" to address the research question, "A Bring Your Own Device policy, what are the ICT implications for the Utility?"

The research question presented by this study focuses on two key elements:
- The implications that a Bring Your Own Device policy will have for the ICT function of the Utility in how we provide services to our customers.
- An investigation into how the ICT function of the Utility can manage the people, processes and policies needed to implement a Bring Your Own Device policy.

My primary research involves conducting qualitative interviews with managers and decision makers within the ICT function of the Electricity Supply Board. The interviews will take about 45 minutes to complete and will be conducted in Utility Head Office, Dublin.

I feel that this research will be useful in gathering information about how consumer-level technology is starting to permeate the ICT function of the organisation, and how key-decision makers feel we will implement technologies, processes and strategies to manage the rollout and support of this service.

Conflicts of Interest:

Please be aware that I am a colleague of yours, and am conducting interviews within the ICT function of the Utility. All materials and data gathered during the course of this interview will be used exclusively for the aforementioned Masters Dissertation research requirements.

Procedures:

You must be over 18 to participate in this interview.

Each interview will be conducted individually and will take approximately 45 minutes to complete.

You are not obliged to answer any question.

Participation is voluntary and you may cease participation at any stage.

Anonymity and confidentiality will apply to all information gathered during the course of this interview, and to all publication and presentation materials produced as a result of the interview.

The researcher is a fellow employee of this organisation and that the data gathered during this interview will only be used for scientific purposes.

In the unlikely event that you make illicit activities known, these will be reported to appropriate authorities.

Electronic recordings can be stopped at any time, and you may at any time, even subsequent to your participation have such recordings destroyed (except in situations such as above).

The Interview Consent form declares that the interview will be digitally recorded to allow me to transcribe the interviews. The digital transcript will be destroyed following submission of the research, and no personally identifiable information will be published. All audio recordings will be stored for the duration of the study in accordance with Irish Data Protection Requirements.

Researcher Details:

Name: David Farrell
Email: dfarrel8@tcd.ie
Mobile: ---------------

Thank you for taking the time to contribute to my research. I am extremely grateful. If you have any questions, concerns, or need for clarification then please let me know.

Regards,

_____

David Farrell.

7.2　Literature Review Mindmap
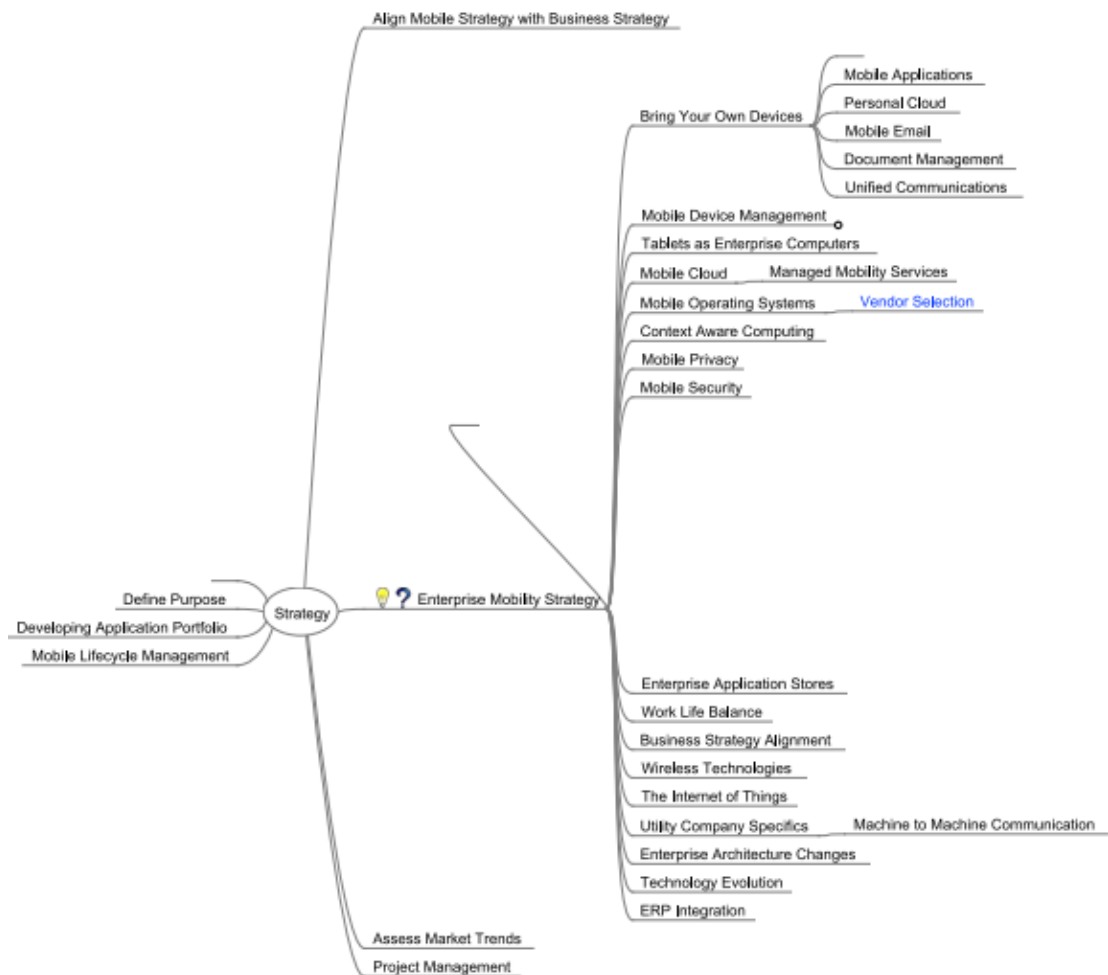
7.3　Interview Questions:

Interview Questions for a semi-structured interview.

1. *General Information*

　　Background questions (years in position, qualifications, experience)

2. *The Consumerisation of IT*

　　Do you know what the consumerisation of IT means?

　　Do you think our customers and fellow employees now have a different
　　expectation of what　IT should deliver as a result of these landscape changes?
　　Do you think that Corporate IT needs to follow all these changes in consumer IT or
　　is there a need to temper expectation?

Do we align with the consumer device market or maintain a strategy of keeping pace with business technology lifecycles?

How do we balance this expectation? And communicate it?

Can you think of any benefits that IT consumerisation brings to the organisation? And to the ICT function?

Can you think of any drawbacks that IT consumerisation brings to the organisation? And to ICT function?

3. *Bring Your Own Device*

Are you aware of what BYOD (Bring Your Own Device) means?

From a utility perspective, can you think of any particular 'use cases' where allowing an employee to use their own device can be of benefit to the organisation?

What do our mobile workforce want from a BYOD policy?

Do you think a BYOD policy can have positive effects on organisational innovation, employee productivity and employee satisfaction?

Do you think BYOD can support corporate and business strategies for increased productivity, customer service, or to support our sustainability objectives?

4. *Implications for the ICT function.*

Do we limit the type and number of devices that can be used as a BYOD technology?

Have you heard of Mobile Device Management? Do we have the necessary software and skills to secure and manage our mobile infrastructure as a result of BYOD?

What are the implications for data security and data integrity as a result of implementing a BYOD policy? How do we remain agile and responsive to customer needs while still protecting our corporate data?

How do we track and manage fast-changing and non-standard technologies? Do we standardise on a specific mobile platform or do we provide the policies and architecture to allow for multiple platforms and devices?

Do you think the utility is an early adopter of mobile technologies? Are you aware of any other mobile technologies we have implemented, and can we learn any lessons if we pursue a BYOD program?

What changes need to be made to IT Security policies to reflect this new use of consumer technology?

What changes need to be made to IT Strategies to reflect this new use of consumer level technology?

Do we limit a BYOD strategy to employees, or should we extend it to allow the use of personal computing devices by contractors, external consultants and external service providers?

We currently provide mobile devices to utility employees who require them and pay for data access. With a BYOD programme can you see such a service continuing, or will the onus be on the employee to pay for their own device if they use it for personal as well as business reasons?

Can you think of any legal or HR issues that may arise if we roll-out a BYOD policy?

What effect would a wide-scale adoption of BYOD have on enterprise architecture?

What effect will BYOD have on hardware refresh lifecycles?

What effect will BYOD have on application design or software purchasing decisions?

Can you think of situations where licencing or software management costs will change as a result of BYOD?

Will changes need to be made to how we support devices? How do we provide support to employees using disparate device types, mobile operating system platforms and mobile service providers? What effect will BYOD have on IT Service Management?

How do we provide access to corporate information technology resources using BYOD? Do we use application virtualisation, custom apps, web interfaces?

How do we decide on what applications or basket of services are made available to users of personal computing devices?

What skills are needed within the IT function to implement a BYOD program? At a technical level and at a management and governance level?

How do we enforce BYOD policies, reporting and administration on BYOD usage and data protection?

Is BYOD a threat or an opportunity to the IT Function?

Do you see BYOD as a natural progression in how we will provide IT services to the group of companies?

Can you think of any other risks or issues that are pertinent to the use of personal devices within the utility?

Can you think of any opportunities this will give to the IT function?

Business Alignment and Mobile Governance
Is there senior management understanding and support for such a program?

How do we align our future mobility services and strategies with those of the organisation?

Can you think of any future mobile services or technologies which might yield benefits to the organisation or to a work process within the organisation?

Can you think of any other mobile services or strategies that need urgent prioritisation?

How do we measure the success of this program in what it brings to the organisation?

Is there any lessons to be learned from past mobile technology implementations?

Is there a systematic approach to how we align mobile technologies and services with the needs of the organisation?

What capabilities and competencies will the future ICT function need to have to further develop our mobility strategy?

7.4   Sample Transcript of Interview Responses

So Redacted, thank you for taking the time to meet me today.   What does the consumerisation of IT mean to you?

That's fine. Great, ok. Consumerisation of IT. Do I know what it is? Yes. I think it's I suppose the pace of change with technology has meant that where traditionally 20 years ago, people came into the job and got exposed to new technologies, but so much so that now actually in the consumer market, the pace of change has outpaced the IT environment and so much so that basically consumers and our business now have access to technology, be it devices, apps and all that kind of stuff and certain expectations come into the workplace now. So where we're lagging behind a bit, they're kind of pushing the boundaries a bit in terms of the use of these types of technologies.

And then so as you said, you think there's a radically different expectation of what people expect nowadays or?

In comparison, yes, it's completely different. The businesses are much more technology savvy. They're getting their hands on technology. There's a difference in terms of how technologies provide these days as well. It's not just that it's outpaced it. It's much more end user focused. It's much more about simplicity and about the experience. So it's really kind of rather than being kind of throwing functionality at people and overloading them with things, it's touching on in such a way that people are using the technology much more in a way that changes their personal lives so that suddenly kind of exposes them in such a way that they can now apply it in a parallel to work lives and say, 'Well, listen, it'd be great if I could get that same change or productivity in my work life. Why can't I do that?' So I think there is a big shift in it, absolutely, yes.

And the tough question early on, do you think that corporate IT, do you think we need to blindly follow all these? Blindly I know is not the word, but do you think we need to follow all these changes in consumer IT or do we kind of need to do a bit of tempering expectation as well or? And how do we manage that? Is there an answer to that question maybe?

It's a bit of both. I wouldn't say blindly follow, but certainly that would be one end of the spectrum, I think, that we shouldn't do. As I say, from my understanding, if we do that, I suppose really your costs are going to escalate and stuff like that and it becomes unmanageable. But certainly I think there's an advantage. There's benefits to the company and to individuals in terms of realising that shift and saying, 'Listen, where technology has become something that was sitting on your desk, it's now shifting more and more to make you mobile and becoming almost that it's wearable technology.' So IT, where previously you had a big mainframe, where you had a big enterprise system maybe dictated what that architecture or what that system was, now to suddenly it's crossing around into personal lives where it's now actually your clothes. I can't see IT now dictating the fashion that you wear or whatever type of devices.

So I think when it comes to the device, I don't think IT… I think the technology is going to catch up enough that it'll be enterprise ready to have the level of encryption and that level of security in-built into it. So suddenly it becomes nearly IT is more available. The

data and the information as it really should be is managing securely that information, that data so that the staff are familiar with the types of devices or what they use and that the IT is more really about the applications and providing the data and the applications securely, access to those on them on any type of device and in any location.

Yes, and we might get into a bit more detail about that later on, but I suppose off the top of your head, could you think of the number one benefit or any tangible benefit that you could see that IT consumerisation could bring to the organisation?

Yes. It's actually the biggest gap that I see or the opportunity I see and it's a major kind of, as I say, driver for my own role as technology innovation manager. So I've gone into the business and done a bunch of learnings and the feedback is that the business feel that they're at an arm's length from IT, that IT don't understand their current needs. And I think our focus has tended to be on the big projects and on delivering the big systems and also from a service management point of view, that we've tended to bring the customer through the service centre in terms of calls. And we're kind of now missing a trick that the day-to-day kind of productivity and end user kind of experience is that really, they're demanding just to do their day-to-day job or enable them to work in new ways. We're kind of missing that focus.

And I think the consumerisation I suppose is actually an opportunity for IT. IT can either take it on and say 'No' to these kind of demands, or we can use it as a way of having a conversation with the business where now they're becoming more technology savvy and that you actually can sit down and work in partnership with the business, which that is the goal for IT. We've always kind of had this separation with the business, but now it's a means of us actually sitting at the table with them and having that conversation and seeing can we address some of those unmet needs, probably in an easy and a very cost-free way, so I think that's the biggest benefit.

I think once you then start meeting those unmet needs and looking at those as opportunities, there's kind of an opportunity that you can get, which allows I suppose, talking to management when I first started in my role. He saw it very much at the executive level the big benefit there was. That for him to go in and have a conversation with the senior guys, that really all they're interested in initially was their toys in front of them. Are they working? If they're not working, if those toys are not working or they're

not meeting those demands, suddenly there'll be approvals and the conversation about the bigger projects. They're not really on board for those kind of things. So for him, if he can go in and say, 'These things, they're happy with those' suddenly it's leading to the next question and suddenly it's an open door for all other kind of….

So yes. So that's where it is. To be able to get at the table, have the conversation and also then address some of those low-hanging fruits. I think it allows for that, so I think rather than look at it as threatening, it's a great opportunity for IT organisations to do that.

How do we balance this need to be agile with our support actitivies?

Yes. The agility question is that traditionally, the type of investments we make as a utility, it's all about long-term investments and assets and power stations and all that kind of stuff. So that's the mentality it is and thinking large, but I think for us as an IT organisation providing service to the business, I think there's meeting the needs, the changing kind of workforce in terms of how they operate and do their business, I think we need to meet those needs. I think that we need to look at obviously meeting the demand in terms of larger projects, but we need to have this agility to be able to balance, as you say, the smaller bits of work, to be able to deliver on those as well.

And also I think the realities for us as a utility, commercially it's changing as well in terms of the operating model of how we provided services out. I think that's even under threat. So I think we need to be responsive to that and be able to enable the business in terms of where it's going. So even if it's the retail part of the business, the margins are very tight. They have to be able to market services and new types of services out, then we've got to be able to be agile enough to keep pace with the changing ethos, say the retail part of the business. Likewise in Networks, they're looking at obviously smart metering and new types of technologies and you've got e-cars and or innovation directors. We need to enable those new businesses and now joint ventures going in with Vodafone in terms of fibre to the building. We have to shift, so traditionally how we provided services to a very stable base in terms of how we've operated the business is now radically changing.

So I think it's a challenge for ourselves, but also other companies. The pace of change in other industries is also relevant, so IT organisations and other companies are all finding out those challenges. How do we keep pace with that? So agility is definitely the order of

the day. It's 'How do we balance the big stuff and also not lose the ball in terms of the agile piece, being able to turn around and meet the needs of the business?'

The million dollar question!

Yes, that's it.

Agility and stability.

That's it. Exactly.

I suppose what does BYOD mean to you, to move on to the BYOD?

BYOD, it definitely stems from, as you asked, around consumerisation. Ok, the likes of Apple bringing out the iPad has really kind of been the tipping point for it. And a lot of other kind of technologies and other vendors have caught up with their own types of devices and certainly the likes of Samsung and their Galaxy smart phones as well and all that kind of stuff anyway is really driving that. It started with devices, but it's now really people are tending to choose the types of devices based on the type of applications. And that success that Apple have had, its store and its market for applications that have been really beneficial to users, is to have ones that are user friendly and allows you to do things. So I suppose in the personal world, there's Dropbox and applications like that, which are really, really useful, so whereas you used to have to… You can store your data and access from any device anywhere - it's brilliant. So where it is about bring your own device, it's actually around bring your own applications and bring your own data. I suppose it's being able to access your data and applications from any device in any location.

So yes, where it started about the device, it is really about looking in the company what way we can provide access to information and data on any type of device. So I think there's a trend there. I think development to us is definitely more so for mobile working. I think that there's definitely still a tradition for companies like the utility is that you still have to provide a primary device, be it a thing to allow you to access systems when you come in as an office worker. And I think probably more so companies are finding not necessarily providing a dedicated device. It tends to be hot desking now in companies, that you come in and you can access your systems from that device. But really mobile working is becoming more and more prevalent, where as I said, you mightn't necessarily

have a dedicated desk, to actually working from home, to actually working from, as I say, from other locations, be it sitting having a cup of coffee.

So the lines are being blurred in terms of working traditionally nine to five now so you can actually access your data and information. There's a flexibility in working and a trust relationship now, where people are being asked to be more flexible, to work outside of hours and vice versa, that return back to the employer, that you could be more flexible in terms of how and when you work to those hours. So I think the technology is a huge enabler for that type of new ways of working, so I think bring your own device is just a symptom or one element of all of that, the kind of shift in new ways of working. So that's what it's about.

Can you see a stage where we support completely employee-purchased devices or I mean this is the employee-bought kind of or hybrid models or?

I think hybrid is definitely the current situation. I think it'll become clearer and clearer as it becomes the norm, that as you say, people will have technologies that they wear. As you say, Google Glass and Android, the watch wearables. As I say, that's the shift. People are looking down at smart phones at the moment. They're looking at tablets. You see them everywhere. You're getting the Luas or on the train and stuff like that. That's all going to change. They're just going to be wearing these devices and looking at the information and accessing it as they go. So they're going to be sitting in meeting rooms wearing these devices and accessing them over the WiFi infrastructure. So there's a level of support there for just being agnostic to accessing through the network wirelessly up to different layers to then, as I say, to accessing applications and interfacing to systems.

So we need to provide standard secure interfaces for these types of devices, but I think that's where the line stops. You won't see people calling into the service centre saying, 'My device isn't working.' That support is still going to be traditionally back to the owners and contracts will be with Vodafone or the hardware or with Google or whatever in terms of support for those devices. But it's really more so is I can't access this service or this application. It's really the support for interfacing and accessing the data is really more so where IT is going to have to provide it. It can then dictate to say, 'Listen, this type of technology. We'll say these types of technologies, I suppose our services are compatible

with.' But we'll find as technology matures, more and more devices will become, as I say, compliant for the enterprise.

Even the customer?

Yes, absolutely.

Very much radical change, I think. So I think you've kind of answered. Do we limit the type, the number of devices that can be used as a delivery platform? I suppose that's all the device is at the moment.

So while we're in a transition, yes. We have to manage expectations and when we said bring your own device, we've taken a baby step to be able to say, 'Listen, access your email, your calendar and your tasks.' That was I suppose a long process over the last year to HR, to legal and to a lot of different parties, IT security to kind of understand the implications of people accessing the company data on a personal device. So when you broke it down, it actually made sense for the company and for individuals to do this. So it is a baby step, but in term of managing expectations, we have to be able to. The technology and the systems that we have are quite limited in terms of the compatibilities with the devices. So yes, we have to dictate and say, 'Certain devices are only going to be compatible.' So that's going to be difficult to manage in the interim, but as we bring in, as you mentioned, the other types of mobile device management and enterprise mobility solutions, they really bring the shift a lot easier. Those products really have rapidly changed over the last couple of years.

Now we need to separate and containerise the data, the company data and the personal data, to separate those and secure it on these types of devices and really allow you to be agnostic to what device that you use. So suddenly it becomes less about dictating what device you can use. As part of that enrolment process, you can containerise the data and manage it in a very user friendly way that it becomes very simple and transparent to the end user.

 So you discussed there MDM, mobile device management.

Yes.

And as you said, the software's rapidly I think approaching maturity almost on them. Gartner said it's gone from being niche to these guys are on the game. Do you think we

have the necessarily skills in here? I know MDM itself is simple, relatively. It's enrolment, policy, push.

Yes. So as I said, there's been a lot of change. So in the same way that we talked about bring your own device, mobile device management is in the same thing, where it initially focused on the device. So the market has shifted all right a lot where it was about, yes, securing that device and providing access to control that device in such a way, but really it's evolved where other kind of services, be it enterprise file sharing and synchronisation, so your enterprise Dropbox effectively becomes part of these products. And also deploying applications onto these and securing and containerising the data on them is also becoming part of it as well.

So it's becoming less about the products now. They're consolidating different offerings into the one, so it's really around enterprise mobility now and being able to provide a single one-stop shop that manages the device, the data and the application securely. Now, yes, it is reaching maturity where a lot of them are all kind of offering very similar services and the pace of change is so quick that if one player doesn't have the services, it will very quickly, especially being in the cloud, cloud-based services that they quickly turn around and they release cycles so much quicker. So yes, it's becoming very much a level playing field out there.

So yes, I suppose it's becoming a mainstay. Do we have the skills? I think there's a level of experience there in terms of I suppose there's a limit in mobile device management inbuilt into the likes of Exchange. So we've asked a lot of the questions around devices and understood. Obviously a huge part of it is the technology part in terms of understanding the types of phones, the types of technology and the types of device management and policies that you can have to lock it down. And asking the types of questions, be it 'What happens if you lose the device? Or what happens if…?' A lot of these situations have been actually already thought of, so from that point of view, there's a bit of experience there. So in terms of the specific knowledge of whatever product we bring in, I don't think the learning curve is going to be massive.

No. I meant it kind of more on the broader picture of it than the MDM management suite.

And I think the broader picture, as I say, a lot of the questions, we've done a lot of the groundwork in the last year and asking both the questions around staff using these types of devices, and as you say, be it a company-owned one or a personally-owned one. And as you say, knowing enough that rather than talking about the device, it's coming back more to talk about the data and the security of that data. So yes, I think that broader question and understanding is there, but the technology, as you say, I think we can very quickly adapt and learn from it. A lot of the controls are inbuilt and you can use them out of the box, which is great. I think the skills that are going to be needed are more so around the development side, developing the applications and the bespoke stuff that we need. So I think the sooner that we can get that in terms of internal line of business applications.

Really where we're going to have the big wins is actually customer-facing applications. We're behind the curve on that space. We don't have a brand and a presence on devices in terms of particularly on a retail side of the business for people to look at their bills, pay their bills, one-time payment and do that securely. I think that's a missing space that we need to do very quickly. Now, Power Check on the network side has obviously been, it's quite primitive, but it actually has been a huge success.

Do you think that mobile development has been a success for us? Do you think it might have changed some of the perceptions surrounding the IT function

Yes, and it's just a taster for what can be done. I think we need to be able to think about the big picture in terms of it's not just about mobile device management and enterprise mobility. If we're going to develop these applications, it's the core logic and the data sits on our enterprise systems and it's how we develop apps in a standard way that hook in and access that data in a way that we can turn around and be agile, to turn around applications in a standardised way, that that can hook in. So it's a service-oriented architecture and we just look at it. And thankfully now it's gotten on the agenda and that we need to look at investing in that from an IT point of view to have that in place rather than starting to develop bespoke applications that are going to hook in and bring a lot of complexity in terms of interfacing into the standard systems.

Maintenance.

Become very costly to maintain and we've the ability then to turn around the applications to meet the needs in the mobility space.

So touching on that, you think the answer to that question in terms of how are we agile is the same for our external customers and our internal customers?

Absolutely.

They're not exclusive? That you put in place the underlying SOA, as you said, and you can deliver out the services?

Well, I think ultimately we have to be commercially driven. And again, talking a bit earlier, that if we are going to be working in partnership with the business, there is a role in just providing obviously the core systems and ensuring the business processes, they're up and available, but we need to segment the different type of systems and services that we provide. We need to keep the show on the road, keep the lights on and obviously provide high availability and continuity for the core systems, but we need to build on top of that then and say, 'What are the systems of innovation, if you want to call it?' The systems that have a shorter lifecycle that we need to be able to provide help to the likes of the marketing or international businesses that are looking to I suppose in a very competitive landscape, be able to win and provide services out? And it's more and more so how they're competing and what differentiates against them is the types of technologies that are used.

And we need to be quick to respond and provide those types of technologies to enable them to win those types of contracts and win the business out there. So the only way to do that is work in partnership with them. So our customer is out there, be it providing the new services out to the retail business. We've got to be able to work closely with Electric Ireland and other parts of the business to be able to say, 'Well, listen, what technologies do we need to provide, and definitely in that space?' And then the consumer-facing apps as well, as I say, is being able to turn those around fairly quickly as well. So our customer, we should in theory be getting closer and closer to working with the business and therefore working with the business to provide services out to the real customer out there.

You said there's going to be a development platform.

Yes

That's not a function do you think that would happen in-house? You think it'd be more vendor management kind of skills that would take place here or could you expect the IT function of a utility to be pushing out on a Tuesday morning an update to an app or?

I see a model, I think.

Or is it hybrid?

It depends on what we see our core competencies being within the company. I think that if we can get ourselves to a stage that we have a standard architecture in terms of providing services to these mobile applications, and not just mobile applications. It could be other kind of I suppose form factors. It could be TVs. It could be various types of devices. When I say mobile, it could be web content management. So it's various form factors and endpoints, how we develop the applications for those. If we can have the architecture that allows it to be agnostic in terms of the touch points of the services provided to those, I think we can outsource it and manage. We're packaging to develop those apps and have those skills there and available to turn those around quickly. And if we then just I suppose act as brokers in terms of the services that we get from those, be it developing them, turning around releases for them and working with the business to make sure that we're providing those services to the business, I think that's the reality. I think we need to have an oversight of the whole architecture and the access and provision of those services to those. We want to make sure that they're done in a standard way, but as long as we've got it standardised, we can work with and tender out to different businesses in terms of development of applications.

Pieces of work.

Yes. So I think that's the reality. To maintain the skills and turn that around for changing platforms, I think it makes more sense to have it outsourced.

Can you see BYOD having an impact on software purchasing decisions or services we purchase? Software again is a word.

Yes.

Platform as a service. Application as a service.

The licensing world is complex and intentionally complex. It's intentionally complex obviously to catch you out, so I mean it's very hard to stay on top of it. I see a shift again in the same way with, as we talked about, devices. The licensing of software tended to be tied to a device, but now as people are using different types of devices and crossing over to their own personal devices, you're going to find licensing models being less tied down to individual devices and more maybe tied to the user or the individual or the employee. So you're probably going to find that software, yes. If people are going to use software in a company context, that it may tend towards more open source. I don't know. There's going to be a shift and a change that allows people to access and use software, be it at home or a personal device or wherever they are, but there is going to be some shift in that space. I don't know where it's at, but it's definitely a transition at the moment and really, I think the big picture is models, the vendors that if they can recognise an opportunity to take this software both to consumers and these consumers working in these enterprises, that if we can provide a model that allows you to use the software, both at home and in the workplace and on any type of device, I think there's an opportunity for them there that'll allow it to be simplified. I think so, yes. There's a shift in that space.

It's the jargon, but are we saying the future is cloudy?

Yes, cloudy. That's it, yes.

We have made an investment in Citrix as an application delivery platform. Can you see that being challenged because we're going to be using say containerisation, virtualisation or?

Do I see a challenge?

So are we going to deliver to primary devices, as you say, using via Citrix interface? But say if we use an MDM solution, it can be a different virtualisation solution, is there an inherent complexity in that or how do we manage that or?

Well, as I said earlier, the product set is evolving in such a way that even Citrix themselves have recognised and then got involved in that market as well. They purchased Zenprise, so they have integrated that as part of their product set. It's unfortunate (removed). So the fact that we've got two different products I think is going to be the way it is going to

be for the next three to five years, but we will recognise a shift, that we'll migrate into one platform.

So I think though the model which we provide Citrix, and again, to a single device, is again dictated by the software licensing. It'll open up more so as the licensing changes. So I suppose it'll become the backend of whether it's Citrix or the vendors I think will become less relevant, but the model is there, that you provide an application out and it's to any type of device, whether it's used through Citrix Receiver or whatever type of technology. I suppose it's a wait and see, to be honest. But Citrix have firmly put themselves in that market and in that place anyway, so they're providing StoreFront and all that kind of stuff to provide applications out, again containerised in a secure way. And we'll wait and see. I think we're again in a transitional period where we just happen to have more than one product. There's an overlap in it. I think it'll consolidate into one sort of enterprise solution that provide all the services. I suppose that's commercially the most cost-effective way, is that we go with one product to do the lot.

And do you think we're being relatively early adopters of this kind of stuff or?

No, no, we're laggards. We're way behind.

You think we're laggards at this?

Complete laggards, yes, absolutely, yes. Way behind the curve. So I suppose the conferences and things are gone to yes, they've talked about BYOD. They've talked about consumerisation. They're kind of really now becoming terms that, as you say, they're no longer the hype. The conversations have moved on now around wearable technology and I think where it was kind of a future trend, it's becoming a mainstay now of organisations now, I think. So we're very late. I think our tender process has been two years now in the process. What was originally going out to get a mobile device management, a mobile development platform, I think even when that tender went out, we were behind the curve. So the fact that it's been two years and we're waiting to get that in, I think really we're definitely laggards now at this stage because of that tender process.

Even in a European context we would be or?

I think so, yes. If you just look at companies providing out applications, consumer-facing applications, I think we're well behind the curve in terms of just simply access to information and bills and payment of bills. We can say, 'Ok, look at utilities.' But I don't think it's relevant. I think you look at the consumer and the services they provide across various domains. So you look at Vodafone or you look at various other services. They've been ahead of the curve a few years ago, that it's almost expected now for you. Your banking systems and everything, it's all provided through a customer-facing application and we don't have that. So we're well behind that and we've missed a lot of opportunities in terms of selling our brand and gaining business by offering that.

So I think we're very closed-minded. I think that you need that. We mightn't necessarily be laggards, but if you look across services in a lot of sectors, we're definitely laggards.

Yes, that's a bigger ques

Not to our employees, I suppose. How do we decide on what applications or basket of services we'd make available? I mean can you see SAP 7.20 ever being available or as you say, are we going to just put in place an SOA that'll provide these in nice visual GUIs or?

Well, even SAP themselves actually have a shift in terms of the product sets they're offering. For a lot of the services and backend systems, they're talking about by 2020 no longer providing them. And even now, their standard frontend that they provide is now mobile first. So the traditional legacy systems that we have, albeit SAP, it is going to be over the next five to 10 years looking at how we in a standard way hook our systems in or our mobile apps to hook into those types of systems. And now more and more as those backend systems become more developed, mobile first and ready, we'll have lesser knowledge in terms of how we integrate and turn it around to provide mobile applications out.

So I think between now and then, while we're in that interim period, it is about picking off which are the most important and looking at our users and what information do we need to get at the fingertips of workers? So definitely in our Networks business, out to the NTs, the people out in the field. It's really around focusing on mobile workers, people who are away from the desk. How do we get access to their fingertips the information and get knowledge and just be able to make decisions and turn around and win contracts? So

they're not reliant on going back to their desk to get the information to their fingertips to be able to relay it to the customer. If they can turn that around there and then, have that conversation and have the information to inform them and give them the insight to make a decision, be it win a contract or get new service for the customer, I think that's really where we need to focus our attention initially.

We could then start looking at layers around our workers. Again, the more mobile you are, the more you need that information at your fingertips. So again, it's looking at those use cases and then applying information, and it's looking at that information and then you look at the systems and applications that are needed to provide that information and that insight. You can then develop then the applications very simplistically around that, be it time sheets or whatever it is to people's fingertips then. So it's building it organically, but again focusing it on really where their customer and where we need the insight to be. So providing it at the frontend for mobile workers.

Do you see BYOD, again, enterprise mobility in general, as a kind of a threat or an opportunity to the IT function or both?

It is both, but more so shifting to an opportunity. If we look at it as a threat, we're in trouble. We're in a lot of trouble. I think we already have been in trouble. There's a lot of pent-up demand in terms of the business that really I can see the frustration. It's almost an emotional reaction from workers who are not enabled to do their job. And the reality is because we've seen it as a threat and haven't reacted to it, the way workers are working is because they're technology savvy, they'll find other routes around to get access to data and get it to their fingertips when they're on the move. So they're going to copy data out to Dropbox. They're going to copy it to their Gmail. They're going to bring commercial data out, just so they can access it on those types of devices.

So if we see this as an opportunity and deal with the reality and look at the existing scenario of what people are going to do anyway, we need to look at it as a way of how we can prevent that type of behaviour and actually get them on board and sign them up to the device management tools and say, 'Listen, let's do this in a secure way that still enables you to access that data on the move.' And I think treating it as an opportunity and understanding what the threats are, rather than being defensive and saying no to

these scenarios really is looking at what way we can enable the business. I think it really is. It's getting that mindset, whereas traditionally, the operation model of an IT organisation is to see threats and prevent it.

Where is the demand? What services do we need to provide?

Well, that's the biggest gap we have at the moment, the demand. As I say, where the conversation has been largely around the device. It's actually not about the device. It's access to the data and the information so it becomes more so how we can provide that data out to different types of devices. At the moment, that's the initial conversation, is data, documents. How do we get them? But then once you have that data then, it becomes more about the applications. The applications turn that data into information and turn it into insight, which allows you then in terms of looking at big data, you're looking at how come that backend, that customer data, what we can do with that to turn that into insight that we can win over business and contracts and all that kind of stuff. So it is primitive in saying access to documents and data, but once they get that access, then it'll be the question of the next step up, is how we can access it through applications that we would otherwise only access at our desk.

So I suppose if you don't have it, you can't take the next steps.

Yes.

Exactly. First the data device, go to the data, now from there it's we can go from there.

I suppose just to bring it back to pure BYOD for a minute.

Yes.

I know it's developed into the bigger questions, but how do we measure the success of this or otherwise?

No, what I've found definitely not just with looking at something like BYOD. I think in this consumerisation space, and as I said, really if you focus on the end user and you're talking about productivity and new ways of working, it really goes into a HR space. It goes into where you're talking about intangibles. I think there is some things, that you can have metrics, that you can certainly say, 'You've saved this much time in doing things.' But I think it has become very challenging. I'm looking at it in unified communications. I'm looking at it bring your own device. I'm looking at it access to video, so it's all this end

user productivity space. It becomes more and more challenging to quantify and say in terms of financial metrics to say, 'Here's the savings that we've made.'

There's definitely a spill-over, a knock-on effect of intangible things that looking at the new generation, winning over. It becomes almost expected that staff coming in looking for a job, that some of the intrinsic benefits that you get, it's almost expected that you can access company information on your personal device. You can remote work. These types of things are a given. So attracting talent into a company is one thing. Maybe you can put figures on it and see. Maybe.

What are the benefits?

There are certain knock-on benefits and then as you say, productivity. If there's a benefit of staff. At the moment, you can see an emotional response from people. If you don't meet those needs, it's a double-edged sword. They get pissed off and annoyed and see IT as being not as an enabler, but as a showstopper to them doing their job. So there's a perception of IT, even though it can keep the systems and it's doing its job, maintaining it really well, the perception of IT providing value or as a good service becomes much lower and the CIO becomes less relevant and doesn't actually have a senior seat at the table. And that's what found in a lot of organisations where the CIO was at the executive level, is now gone down a few pegs because of that. So there's knock-on intangible consequences. So the benefits if you give this stuff is you'll see a reversal in that kind of trend where the CIO becomes more relevant. You see it attracting talent. You'll see the staff having a much more positive perception of IT and a knock-on effect, they don't have to do the administrative work. They don't have to access their information. A knock-on effect, we win more business. So there are some metrics, but it's definitely a lot more challenging. When you're looking in that end user space, it becomes more and more difficult to do. And certainly from the BYOD pilot group concept, we did map out to say, 'Here's the types of benefits to the user and the organisation.' But again, a lot of them were intangible benefits.

So that's the brave space, of the HR space of having that buy-in, is to say, 'Listen, if this is going to change how we work and enable the new ways of working, it's that sponsorship you'll need maybe at a more corporate level or a HR level to say, 'This is going to benefit and enable us to work in new ways and fits strategically with this agile and engaged

organisation.'' If you can align it to those kind of goals, rather than the pip savings or that kind of space, that really companies that recognise it and have already recognised it, that's where they've been ahead of the game in adopting these type of technologies and seeing its benefit early on, rather than looking at purely the financial outcome.

Do you think there's senior management understanding, both at the IT level and at company board level for such things? Or is it an expectation or is it kind of an acceptance that this is the way things are going to go or?

At the most senior level, so the executive level, they have been fully supportive and see the benefits of using your own technology and the use of these types of devices. And in fairness, as you said, the likes of Removed, Removed have really, really kind of been big advocates of this and for their own experience using the system, like the board papers application Removed, it's now a cloud-based application provided onto technically personally owned iPads. They're not managed by the company and they're unmanaged devices used by the executive team. That has been a huge success, to shift from the old type of company laptops that they really didn't carry around much, to providing this solution where they can access the board papers securely from their iPads anywhere on the move. So it's been a real positive shift. Access to their email, their calendars on these types of devices has been really, really good. So they've been hugely supportive and see that benefit.

And also, as you say, the shift from a day to day in different parts of the business, the business really do see the need for this. I think what's more behind is the IT management level. I suppose again, it's the culture of how we've traditionally managed silos and had a focus on managing big projects and focused on the enterprise systems and keeping the lights on and focused our budget, our investment cycles all around 80% to 90% Gartner would say of investment and time resources is just spent on the legacy systems, keeping them up and running. And really we've lost the focus on putting the time into actually looking at how we can enable these types of initiatives that ok, are largely sparked as buzzwords as BYOD, but if you strip them back and understand really what it's about, I think there's opportunities there where really, we need to shift, as I say, and look at these as opportunities and say how we can enable the business and provide different services.

And obviously the importance of managing the core business, but we're also providing services out to enable the business to reap the benefit and provide services to customers.

Do you think our core competencies are going to change as a result of BYOD?

Our competencies are definitely going to change and I think the traditional model of us owning and hosting and providing every IT service, we've got to be realistic. We've got to look at the higher value services that we do provide to the business. And there's definitely going to be identifying those services that we don't necessarily have to have the competencies in and that we are necessarily unable to be agile enough in terms of turning around to meet the timelines for the business. Really, if we're not at the races and can't provide the service at a competitive level, be it cost or quality or in terms of agility, we need to be able to be realistic and look at ourselves as part of a company. To be competitive as a company, we need to be able to outsource those services.

So it's not to see it as a threat. We need to be realistic about it, and if we can do that, we can still have a seat at the table to provide the senior level advice in terms of integrating these systems and accessing these systems and services in and be, as I say, a broker of services more to the business so that we kind of spend more attention and time working with the business in terms of meeting their needs, rather than working at a lower level in developing and hosting services and systems, that it really becomes more about, as I say, managing the information and the data and making sure that we can do it in a secure way and that enables the business. I think we look more at the bigger picture, that's the shift we have to. Don't look at it as a threat because we'll become irrelevant otherwise if we don't.