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The evolution of electronic filing process at the UK's HM Revenue and Customs: The case of XBRL adoption

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Abstract

Electronic filing was introduced to HM Revenue and Customs (HMRC) in the United Kingdom (UK) over fifty years ago. The filing process at HMRC evolved from relying on a simple batch system in the 1960s for performing simple data-processing tasks to adopting an open-source reporting technology, Extensible Business Reporting Language (XBRL), in 2010. HMRC championed the use of XBRL to standardise the processing and presentation of data in the Corporation Tax's supporting documents (accounts and computations). XBRL aims to improve the efficiency of case management, enhance the data quality, and add value to the evidence-based decision-making at HMRC. This research chronicles the evolution of HMRC's electronic filing process, which ultimately drove the agency's decision to develop Inline XBRL (the advanced version of XBRL). The UK government required all private, limited, not-for-profit and charity organisations to file their tax returns using Inline XBRL from April 2011. This case study captures and analyses HMRC's remarkable shift in perceptions and strategies towards using reporting technologies in processing information in tax filings. In addition, it contributes to the extant literature on government agencies' adoption of emerging technologies by examining HMRC's "XBRL Project." The findings showcase the essence of championing reporting technologies, continuously committing to develop them, and strategically engaging with multiple stakeholders (top government, software industry and professional accounting institutions) based on HMRC's experience with XBRL adoption process.
Keywords: HMRC, electronic filing, XBRL, adoption.

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1.   INTRODUCTION

The utilisation of reporting technologies in the filing systems of government agencies is an integral part of those agencies' operating systems. Ebrahim and Irani (2005) and Heeks (2006) define electronic government as not only the usage but also the adoption process of Information and Communications Technologies (ICTs) including Internet-based technologies and network and communication infrastructure by government agencies. Technology improves the informational and transactional exchanges between the government and stakeholders such as individuals, businesses and information technology suppliers (Heeks, 2006). Technology also supports a variety of government needs ranging from government operations to improved interaction with stakeholders. Additionally, technology helps to reduce both regulatory burden and the cost of delivering governmental services (Garson, 2004; Brown, 2005).

The utilisation of ICTs enhance data processing and add value to decision-making process in regulatory authorities (Mousa, 2010). Many important decisions depend on information provided by tax professionals. In the UK, HMRC receives and processes different forms of tax filings by individual and corporate taxpayers. Corporate taxpayers file their annual tax returns (CT600) along with the supporting accounts (eg, taxable income) and computations in non-standardised formats. Given the apparent complexity and richness of the data in these supporting documents, HMRC strives to standardise data processing. The processing of such data drives the agency to make an informed decision whether to select certain cases for conducting further tax analysis and/or assess certain financial risks. The use of a reporting technology liberates HMRC staff from performing tasks such as data processing and validation, and encourages them to focus on more complex activities such as compliance and risk assessment. However, the UK is home to 2 million companies, as well as 100 000 tax agents and payroll professionals. This made the agency fully aware of the need to have a functional reporting system that could utilise technologies that will facilitate processing the vast number of tax returns. Particularly, the complexity of the data structure and the lack of the standardisation of tax data in the Corporation Tax returns' supporting documents (accounts and computations) was the driving force behind HMRC's decision to adopt Extensible Business Reporting Language (XBRL) to support risk assessment by implementing 'XBRL Project'. HMRC became the first government agency to embrace the functionalities of XBRL technology in regulatory tax reporting. The agency also developed its advanced version, Inline XBRL, to support the seamless presentation of data in tax filings so it can be both human and machine-readable. HMRC required all companies to file their Corporate Tax (CT600 accounts and computations) in Inline XBRL from April 2011.

While HMRC's Inline XBRL adoption is considered the world's largest-scale 'live' implementation of the reporting technology (Monterio, 2011a) and its advanced version of Inline XBRL, this technology has gradually been gaining momentum in the global tax-reporting domain. The Irish Tax & Customs authority closely watched HMRC's experience and mandated a phased filing of Inline XBRL-based financial statements for corporate taxpayers starting in October 2013 (Boyle, 2012). In Australia, the government introduced the Inline XBRL-based Standard Business Reporting (SBR) program in 2010. Preparers file their financial and tax returns required by the Australian Taxation Office (ATO), the Australian Prudential Regulatory Authority (APRA) and State Revenue Offices using Inline-XBRL technology. [i] According to the annual report published by the Australian

Commissioner of Taxation (2014–2015), the ATO estimates that the cost savings of using Inline-XBRL-based SBR amounted to AUD400 million due to the remarkable number of processed SBR transactions, which exceeded 15 million in 2015.[ii] Other international tax authorities have opted for a 'wait-and-see' strategy, mainly observing HMRC's experience, to determine XBRL applicability to their tax processing systems. For example, regulatory authorities in Denmark, Germany, Ireland, Japan and the Netherlands are still investigating the capabilities and functionalities of XBRL to support the tax filing process by private and public companies.[iii] They are also actively working on developing XBRL taxonomies that will incorporate the variations of GAAP and IFRS. The inclination of tax authorities to leverage the power of XBRL is deeply rooted in those authorities, such as in the Netherlands, which strive to minimise the compliance burden of providing financial and business information reports by filing companies to the governments (Monterio, 2011a). This also works in favor of those governments' systems, which have to be adequately equipped for streamlining and processing business and financial data filed by millions of companies.

In the United States (US), the Internal Revenue Service (IRS) is still investigating XBRL's potential, despite the agency's long involvement in utilising XML standards in tax filing. The IRS's Chief Information Officer, Terence Lutes, expressed the need to adopt XBRL to be part of the agency's e-file program as 'receiving data from reporting entities such as banks and corporations in a common data format makes the entire [filing] process faster and easier' (Hannon, 2006). This resonates with HMRC's initial motivation to adopt XBRL, which should hold more potential for a possible XBRL adoption at the IRS. Some XBRL advocates indicate that XBRL could standardise data gathering and reporting; provide better audit filing requirements, faster settlement of tax enquiries and effective risk management (Hannon, 2006; Monterio, 2011b). Other XBRL experts have even proposed a potential usage for XBRL to file the paper-based Form 990 (Organization Exempt from Income Tax), which is filed manually by 230 000 charitable organisations with the IRS (Strand et al., 2001). They believe that XBRL can eliminate 920 000 reporting errors, assuming that there is a 1 per cent keying error rate among filing organisations (230 000 organisations multiplied by 400 pieces of information per organisation). There will be no additional cost incurred as the data is entered into the filers' operating systems and filed electronically with the IRS, which could eliminate the keying errors for both the filing companies and the IRS (Strand et al., 2001). Despite all these espoused benefits, the IRS is still skeptical of XBRL. This reluctance could be due to the IRS's reliance on its existing electronic filing systems to process tax filings and the absence of a need or motivation to develop these systems. However, as the technology is being seriously considered and implemented by international tax authorities and gaining critical mass, the IRS could re-consider its reporting strategies.

The purpose of this case study is to chronicle the evolution of HMRC's electronic filing process from the 1960s until the implementation of XBRL and the development of Inline XBRL to support the filing of the Corporate Tax (CT600 accounts and computation). This case study contributes to the literature of technological innovations in tax authorities as it provides an in-depth analysis of HMRC's experience, strategies, decisions and focuses on the agency's collaboration with key stakeholders who played key roles in XBRL adoption process. It also provides practical insight and guidance to potential XBRL regulatory tax adopters, policy

makers and IT specialists, who are involved in adopting and developing reporting technologies in their organisations.
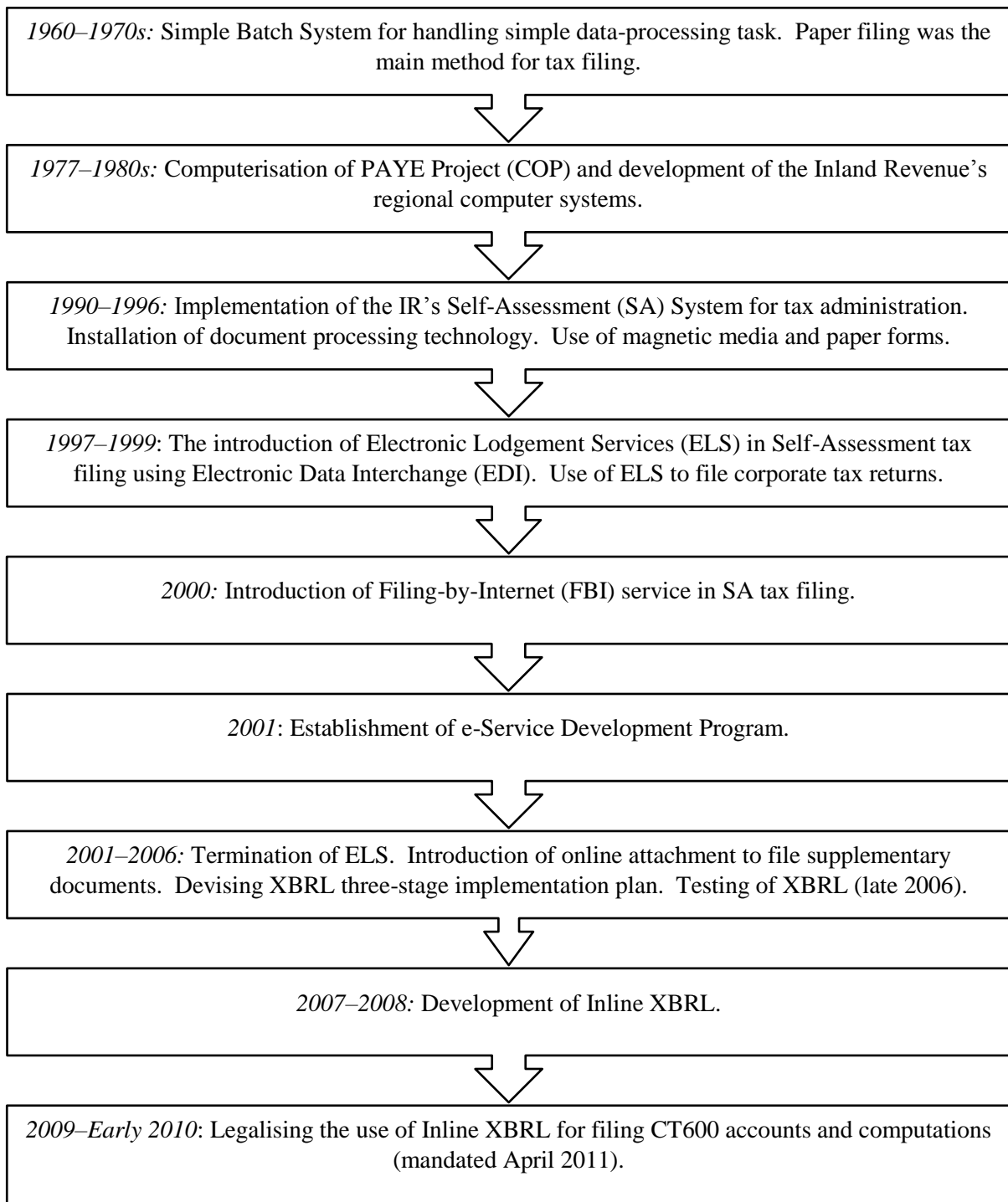
2.   RESEARCH METHODS

This paper provides an in-depth case study that involves longitudinal examination of HMRC's electronic filing history (Davey, 1991; Yin, 2003). Yin (2003, 2) indicates that case studies are concerned with the "rigorous and fair presentation of empirical data." Also, according to Yin (1994) and Benbasat, Goldstein and Mead (1987), the case study method can be used for exploring an emerging technology (Paré, 2004), making the main research focus is on the organisational setting instead of technical issues.

The case study has been fundamentally supported by the use of semi-structured interviews and documentation analysis. Case studies and interviews are cited as the most popular research method in XBRL adoption research (Perdana, Robb and Rohde, 2015). Three semi-structured interviews were conducted in three locations of HMRC (Telford, Peterborough and London) with members of the XBRL project during May to November 2008. Recorded interviews comprise the core part of the "oral history" of HMRC's electronic filing reporting process with particular emphasis on the participants' experience in implementing 'XBRL Project'. Literature indicates that oral historians can seek a "purposeful" rather than a random selection of research participants (Facio, 1993). This view is supported in this research as the participants were selected based on their job affiliation and role in HMRC's IT services division and particularly, XBRL adoption.[iv] The oral history is a dynamic and creative research technique, which involves preserving the "knowledge of historical events as recounted by participants" (Baum, 1977, p.5). An interview process generally consists of a well-planned interview, which allows the interviewer to question the interviewee on their views and elicit their personal commentaries, which are of historical significance to the research issues (Ritchie, 2003). In support of using oral history in accounting, Collins and Bloom (1997) emphasise the importance of interviewing the 'major personalities in the development of the [accounting] field' (Hammond and Sikka, 1996, 79). It also greatly contributes to the understanding of the 'construction and refinement of accounting techniques and practices' (Hammond and Sikka, 1996, 91). Exploring HMRC's electronic filing history reveals the agency's long-standing experience with electronic data processing practices. All interviews were digitally recorded and transcribed. The researcher followed Hoque's suggestion by using taped interviews in qualitative accounting research (Moll, Major and Hoque, 2006). The taped interviews offer the advantage of using specific interviewee quotes to improve the data credibility, while providing the researcher with the rare opportunity to be attentive to the subtle interactions with the interviewees. However, transcribing taped interviews was difficult because they had to be transcribed verbatim while the interview was still fresh in the researcher's mind. The researcher faced the risk of allowing another person to transcribe the interviews, which could undermine the integrity and accuracy of the transcribed data. To mitigate this risk, the researcher decided to personally transcribe all the taped interviews; a procedure that is often very time-consuming to researchers conducting similar qualitative case studies. HMRC's identifiers were removed from the transcripts and a code was assigned as a means of identification. A separate list of participants and the codes assigned to them is kept confidential. From the transcripts, a qualitative analysis was conducted to identify the

major research themes. Nvivo, a popular qualitative data analysis software tool, was used to support the data analysis of the interviews (Welsh, 2002). All interview transcripts were loaded and saved in Nvivo as documents. Nodes were created prior to the data analysis to reflect the research themes. Coding was used to generate those themes that contain pointers to the actual data (Morse and Richards, 2002; Richards, 2005). The coding process was carried out using descriptive codes (Miles and Huberman, 1994; Morse and Richards, 2002), where phrases, words and sentences from interview transcripts were labeled using relevant words according to the research themes identified in the literature. Axial coding was used to systematically develop the research themes. This helped in reducing the data that would be analysed. Throughout the coding process, the transcripts were frequently revisited to ensure that the axial codes and meanings were interpreted in context. One of the main challenges associated with conducting historical case studies is the possibility of facing gaps in the observations and information provided by the research participants (interviewees in this research). To overcome this concern, the researcher ensured that the data was carefully observed to identify any potential gaps. Gap analysis was conducted to determine the differences between the information provided in the interviews and the literature reviewed throughout the documentation analysis.

Benbasat, Goldstein and Mead (1987) critiqued that a significant majority of information technology implementation studies in public sector organisations rely on data collection from a small number of sources. To overcome this shortcoming, the researcher used an in-depth longitudinal documentation analysis of HMRC's electronic filing history. Longitudinal analysis was described as a demonstration of an 'exemplary effort of data collection' in case study research (Benbasat, Goldstein and Mead, 1987, 381). Documentation analysis is widely supported as one of the main methods of qualitative research analysis (Yin, 2003). The researcher built over the course of three years multiple databases of documentation, which validated and augmented the evidence collected from the interviews. Documentation included government reports, consultation documents, organisational presentations, HMRC's annual reports, white papers, and archived reports issued by major UK professional bodies and academic papers. These databases were structured by following a particular line of inquiry, so evidence associated with each inquiry is presented in the same place.[v] The archived documents were retrieved as they explain some of the issues discussed and referenced by the interviewees. This allowed the researcher to conduct a comprehensive analysis of HRMC's electronic filing process. The appendix includes tables showing the interviewees' details and a sample of archived documentation.

Figure 1: Timeline of HMRC's Electronic Filing History

1960–1970s: Simple Batch System for handling simple data-processing task. Paper filing was the main method for tax filing.

1977–1980s: Computerisation of PAYE Project (COP) and development of the Inland Revenue's regional computer systems.

1990–1996: Implementation of the IR's Self-Assessment (SA) System for tax administration. Installation of document processing technology. Use of magnetic media and paper forms.

1997–1999: The introduction of Electronic Lodgement Services (ELS) in Self-Assessment tax filing using Electronic Data Interchange (EDI). Use of ELS to file corporate tax returns.

2000: Introduction of Filing-by-Internet (FBI) service in SA tax filing.

2001: Establishment of e-Service Development Program.

2001–2006: Termination of ELS. Introduction of online attachment to file supplementary documents. Devising XBRL three-stage implementation plan. Testing of XBRL (late 2006).

2007–2008: Development of Inline XBRL.

2009–Early 2010: Legalising the use of Inline XBRL for filing CT600 accounts and computations (mandated April 2011).

3.   INLAND REVENUE ELECTRONIC FILING: 1960S–1970S

The former Inland Revenue (IR) began investing in information technologies in the 1960s. The IR developed its filing system and ran one of the largest administrative computer networks in Europe (NAO, 2000). The IR's first computer system was responsible for performing simple data-processing tasks. In 1965, the initial plan to computerise the main tax system was drawn up as a batch system[vi] for the Pay-As-You-Earn (PAYE) system, a mechanism used for withholding and collecting personal income tax to employees, which would run from nine computer centers across the UK (Margetts, 1999). The first, *Center 1,* was established in Scotland in 1968 and a second center, *Center 2,* was built and staffed in Liverpool. However, in 1970, the government planned radical changes to the tax system to include a tax credit system, with a single interface of financial transactions between the government and citizens (Margetts, 1999). This policy change meant a merger of revenue, national insurance and benefits. The batch system for PAYE was deemed inappropriate for the policy changes and *Center 2* was never opened. In 1974, the government abandoned plans for the tax credits because it proved to be too expensive to implement. Then-Secretary of Inland Revenue, Sir William Pile said, 'the manual system was close to break' and that service would decline with the 'sheer weight that is being put on it' (Dyerson and Roper, 1992, 304).

In 1977, the IR reconsidered its original plans to automate the tax system. Steve Matheson of the Treasury Department was tasked with investigating new possibilities for computerising the batch system for PAYE. An approval was granted to initiate 'a very limited on-line system' (Matheson, 1984, 92), and a feasibility study was conducted from 1978 to 1979.

4.   COMPUTERISATION OF PAY-AS-YOU-EARN PROJECT: 1980S

In 1980, a decision was made to implement the 'Computerisation of PAYE' Project or COP Project to 'improve the service to the public through greater accuracy, reliability and speed response to communications … and to create a system offering greater flexibility for the implementation of future changes within the present tax structure' (NAO, 1987, 7). In April 1984, the COP Project was extended to include assessment of Schedule D Tax, the personal income tax for the self-employed on trading income, income from professions, interest and overseas income.

During the implementation of the COP Project, the IR suffered from shortages of skilled labor for the development of the agency's computer systems. This prompted the IR to train the local office employees as programmers. Despite the high cost, this training strategy contributed to elevating the technical skills of the staff members, which added greater value to the COP Project (Dyerson and Roper, 1992). Furthermore, the involvement of staff at the highest level of the organisation was evident. Dyerson and Roper (1992) indicate it was unusual for a government IT initiative to display a high level of personal commitment given by the senior management at the IR on the COP Project. A committee structure was established to manage the COP Project and a coordinating committee chaired by the Project Director met on a monthly basis to monitor the progress. Matheson, who directed the COP Project from the initiation of the feasibility study in 1978 until 1984, became the COP Project 'champion'. IT support contracts with two external consultancy firms,

Computer Sciences and Pactel, were signed at the beginning of 1981 to review the implementation of the COP Project (NAO, 1987, 15).

The COP Project's completion coincided with the end of the government's preferred procurement policy favoring British IT service suppliers. Matheson recommended in the feasibility study that the COP Project should be left for an open tender (Morris and Hough, 1987). He also recommended integrating a full mainframe system and a full distribution system to streamline the reporting process across the UK. The integration was needed to keep the local computer systems synchronised with the central one. No software vendor was capable of this synchronisation. ICL, an American supplier of computer hardware for the COP Project, offered to engage in such a task, but the supplier wanted to create new hardware and software from scratch (Morris and Hough, 1987). However, ICL had no experience with distributed systems, and it did not develop suitable recovery software to prevent database corruption. Despite the concerns over the reliance on a foreign IT supplier, the IR was told to 'refashion' a system specification, which ICL could do. The IR's contract with ICL marked an important step towards the agency's IT implementation strategy, as it highlighted the need to seek external non-UK IT support to implement large-scale IT projects in the future. This was evident with the IR's decision to implement the latest technologies in tax filing, which was the main highlight of the 1990s era in the IR's filing system history (Margetts, 1999).

5.   THE IR'S ELECTRONIC FILING SYSTEMS: 1990S

In April 1991, the Information Technology Office (ITO) of the IR was established as an Executive Office of the Inland Revenue to oversee the COP Project (Margetts, 1999). The ITO was also responsible for developing, maintaining and operating all IR's computer systems. During 1991 to 1992, the ITO ran all IR's computer systems with an annual budget of £250 million and operated 13 regional computer centres (NAO, 2000). The centres were split into smaller and more manageable systems to reduce complexity. These smaller systems were still capable of working seamlessly together to maintain an efficient and coherent support system (Inland Revenue, 1992, 42).

The IR initiated its biggest tax reform through the introduction of a Self-Assessment system of tax administration during the period 1992 to 1993 (Beynon-Davies, 2005). The system was similar to the one used in the US, where taxpayers estimate their own tax liability and file their tax returns to the IR along with payment. The system was planned to apply to nine million higher-rate taxpayers[vii] and the self-employed who had to file individual tax returns, in an attempt to cut 'red tape', reduce costs and make the system more accurate. The National Audit Office (NAO) noted that the IR's computer systems became more complex over the years and 'they [systems] cannot be enhanced to provide the functionality needed to support all the changes the Department wants to make' (NAO, 1996, 19). To improve the functionality of its IT system, the IR spent nearly £80 million in 1991 to 1992, including £17 million on IT consultancy support (HM Treasury, 1992, 63).

In July 1992, the Director of the Information Technology Office (ITO) announced a strategic partnership with Electronic Data Systems (EDS), making it IR's sole IT services provider at the time (Inland Revenue, 1992, 42). From 1994, all the computers and information systems of the ITO were provided by EDS (Beynon-

Davies, 2005). The IR also studied possible uses of optical character recognition (OCR), electronic data matching and imaging technologies. However, there was little effort to implement any of these technologies at a decentralised level (Margetts, 1999). Document-processing technology was tested but problems with the technology deterred the implementation of any plan.

In 1994, tax software vendors introduced tax-filing packages.[viii] The software showed a copy of a tax return complete with the IR's own guidance notes. According to the *Independent,* tax agents used computerized versions of tax returns instead of paper forms for about a million personal taxpayers, but the electronic filing of such forms was not enabled.[ix]

The IR's strategy to reform its tax administration systems was guided by then-Prime Minister Tony Blair, who announced in 1997 that by 2002, 25 per cent of government services would be electronically enabled, and by 2005, 100 per cent of such services would be digitised (Beynon-Davies, 2005). In late 1997, and following the UK's e-government initiative[x], the IR established a new Electronic Business Unit (EBU) to provide support to customers that is compatible with the agency's own electronic services (NAO, 2002). The agency set out key features for its 'e-business' strategy that included using intermediaries such as software developers to provide bespoke services to taxpayers and tax agents. The strategy also emphasised transforming its staff roles to embrace the extensive use of electronic tools (Beynon-Davies, 2005).

6.   INTRODUCTION OF THE ELECTRONIC LODGEMENT SERVICE: 1997

Until October 1997, the IR relied on magnetic media and paper forms for tax filing. Data communication problems such as keying and processing taxpayers' data and information were encountered. This resulted in rendering 60 per cent of taxpayers' records inaccurate, generating delays and further paper work (NAO, 1999). The EBU's team worked alongside the EDS to develop a new means of electronic communication with employers and payroll operators to solve these problems. In 1997, the Electronic Lodgement Service (ELS) was introduced to enable tax agents and accountants to file Self-Assessment's annual returns electronically on behalf of their clients using an Electronic Data Interchange (EDI) service.[xi] This service reduced the burden on employers of compliance with regulations and minimised the routine manual data processing. Beynon-Davies points out that, 'over 267 000 returns were submitted through ELS in 2000-2001, [which is] equivalent to 7 per cent of the target audience' (15).

The on-line self-assessment regime of the Corporation Tax was introduced in July 1999 as part of the ELS system. According to the Office of National Statistics, there were 2.15 million business enterprises in 2009, 52 per cent of which represented corporate businesses.[xii] The IR deals with 2400 of the largest businesses through Large Business Service (LBS) division (NAO, 2007). Of the 2400 businesses, the LBS division deals with Corporation Tax for 900 businesses in the banking, insurance, retail and telecommunications sectors. Each UK Company has to prepare an annual return of its taxable income by filing the Corporation Tax Return (CT600 Form). The CT600 form also includes statutory accounts (such as income statement) and supporting documents (such as computations). Agents and tax filers dealing with Corporation Tax had the choice to either file CT600 returns using the Self-Assessment web-filing facility or complete returns in paper forms.

The IR commissioned a research study to assess potential business interest in ELS by its corporate users. It was found that ELS did not offer added value to the users.[xiii] In addition, users had high expectations that ELS would 'enable them to complete their return quickly, in less than 15 minutes' (NAO, 2002, 16). The agency was alarmed because of the significant low take-up of ELS as only 49 out of 660 organisations were utilising ELS. The rest of the organisations approached the agency to enquire about using the service, but they were found to be too small to accommodate EDI's needs for filing tax returns (NAO, 2002).

During the assessment of ELS, the agency had five account managers at the EBU who supported and promoted the usage of the facility. After ELS became widely available in April 2000, 'these managers received a substantial number of enquiries' (NAO, 2002, 16). They also did not initiate contact with many companies, which were unaware of the ELS service. The IR provided additional resources to its EBU to meet the EDI's needs of the large business organisations segment. In addition, the IR struggled with the 'availability of EDI's payroll software applications' that required functionality in the payroll products (NAO, 2002, 30). Agents filing attachments (accounts and computations supplementing the Corporation Tax) complained about the form's small space designated for computations and comments. There was a need for an electronic system, which has built-in filing functionalities such as additional space for information disclosure in the tax forms.

7.   INTRODUCTION OF FILING-BY-INTERNET SERVICE: 2000

The IR started to use the Internet as a medium for electronic filing service as part of the larger Government Gateway Project.[xiv] The Gateway Project was the cornerstone of the Government's electronic communication infrastructure and a key to meeting then-Prime Minister Blair's target of enabling the electronic delivery of government services by 2005. In 2000, the Government Gateway Project encountered a technical problem as the digital certificates system, which was central to the project, blocked all non-Microsoft users (Lettice, 2001). As a result, it became unclear when an online filing service would become available through the Gateway. The IR realised the importance of supporting its ELS during the peak period of the tax-filing season by providing an alternative electronic filing channel (NAO, 2002). In April 2000, IR introduced Filing-by-Internet or FBI. The new filing system was tested and some security problems were detected, which delayed the full implementation of the system until July 2000.

The FBI service became an integral part of the agency's 'Agents on-line project' (Hansford, Lymer and Pilkington, 2005 and 2006). The IR supported the usage of the new online filing service to encourage the population of filers (90 per cent of Self-Assessment return filers) to file their tax returns using IR-approved tax software packages. The FBI service reduced the time for processing tax returns and receiving confirmations from a day with ELS to a few seconds with the FBI service. Additionally, it instantly captured the data in the tax filings and minimised keying errors by the IR's staff.

8.   ESTABLISHMENT OF THE IR'S E-SERVICE PROGRAM: 2001

In 2001, the Committee of Public Accounts published its fifty-second report on the performance of the IR's electronic filing services.[xv] The report assessed the progress of the FBI service and revealed that only 32 per cent of individual taxpayers and 28.5 per cent of tax agents used the facility during the period 2000 to 2001. Key factors behind this low take-up included problems encountered by users trying to gain access. Four out of five attempts to submit tax forms electronically were unsuccessful. Some taxpayers found it difficult to register because they did not know their tax number, and Mac users were unable to use the service. Tax agents received error messages while using the service and faced issues in viewing client lists and enabling the online agent authorisation.[xvi] In recognition, the IR implemented an e-Service Program between 2001 to develop the performance of the FBI facility (NAO, 2002).

9.   DEVELOPMENT OF CORPORATION TAX FILING AND THE INTRODUCTION OF XBRL: 2001–2005

As part of implementing the e-Service Program, the IR introduced a Corporation Tax filing portal to enable companies and their agents identify the types of payments made and which tax liabilities remained. Stephen Banyard, who managed the agency's Business Customer Unit (business taxpayers) at the time, was one of the agency's key figures involved in the e-Service Program.[xvii] He also had substantial experience with tax agents and advisors through working as part of 'Working Together E-group'.[xviii] Banyard established the 'Carter Agent Steering Group', part of which is the 'Working Together Group', to start a dialogue with tax agents and representative members of different professional accounting bodies. Through these meetings, tax agents, representing large business companies, complained about the difficulty of filing large volumes of supplementary documents, which typically accompany the Corporation Tax (CT600) tax returns.

In recognition, the IR introduced the 'online attachments' option to the CT600 tax return filing service in early 2003.[xix] Tax agents were allowed to complete CT600, attach supporting documents and post them using CT600 online application forms. Electronic returns and supporting documents were also filed using third-party tax software applications. However, by the end of the 2005–2006 tax year, only 2 per cent of companies took advantage of this facility.[xx] The 2 per cent represented 900 'Large Business Services Group' of companies (providing UK £18 billion of tax revenue), which were allowed to send their accounts and supporting documents as online attachments. Companies filed these online attachments in non-structured formats, which undermined the agency's data processing system to capture and process the data effectively.

For the IR, the information contained in the accounts and tax computations was crucial for the risk assessment process carried out by a network of 68 tax inspectors and risk assessment offices. This network dealt with 1.1 million tax returns filed by companies, who paid £15 billion in 2004to 2005.[xxi] The Corporation Tax work costs the agency £220 million or 1.4 pence per pound of revenue.[xxii] Each risk assessment area is responsible for assessing non-compliance risks. Cases selected for further tax enquiries are usually required to submit additional supporting information, which is disclosed in the selected company's accounts and tax computations documentation. This documentation cannot be filed electronically as the systems cannot process the

data in the attachment. The IR normally conducts two types of tax enquiries in such cases (HoC, 2005). *Full Enquiries* focus on the disclosure of accounting for the entire income and assets of a business, and this is typically associated with small companies. *Aspect Enquiries* examine the accuracy and tax treatment of one or more particular features of complex CT600 tax returns, which is associated with larger companies. However, *Aspect Enquiries* could be also applied to smaller companies if only limited aspects of the tax returns are considered necessary to examine. Enquiries may result in securing additional Corporation Tax or profit adjustment for IR.

The IR found that even though *Aspect Enquiries* generated lower yield than *Full Enquiries*; they produced a higher payback rate because they are much less costly than *Full Enquiries*. Table 1 presents a comparison between the *Full* and *Aspect Enquiries*. [xxiii]

Table 1: Cost/Yield Analysis of Full and Aspect Corporation Tax Enquiries

	Full Enquiries	*Aspect Enquiries*
Number completed	4500	39 200
Average Yield	GBP 26 700	GBP 12 300
Average Staff Cost	GBP 5600	GBP 500
Average Yield/Cost Ratio	4.8:1	22.6:1
Proportion of enquiries resulting in a tax or profit adjustment	81%	58%

This variation in yield and cost of case enquiries prompted the agency to deploy additional resources into the processing of *Aspect Enquiries* which deal with Corporation Tax for the large companies (HoC, 2005). It explored different options to improve the risk assessment techniques to expedite the processing of the case enquiries. One such way would to allow companies to submit their accounts and computations in a structured format that could facilitate risk assessment process. The IR's technical experts worked on identifying a functional reporting medium, which would accommodate processing the non-structured complex data structure of the CT600's accounts and computations. The agency developed its Corporation Tax portal and started the adoption of an XML-based reporting technology, the XBRL. During the decision-making process, the then-Chancellor of the Exchequer, Gordon Brown, officially announced the government's decision to merge Inland Revenue and HM Customs and Excise into a single entity, HMRC. The HMRC was established in 2005 as the UK government agency responsible for the administration of income tax, corporation tax, capital tax gains as well as custom duties and a number of other types of taxes. [xxiv]

XBRL is an extension of XML, which was initially mandated by the UK government to be used for delivering all government online services (Cabinet Office, 2000]). XBRL was technically developed to possess the same tagging feature of XML by using XML schema to describe the structure of business and financial reports. This particular interest in XML as a reporting technology demonstrates XML's ability to tag data in business and financial reports to describe their use and their relationships with other data in the report. This would provide better data integration and easier access to information (Cabinet Office, 2001). XBRL also introduces additional business 'semantics' or meanings, which were not provided by XML alone (Hoffman and Strand, 2001).   These semantics can link each data element with multiple resources (such as definitions and calculations) and can be communicated to, and used

by, other users enabling data exchange between humans or electronic reporting systems (Debreceny and Gray, 2001). Tagged data could be automatically captured, processed and manipulated by a variety of computer programs, which can understand the same tags by using Taxonomy. Taxonomy is a financial and business dictionary of all data elements commonly reported in financial statements that follow country-specific Generally Accepted Accounting Principles (eg, UK GAAP). When a particular data element is not defined in the taxonomy, a taxonomy extension will be created to meet the specific needs of the company. This extensibility is one of the main features of XBRL, as it allows for wider uses of XBRL by many corporate filers. The HMRC's technical team determined that corporate users could also utilise the automatic validation feature of XBRL-compatible software packages to send their tax filings, which improves the efficiency of data processing with minimum human intervention.[xxv]

Since the inception of the e-Services Program in 2001, HMRC started developing the first draft of XBRL taxonomy containing approximately 1500 data elements reported in the main financial statements and a substantial range of accompanying notes (XBRL Progress Report, 2002). Standardising the data formats in the CT600 accounts and computations was essential for conducting effective risk assessment and implementing case enquiries, so XBRL had the potential to achieve this target. XBRL UK organisation[xxvi] discussed the idea of introducing XBRL with the Interoperability Unit of the Technology Strategy Group of the e-Envoy Office, which immediately recognized the data standardisation potential for HMRC (Hamscher, 2002). HMRC's membership in XBRL UK organisation provided an ample opportunity for HMRC's technical experts to discuss XBRL implementation issues with other XBRL UK's members including large companies, accounting firms, software vendors and professional accounting bodies during the first global meeting of XBRL International in London during February 2001.

The Institute of Chartered Accountants in England and Wales (ICAEW) is one of the active institutional members of XBRL UK, which explored the potential practical applications of XBRL for the agency and users. The ICAEW was the first UK professional body to raise XBRL awareness in its published progress report on digital reporting, describing XBRL as 'Level 2 Digital Reporting' (ICAEW, 2004). The report also introduced HMRC's electronic filing strategy to file CT600 accounts and computations in XBRL format. This strategy was discussed at length during a Proposal Review Workshop in January 2002, attended by representatives from the IT Faculty of the ICAEW and XBRL UK (Appendix, Table 2, H3). On 30 April 2003, HMRC followed up with a Scoping Workshop that resulted in drafting a three-phase implementation plan of XBRL filing to be carried out over the period of 2003-2005 (Table 2, H5). The plan was spearheaded by HMRC's technical experts, who founded XBRL Project.

Following the proposals discussed during the Scoping Workshop, HMRC started developing XBRL taxonomy, which could work seamlessly with its existing XML-based CT600's reporting platform. The platform was developed to enable data tagging and define the business relationships of such tags in the accounts and computations. Over the period 2002 to 2004, the technical infrastructure of XBRL filing was designed by XBRL Project members and supported by third-party software developers to assess the scope and structure of CT600 computation taxonomy.[xxvii] XBRL Project team members also worked with XBRL UK, which published an initial

draft of UK GAAP's taxonomy in May 2004. The project members secured sufficient feedback through their stakeholders to determine the most appropriate presentation of XBRL-based statutory accounts using Style sheets. [xxviii] Additional financial information, which was not formally defined by UK GAAP taxonomy could be included by extending the taxonomy itself to add additional financial elements where necessary. The team also worked on introducing the required electronic tools for the agency's tax inspectors to view XBRL documents and conduct case enquiries.

Top government and professional bodies supported HMRC's XBRL initiative. In April 2002, the Cabinet Office recommended the use of XBRL by UK government agencies as part of the UK E-Government Interoperability Framework (E-GIF) initiated by the Cabinet Office (Hamscher, 2002). The E-GIF was designed to define the technical policies and specifications governing information flow across government agencies, which cover interconnectivity, data integration, electronic services access and content management. The Cabinet Office subsequently authorised its use via GovTalk to include a wider endorsement in the future versions of the E-GIF. GovTalk is a UK government initiative sponsored by the Cabinet Office, designed to encourage the efficient usage of Internet and modern electronic reporting technologies by government agencies. HMRC's Manager of Online Services, a member of XBRL Project team, met with representatives of the HM Treasury and secured the financial support for XBRL project. In addition, the idea of XBRL adoption was also advocated by the Association of Chartered Certified Accountants' (ACCA) report that supported the reduction of compliance costs faced by businesses. [xxix]

In July 2005, the Office of HM Paymaster General[xxx] asked Lord Carter to conduct an assessment of HMRC's online services. The assessment examined different methods of adopting electronic filing services by users that would increase the efficiency of the electronic filing process for HMRC, focusing on compliance and customer support issues (HMRC, 2006). The report recommended the delivery of 'robust' online services, focusing on the PAYE collection mechanism and the core taxation area of Corporation Tax. The report also introduced the mandatory use of XBRL by companies to submit their CT600 accounts and computations by April 2011. This recommendation was a result of several consultations with representatives of professional bodies, including the ICAEW, Institute of Chartered Accountants of Scotland (ICAS), the Chartered Institute of Taxation (CIOT) and the Association of Chartered Certified Accountants (ACCA), and key figures from the Treasury and the Cabinet Office to discuss budgetary and legal requirements.

The HMRC started building a public business case for using XBRL in its reporting systems. In a meeting of the Committee of Public Account in the House of Commons in 2005, Sir David Varney, the Chief Executive of HMRC, announced that the use of XBRL would bring cost savings equivalent to 30 staff members through savings in data processing area by 2008. Banyard, who managed HMRC's Business Customer Unit, also supported the use of XBRL to tag the data elements in the accounts and computations to facilitate data standardisation and processing for risk assessment purpose. Banyard emphasised the importance of building of an extensive database of financial data elements in the CT600 accounts and computations reports (Banyard, 2009). These databases would be used to assist the automated risk assessment and provide HMRC with the opportunity to focus its resource deployment on non-compliant businesses.

10.   XBRL TESTING: MID 2006

During an XBRL UK conference in 2006, a live demonstration of XBRL filing was conducted by Adobe Systems and CoreFiling, which became HMRC's main IT business partners in XBRL adoption process.[xxxi] CoreFiling played an important role in assisting HMRC by introducing its 'True North' validation and processing engine. This tool was necessary in validating and processing XBRL content. CoreFiling also provided specialised support in 'converting HMRC's business needs, expressed as preliminary taxonomies prepared in Microsoft Excel, into a fully compliant XBRL taxonomy.'[xxxii]

In subsequent meetings with its IT partners and specialists, HMRC's XBRL project team members started developing XBRL's technical capabilities of XBRL-based accounts and computations. HMRC conducted several live XBRL demonstrations with tax software vendors, after which, it was determined that tax inspectors would face some difficulties in viewing the submitted data in a human-readable form. In March 2006, HMRC provided a viewer of the XBRL tax computation, which would be used by potential corporate users. However, the process of generating XBRL style sheets was very slow and computations were not easily understood due to the poor display of data as indicated by HMRC's Technical Architect. In addition, many data elements were omitted from the computation style sheets.[xxxiii] HMRC's Technical Architect further explained the problem facing HMRC's tax inspectors who collect data, typically stored in HMRC's databases, to analyse it for risk assessment purposes. He indicated that the human element is essential to the risk assessment process along with the assistance of technology to run assessment checks on certain companies. He also pointed out that in some cases, risk assessment services do not work according to risk rules, which require human intervention to solve such a problem. Another difficulty was faced because the information reported in the accounts and computations had to be understandable by both tax inspectors and the corporate filers' systems. This necessitated the need to render XBRL data in a way that it can be 'human-consumable' and machine-readable. Traditionally, this was done by creating the style sheets that transfer XBRL document into HTML or printed format that is human consumable. However, style sheets technology and XBRL did not work together seamlessly. The problem of rendering XBRL data required developed the capabilities of XBRL technology to produce human-readable forms.

11.   DEVELOPMENT OF INLINE XBRL: 2007–2008

The rich structure of the tax computations and accounts did not lend itself to the way style sheets work, leading to the generation of 'un-maintainable style sheets' as indicated by HMRC's Technical Architect and member of the XBRL project team. There are 12°000 financial data elements[xxxiv] of XBRL taxonomy, style sheets' sizes could reach 9 MB, which was complex to understand by tax inspectors. The style sheets took a long time to be generated, which did not contribute to the efficiency of the risk assessment process and data processing. A group of software vendors co-founded the 'Rendering Working Group' as part of XBRL International Organization. This group worked primarily on solving the data-rendering problem. HMRC's XBRL project members collaborated with the Rendering Group to develop XBRL processing capabilities to accommodate the data requirements of accounts and computations.

In late 2008, HMRC cooperated with its IT partners and members of the Rendering Group to develop a human-readable form of XBRL, known as 'Inline XBRL'. Before Inline XBRL, it was essential to undertake strenuous data rendering to convert tagged tax filings into a readable document. This has resulted in variations in rendering approaches, which involved the risk of converting a document that could look substantially different from the original report, which could compromise the data integrity. Inline XBRL solved this data-rendering dilemma. It provided the data preparers (companies and tax agents) with the opportunity to maintain the reporting layout and presentation of data, while the reports themselves would incorporate computer-readable tags. Therefore, the same set of XBRL filing can be easily understood by the data preparers and HMRC's tax inspectors. Mark Holden, the Director of HMRC's Carter Program, described Inline XBRL as, 'HMRC strategic solution for filing accounts and corporation tax computation. It preserves all branding and formatting, so that HMRC sees exactly what taxpayers send – that was important to our customers and so it is important to us' (CoreFiling, 2009).
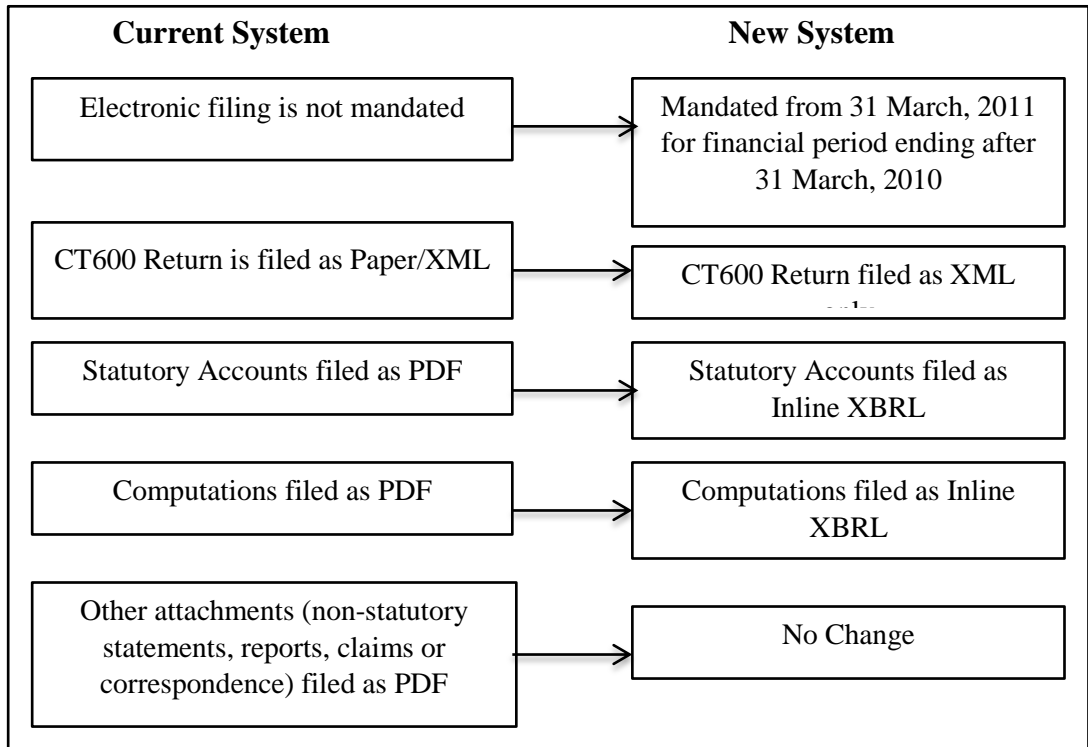
While working on the data rendering issues, HMRC updated the XBRL taxonomy to reflect the changes in accounting regulations, based on the feedback solicited from XBRL stakeholders during the workshops organised by HMRC.[xxxv] Following XBRL conference held in London in June 2006, XBRL UK introduced UK GAAP and UK IFRS XBRL taxonomies.[xxxvi] In January 2007, XBRL UK released UK GAAP taxonomy and common data taxonomy for trial use and review by all preparers and users including investors, accountants, and software vendors. The UK GAAP taxonomy covers the main data content and technical features required for UK GAAP reporting by unlisted companies, whereas the common taxonomy represents standard information such as company name, address and commonly used information in financial reporting. Initially, HMRC developed its taxonomy to conform with UK GAAP, UK IFRS, UK Common data[xxxvii] and HMRC CT600 Computational for tax companies. However, with the development of 'Inline XBRL', the agency realised that all XBRL tags have to be used for tax returns submitted by April 2011.

12.   DEVELOPMENT OF INLINE XBRL TAGGING: 2009–2010

Lord Carter indicated the importance of HMRC's collaboration with the software industry and corporate users. Software developers needed time to re-design their tax software applications to be Inline XBRL-compatible.[xxxviii] In addition, business and financial users' community, including preparers and analysts, expressed their concerns over the time and effort required to familiarise themselves with Inline XBRL-enabled software applications to file company tax returns (Dunne et al., 2009; Singh, 2009; ICAS, 2010). The users' community denoted that they need technical training and resources to tag financial reports in Inline XBRL. It was evident that businesses would ultimately bear the compliance cost of installing Inline XBRL-compliant tax software applications and training their staff members to use it (Mousa, 2010). Therefore, HMRC faced the challenge of implementing a technology that would allow seamless filing of Inline XBRL-based forms while shielding the corporate users from having to face the complexities of integrating it into their internal reporting systems. In recognition, HMRC reduced the tagging requirements for tax accounts and computations. The agency moved gradually to full tagging for the tax accounts (UK GAAP and UK IFRS) in 2013. In preparation for the Inline XBRL mandate in April 2011, HMRC sought legal approval for receiving CT600 accounts and computations

in Inline XBRL format. In December 2009, the approval was granted and was included in the amendments of the law governing electronic communication and data handling techniques employed by HMRC. [xxxix] Figure 2 summarises HMRC requirements for filing in Inline XBRL.

Figure 2: HMRC Requirements for Filing in Inline XBRL

Current System	New System
Electronic filing is not mandated	Mandated from 31 March, 2011 for financial period ending after 31 March, 2010
CT600 Return is filed as Paper/XML	CT600 Return filed as XML only
Statutory Accounts filed as PDF	Statutory Accounts filed as Inline XBRL
Computations filed as PDF	Computations filed as Inline XBRL
Other attachments (non-statutory statements, reports, claims or correspondence) filed as PDF	No Change

13. RESEARCH FINDINGS

The case study showcases HMRC's main IT strategy as a strong regulatory investor in reporting technologies over the fifty years. That keen interest in reporting technologies started with the batch system, which automated the tax filing system in the late 1970s. The agency implemented the computerised Pay-As-You-Earn system to boast the accuracy and reliability of communication and filing. The agency's belief in reporting technologies was greatly exemplified by the introduction of the Filing-By-Internet (FBI) service in the mid-2000s to develop and boost the efficiency of the self-assessment system. It also provided an added value that was not offered by previous reporting technologies because the FBI validated the data filed by taxpayers and agents, which helped minimise keying errors. This pushed the agency to improve the capabilities of the FBI facility, which paved the way for the future adoption of XBRL technology.

Another important finding is that HMRC was driven largely by its goal to receive 'better quality access to data' rather than having everything filed in paper format. XBRL was viewed as a remarkable reporting tool, which would not only generate high quality data, but also move data seamlessly between systems. This expanded the

previously limited internal access and ability to use CT600 filings to facilitate the risk assessment process. According to HMRC's Manager of Online Services, it has *always* been HMRC's goal of adopting XBRL as a potential filing solution for CT600 accounts and computations. This goal was also supported by NAO's report on HMRC's e-Revenue project initiated in 1999 (NAO, 2002). HMRC's XBRL project team members were diligent to promote XBRL potential as not just a government-mandated electronic filing medium, but also an 'e-filing solution' that would facilitate the flow of data between tax preparers and HMRC's filing systems. The use of technology in tax reporting contributes to reducing tax preparation time (Hampton, 2005). This is consistent with HMRC's experience with previous technologies when the agency prioritised the need for achieving efficiencies through the development of ELS and FBI to provide additional processing power and reduce the compliance burden on taxpayers.

As government agencies are often faced with limited financial resources, especially during tough economic conditions, careful spending cuts have to be undertaken to alleviate the financial burden. In that regard, HMRC was not any different from financially-strained tax regulators. HMRC perceived the adoption and mandating of XBRL technology as an innovative response to manage its administrative costs. The agency made a strategic decision to use XBRL after it identified the variation in yield and cost of case enquiries, which motivated the agency to deploy additional resources into the processing of *Aspect Enquiries* of the Corporation Tax. This strategy bolstered HMRC's efforts in expediting the collection of corporate tax revenue while maintaining lower operating staff costs.

HMRC was also essentially driven by the need to receive and process CT600 accounts and computations in standardised form. HMRC realised XBRL's capability to accommodate the complexity of the rich data structure of CT600 accounts and computations, which were traditionally filed in non-standardised formats by tax agents and companies. XML (a form-based reporting language) has been used effectively for filing CT600 tax returns. However, the non-standardisation of the accounts and computations did not work efficiently with XML. HMRC believed that XBRL would have an advantage over XML because XBRL would allow tax inspectors to have electronically tagged data in the computations, which can be easily linked to the main tax returns. XBRL has been perceived to enhance the readability and processing of business and financial data by tax inspectors and companies and support the risk assessment process. Peter Calvert of XBRL UK pointed out that regulators receiving XBRL information 'will be able to automate and introduce far more wide-ranging and effective analysis than they can achieve now' (Tilbury, 2009, 2). As Wilson and Sangster (1992) indicate, the availability of micro-computers has introduced a paradigm shift in increasing the use of modeling and decision support techniques. XBRL has also introduced a comparable shift in enhancing the human and machine readability of XML-based financial data. This has contributed to the enhancement of quality data, which would greatly support the risk assessment process. Effective risk assessment adds value to the evidence-based decision-making process that could determine whether a company has to be audited.

The case study reveals HMRC's strong collaboration with its IT partners represented by the software industry. This was evidenced by HMRC's working relationship with IT consulting firms to develop the COP Project. The collaboration was also central to the implementation of the self-assessment system when HMRC selected EDS as the

sole information technology provider for the self-assessment system at the time. During the adoption of XBRL, HMRC ensured that all XBRL-enabled software packages are vetted before offering them to the general public. It worked extensively with Adobe Systems and CoreFiling to develop the technical infrastructure of XBRL taxonomy, which is the most difficult task in XBRL adoption process due to the complexity of the data in accounts and computations filings.

HMRC has also strengthened its ties with government bodies, XBRL UK, accounting firms and professional entities. Stakeholder participation is regarded as one of the 'success' factors in the adoption of any electronic government initiative. For example, Hirschheim, Klein and Lyytinen (1995) argue that the adoption of new technologies by government agencies is contingent on the ability of government agencies to collaborate and meet the needs and expectations of stakeholders. In particular, stakeholder engagement in the XBRL adoption process has been depicted in XBRL literature (Doolin and Troshani, 2007; Troshani and Rao, 2007; Mousa and Chen, 2012). HMRC was initially aware of the potential of XBRL through their meetings with representatives of ICAEW during the first global meeting of XBRL International organisation in February 2001. The ICAEW played a major role in forming a broad-based steering group in London to develop, in cooperation with the software industry, the UK XBRL taxonomy for financial reports. The ICAEW's advisory role was also evident when it discussed the practical applications of XBRL for HMRC. In addition and in response to Lord Carter's report that mandated the use of Inline XBRL, HMRC conducted several consultations with representatives of the ICAEW, ICAS, CIOT and the ACCA. HMRC utilised its network stakeholders to solicit the industry's perception of XBRL benefits, challenges and applications for all potential parties affected by the mandate. HMRC worked with the Treasury and the Cabinet Office to discuss the budgetary and legal requirements of disclosing and presenting the data in the accounts and computations in XBRL format. A positive outcome of all these collaborative efforts allowed HMRC to devise a three-stage phase plan (2003–2005) to implement XBRL.

The case study also shows HMRC's efforts in overcoming the main obstacles during XBRL adoption process. HMRC faced the problem of rendering data in the accounts and computations, which undermined the readability of the reports. HMRC has responded by conducting consultations and organising workshops to seek technical support from its IT partners. The development of Inline XBRL was the outcome of these successful consultations and meetings. The case study shows that both traditional XBRL and Inline XBRL deliver the advantage of tagging and structuring the data in the accounts and computations. However, the XBRL realises that these tax filings are not just analysed by electronic reporting systems, but also by tax preparers and risk assessment employees, which would give Inline XBRL an advantage over traditional XBRL.

One of the most interesting findings of this case study is that government agencies, rather than corporate users, remain the primary 'champions' for XBRL. While XBRL has been adopted at HMRC to standardise the data in the CT600 supporting documents, many corporate users are concerned about the XBRL potential for the private sector in the UK (Dunne et al. 2013). In a comparable study, Cordery et al. (2011) indicate that many business organisations in New Zealand are concerned about the compliance cost of filing corporate income tax in XBRL format. However, this notion can be refuted. Technically, XBRL is not drastically different from any other

traditional XML-based filing facility. The key difference between XBRL and any another electronic reporting technology is that XBRL is 'widely agreed upon by accountants' (Hamscher, 2002). In addition, as the case with any technology adoption, there is always a potential resistance to change, which could be lessened by building better awareness of the technology's realised benefits.

The case study shows that most important obstacle faced during XBRL adoption was building XBRL's technical infrastructure (taxonomy). The sheer number of financial data elements that have to be tagged in XBRL, and the possibility of extending the taxonomy to incorporate company-specific tagging added an additional challenge. The tagging process is tedious, as it requires great investment in technical resources and expertise. A UK-based research conducted by Dunne et al. (2009) indicates that many potential corporate users are deterred by the proliferation of XBRL taxonomy. This was also supported by findings of Cordery, Fowler and Mustafa (2011), who surveyed a group of New Zealand's government agencies and business organisations. In the Australian context, large business organisations pointed out the significance of mobilising technical and financial resources to build XBRL taxonomy infrastructure. They were concerned about the sophistication of XBRL as a technology and whether they have the technical expertise to build a taxonomy structure that would accommodate the tagging of hundreds of financial elements in financial reports using XBRL (Doolin and Troshani, 2007). The challenge is amplified as companies would be required to extend certain financial data elements based on their needs to disclose corporate information.

Finally, the case study fosters the importance of project 'champions' in implementing technological innovations in regulatory authorities. The key role of project 'champions' has been acknowledged by prior literature. Turner and Apelt (2004), who have examined the adoption of an electronic filing initiative in Australia, supported the importance of cultivating project championship culture in tax authorities. The existence of XBRL project 'champions', represented by HMRC's manager of online services and technical architect, has provided a great example of resourceful leadership and technical excellence. Their rich experience (amounting to a combined 60 years) was one of the most success factors that supported the process of building XBRL taxonomy structure. They worked with their IT partners to build, tag and define 12°000 data elements in the accounts and computations documents. Championing the technology and possessing the right IT skill-set for XBRL set the tone of XBRL adoption process. It also steered the process of XBRL development into the right direction when HMRC faced rendering issues with the older version of XBRL, which affected the data presentation of the XBRL-based accounts and computation.

14. CONCLUSIONS

The case study contributes to the body of knowledge on the adoption of emerging technologies at the UK's HM Revenue & Customs. The study found that the agency has developed a long-standing strategy of embracing reporting technologies to accommodate the processing of complex data in tax filings. It ensured that its IT strategy would keep up with monumental developments happening in Inline XBRL domain. The adoption of Inline XBRL was mainly driven by HMRC's need to have better quality data in the supporting documents of the Corporation Tax (accounts and

computations). In addition, the agency embraced the technology to standardise the presentation and processing of tax data, add value to the risk assessment process and accelerate the corporate tax revenue collection. Furthermore, the case study reveals the pivotal roles of the stakeholders (top government bodies, software development partners, XBRL UK organisation and UK accounting professional organisations) in the adoption process. The agency's highly regarded technical experts, members of XBRL Project, have effectively steered the adoption and development of Inline XBRL. They performed an exemplary role of leadership and dedication. The UK government formalised HMRC's decision to implement the technology when it mandated that all companies must file their CT600 accounts and computation in Inline XBRL starting April 2011.

The findings of this research demonstrate the broader context of the importance of having strong collaboration with the software industry and accounting professional bodies that is very apparent in XBRL adoption process. HMRC's experience provides great insights to some international tax authorities, which are currently considering the adoption of emerging technologies in general and Inline XBRL in particular to support their filing systems. It also provides guidance to IT experts in regulatory authorities who could be facing issues and challenges with their existing XBRL-enabled systems as has been found in HMRC's case with data rendering. The findings of this study reveal HMRC's awareness of the technology challenges and its ability to leverage its collaboration with stakeholders to overcome those challenges.

The case study provides great evidence that the UK is a front-runner in embracing progressive reporting technologies such as Inline XBRL. HMRC's Inline XBRL Project is the largest live implementation of this technology in the world. A comparative analysis of HMRC's electronic filing process with international tax authorities will be an opportunity for future researchers as Inline XBRL is gaining a critical mass among regulators. Future research could also examine the social and behavioral aspects of Inline XBRL adoption and elevate our understanding of different aspects of the electronic filing process through which emerging reporting technologies could evolve.

15.   ACKNOWLEDGEMENT

16.   REFERENCES

Banyard, S, 'Regime change in the CT arena' (December 2009) *Tax Adviser* 24-26.

Baum, W, *Transcribing and Editing Oral History* (Altamira Press, Rowman and Littlefield Publisher, 1977)

Benbasat, I., D. Goldstein, and M. Mead, "The Case Study Research in Studies of Information Systems" (1987) 11(3) *MIS Quarterly* 369–386

Beynon-Davies, P, 'Constructing Electronic Government: The Case of the UK Inland Revenue' (2005) 25(1) *International Journal of Information Management* 3–20

BIS (Department for Business, Innovation and Skills), *Simplification Plan 2009: Delivering a Better Business Environment* (December 2009)

Boyle, B, 'iXBRL: The Time Has Come – Optional Phase, November 2012' (2012) 3 *Irish Tax Review* 115–117

Brown, D, 'Electronic Government and Public Administration' (2005) 17(2) *International Review of Administrative Sciences* 241–54

Cabinet Office, *E-Government – A Strategic Framework for the Public Services in the Information Age* (Cabinet Office, Performance and Innovation Unit, The Stationery Office, London, 2000)

Cabinet Office, *UK Online Annual Report* (Office of the e-Envoy, Cabinet Office, London, 2001)

Collins, M and R Bloom, 'The Role of Oral History in Accounting' (1991) 4(4) *Accounting, Auditing & Accountability Journal* 23–31

Cordery, C, C Fowler and K Mustafa, 'A Solution Looking For a Problem: Factors Associated With the Non-adoption of XBRL' (2011) 23(1) *Pacific Accounting Review* 69–88

CoreFiling, '*HMRC and CoreFiling Lead The Way with Inline XBRL. HMRC Case Study'* (CoreFiling, , 2009)

Davey, L, 'The Application of Case Study Evaluations' (2001) 2(9) *Practical Assessment, Research and Evaluation*. Available at: http://pareonline.net/getvn.asp?v=2&n=9. Accessed 10 May, 2016

Debreceny, R and G Gray, 'The Production and Use of Semantically Rich Accounting Reports on the Internet: XML and XBRL' (2001) 2(1) *International Journal of Accounting Information Systems* 47–74

Doolin, B and I Troshani, 'Organizational adoption of XBRL' (2007) 17(3) *Electronic Markets – The International Journal* 199–209

Dunne, T, C Helliar, A Lymer and R Mousa, 'XBRL: The Views of Stakeholders' (2009) ACCA Research Report, No. 111. Available at: http://www.accaglobal.com/content/dam/acca/global/PDF-technical/technology-publications/rr-111-002.pdf. Accessed 10 May, 2016

Dunne, T, C Helliar, A Lymer, and R Mousa, 'Stakeholder Engagement in Internet Financial Reporting: The Diffusion of XBRL in the UK' (2013) 45(3) *The British Accounting Review* 167–182

Dyerson, R and M Roper, 'Large Scale Information Systems in the UK' in P Frissen, V Bekkers, B Brussard, I Snellen and M Wolters (eds), *European Public Administration and Informatization* (IOS Press, 1992)

Ebrahim, Z and Z Irani, 'E-government adoption: architecture and barriers' (2005) 11(5) *Business Process Management Journal* 589–611

Facio, E, 'Ethnography as Personal Experience" in JH Stanfield II and R M Dennis (eds), *Race and Ethnicity in Research Methods* (Sage Publications, 1993)

Fuller, C, 'Budget 2015: Government to Finally Introduce Online Tax Accounts' *Accountancy Age* 18 March 2015. Available at: http://www.accountancyage.com/aa/news/2400205/budget-2015-government-to-finally-introduce-online-tax-accounts. Accessed 10 May, 2016

Garson, G, 'The Promise of Digital Government' in A Pavlichev and G Garson (eds), *Digital Government: Principles and Best Practices*, (Idea Group, 2004)

Hammond, T and P Sikka, 'Radicalizing Accounting History: The Potential of Oral History', (1996) 9(3) *Accounting, Auditing & Accountability Journal,* 79–97

Hampton, P, *Reducing Administrative Burdens: Effective Inspections and Enforcement (*HM Treasury, 2005)

Hamscher, W, *XBRL in Taxation: The Business Case* (XBRL International Inc., 2002)

Hannon, N, 'Will The IRS Be Next To Adopt XBRL?' (2006) 87(8) *Strategic Finance* 4–5

Hansford, A, A Lymer and C Pilkington, 'FBI in the UK: The Barriers to Adoption of Filing Self-Assessment Tax Returns by Internet' (2005) 5 *British Tax Review* 538–50

Hansford, A, A Lymer and C Pilkington, 'IT Adoption Strategies and Their Application to e-Filing Self-Assessment Tax Returns: The Case of the UK' (2006) 4(1) *eJournal of Tax Research* 80–96

Heeks, R, *Implementing and Managing e-Government* (Sage Publications, 2006)

Hirschheim, R, H Klein and K Lyytinen, *Information Systems Development and Data Modeling: Conceptual and Philosophical Foundations (*Cambridge University Press, 1995)

HM RC (HM Revenue & Customs), *Review of HMRC Online Services Report* (HMRC Online Services, 2006)

HM Treasury, *Departmental Report of the Chancellor of the Exchequer's Departments: The Government's Expenditure Plans 1992–93 to 1994–95, Cm. 1918,* (HM Treasury, 1992)

HoC (House of Commons), *The Committee of Public Accounts:Forty-Ninth Report of Session 2005–2006* (HoC, 2005)

Hoffman, C and C Strand, *XBRL Essentials* (AICPA, 2001)

ICAEW (Institute of Chartered Accountants in England and Wales), *Information for Better Markets, Digital Reporting: A Progress Report* (ICAEW, 2004)

ICAS (Institute of Chartered Accountants of Scotland), *Concerns About Imminent Changes to Company Tax Filing. A report on ICAS Members' Survey on the Current State of Readiness of Companies and Tax Agents for Implementation of Mandatory iXBRL-based Corporation Tax*

Online Filing on 1 April 2011 (ICAS, 2010). Available at:
http://www.accountingeducation.com/index.cfm?page=newsdetails&id=151101. Accessed 10 May, 2016

Inland Revenue, *Report for the Year Ending 31st May 1992: One Hundred and Thirty Fourth Report.* (HMSO, 1992)

Lettice, J, 'MS-built UK Government Gateway locks out non-MS browsers' (2001) *The Registrar,* 28 May. Available at:
http://www.theregister.co.uk/2001/05/28/msbuilt_uk_government_gateway_locks/. Accessed 10 May 2016.

Margetts, H, *Information Technology in Government: Britain and America* (Routledge, 1999)

Matheson, S (1984), 'Computerization of the Pay As You Earn System' in Pitt, D and B Smith (eds), *The Computer Revolution in Public Administration: The Impact of Information Technology on Government* (Edward Elgar, 1984)

Miles, M and M Huberman,, *Qualitative Dana Analysis: An Expanded Source Book* (Sage Publications, 1994)

Moll, J, M Major and Z Hoque, 'The Qualitative Research Tradition' in Z Hoque (ed), *Methodological Issues in Accounting Research: Theories, Methods and Issues* (2007, Spiramus Press Limited)

Monterio, B, 'XBRL Wake-up Call' (2011a) *California CPA Magazine*, August 2011

Monterio, B, 'XBRL and its impact on corporate tax departments' (2011b) 92(8) *Strategic Finance*56–61

Morris, P and G Hough, *The Anatomy of Major Projects: A Study of the Reality of Project Management* (John Wiley, 1987)

Morse, J and L Richards, *Readme First for a User's Guide to Qualitative Methods* (Sage Publications, 2002)

Mousa, R, *E-Government Adoption Process: XBRL Adoption in HM Revenue and Customs and Companies House* (PhD Thesis, University of Birmingham, 2010)

Mousa, R and Y Chen, 'E-Government Adoption of XBRL: A U.K./U.S. Comparison' in V. Weerakkody and C Reddick, C (eds), *Public Sector Transformation Through E-Government: Experiences from Europe and North America* (Routledge, 2012)

NAO (National Audit Office), *Inland Revenue: Control of Major Developments in Use of Information Technology.* HC132, (HMSO, 1987)

NAO (National Audit Office), *Change Management in the Inland Revenue.* HC 140. (HMSO, 1996)

NAO (National Audit Office), *Examining the Value for Money of Deals Under the Private Finance Initiative* (The Stationery Office, 1999)

NAO (National Audit Office), *Inland Revenue/EDS Strategic Partnership: Award of New Work* (The Stationery Office, 2000)

NAO (National Audit Office), *E-Revenue,* Comptroller and Auditor General. HC 492 Session 2001–2002: 14 February 2002(NAO, 2002)

NAO (National Audit Office), *HM Revenue and Customs: Management of Large Business Corporation Tax.* Comptroller and Auditor General. HC 614 Session 2006–2007 (NAO, 2007)

Paré, G, 'Investigating Information Systems With Positivist Case Study Research', (2004) 13(14) *Communications of the Association for Information System* 233–64

Perdana, A, A Robb and F Rohde, 'An Integrative Review and Synthesis of XBRL Research in Academic Journals' (2015) 29(1) *Journal of Information Systems* 115–53

Richards, L, *Handling Qualitative Data: A Practical Guide* (Sage Publications, 2005)

Ritchie, D, *Doing Oral History: A Practical Guide* (Oxford University Press, 2003)

Shah, H, Malik, A and M Yaqub, 'Accounting for Merger: The Case of HM Revenue and Customs' (2010) 18 *European Journal of Economics, Finance and Administrative Sciences* 122–32

Singh, R, 'HMRC criticized over XBRL by accountants' (2009) *Accountancy Age,* 21 October. Available at http://www.accountancyage.com/aa/news/1752315/hmrc-criticised-xbrl-accountants. Accessed 10 May, 2016

Strand, C, B McGuire, L Watson and C Hoffman, 'The XBRL Potential' (2001) 82(12) *Strategic Finance* 58–63

Tilbury, G, *Corporate Tax Filing, White Paper, Digital Tax and Accounting* (Thomson Reuters, 2009)

Troshani, I and S Rao, 'Drivers and Inhibitors to XBRL Adoption: A Qualitative Approach to Build a Theory in Under-researched Areas' (2007) 3(4) *International Journal of E-Business Research* 98–111

Turner, L and C Apelt, 'Globalization, Innovation and Information Sharing in Tax Systems: The Australian Experience of the Diffusion and Adoption of Electronic Lodgement' (2004) 2(2) *eJournal of Tax Research* 241–69

Welsh, E, 'Dealing With Data: Using Nvivo in the Qualitative Data Analysis Process' (2002) 3(2) *Forum: Qualitative Social Research*

Wilson, R and A Sangster, 'The Automation of Accounting Practice' (1992) 7(2) *Journal of Information Technology* 65–75

XBRL International Inc., *Progress Report* (*XBRL International Inc.*, 2002)

Yin, R, *Case Study Research: Design and Methods* (2nd ed., Sage Publications, 1994)

Yin, R, *Case ,Study Research: Design and Methods* (3rd ed., Sage Publications, 2003)

17.   END NOTES

[i] http://www.ifrs.org/XBRL/Documents/Profiles/Australia-8-June-2015.pdf. Accessed 10 May, 2016.

[ii] https://www.xbrl.org/sbr-in-australia-by-the-numbers. Accessed 10 May, 2016.

[iii] For more information, please visit: https://www.xbrl.org/the-consortium/about/jurisdictions. Accessed 10 May, 2016.

[iv] A summary of the interviewees' details could be provided upon request.

[v] A list of all the organisational archived documents that were provided by the interviewees to support the case study is available upon request.

[vi] Information systems use batch and transaction processing systems. Transaction processing continuously updates tax files as orders are entered. At the end of the day, batch-processing system generates selected data lists for the data warehouse. Final output reports could be generated and printed as they are "batch processed" at the end of certain period.

[vii] Basic rate taxpayers pay 20 per cent income tax rate for those earning (£0 – 34,370). Higher-rate taxpayers pay 40 per cent income tax rate for those earning (£34 371-150 000). Non-basic rate taxpayers who are not self-employed do not have to pay any personal income tax in the UK, whereas in other countries such as the US and Australia, all taxpayers must do so.

[viii] For example, Quicktax for Windows application showed a copy of a tax return complete with the IR's own guidance notes (Margetts, 1999).

[ix] The Independent, 21 April 1994.

[x] In 1997, modernising the structure of the public sector was one of the main targets of UK government, with a particular interest in developing the process of e-government as part of a wider modernisation agenda. The Cabinet Office's e-Envoy Office was established later in 1999 to develop and enable the electronic delivery of government services by 2005 and coordinate the UK's e-government agenda across different central departments, including HMRC.

[xi] 'Electronic Commerce: The UK's Taxation Agenda', November 1999, Revenue and HM Customs & Excise. Available at: http://www.iwar.org.uk/e-commerce/resources/ecom.pdf. Accessed 10 May, 2016.

[xii] 'UK Business: Activity, size and location: 2014', 29 October 2014, Office for National Statistics. Available at: http://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusiness activitysizeandlocation/2014-10-29. Accessed 10 May, 2016.

[xiii] Inland Revenue Internet Filing Survey Market Research Report, Continental Research, October 1999

[xiv] Government Gateway Project is part of UK Government' IT infrastructure strategy aimed to enable central government departments (including HMRC) to provide electronic services by year 2005. Please see: http://www.gateway.gov.uk/. Last accessed 10 May, 2016.

[xv] Fifty-second Report of Session 2001-09, "E-Revenue" HC 707. 17 July 2002, House of Commons, Committee of Public Accounts. Available at: http://www.publications.parliament.uk/pa/cm200102/cmselect/cmpubacc/707/707.pdf. Accessed 10 May, 2016.

[xvi] Tax Faculty weekly newswire No 438 - TAXline weekly news update No 261. Please see: http://www.ion.icaew.com/taxfaculty/documents/download/?fsid=f9e1a488-646b-4ec6-afb2-8d79dcc7e94c.. Last accessed 10 May, 2016.

[xvii] 'HM Revenue & Customs: The Business Inspector gets boost from HMRC,' 19 February, 2010. Available at: http://www.mynewsdesk.com/uk/view/pressrelease/hm-revenue-customs-the-business-inspector-gets-boost-from-hmrc-374542. Accessed 10 May, 2016.

[xviii] Thirtieth Report of Session 2007-09, 'Management of large business Corporation Tax.' HC 302, 21 October, 2008, House of Commons. Available at: http://www.publications.parliament.uk/pa/cm200708/cmselect/cmpubacc/302/302.pdf. Last accessed 10 May, 2016.

[xix] Ibid.

[xx] Speech delivered by Lord Carter during Wyman Symposium, published by the ICAEW. Available at: http://www.icaew.com/~/media/corporate/archive/files/technical/tax/tax%20policy/lord%20carter%20 %20%20wyman%20symposium.ashx. Accessed 10 May, 2016.

[xxi] Report on 'Corporation Tax: companies managed by HM Revenue and Customs' Area offices,' HC 678, 13 January, 2006, the Comptroller and Auditor General (National Audit Office). Available at: https://www.nao.org.uk/wp-content/uploads/2006/01/0506678es.pdf. Accessed 10 May, 2016.

xxii Ibid

xxiii Forty-ninth Report of Session 2005-06, 'Corporation Tax: companies managed by HM Revenue and Customs' Report.' HC 967, 29 June,, 2006, the House of Commons. Available at http://www.publications.parliament.uk/pa/cm200506/cmselect/cmpubacc/967/967.pdf. Accessed 10 May, 2016.

xxiv 'Commissioners for Revenue and Customs Act 2005 (c.11)-Chapter 11' Available at: http://www.legislation.gov.uk/ukpga/2005/11/contents. Accessed 10 May, 2016.

xxv Information on XBRL is available upon request.

xxvi Information on XBRL UK is available upon request

xxvii By December 2008, HMRC conducted 225 workshops attended by over 11 000 agents (HMRC Departmental Report, 2009). Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228608/7591.pdf. Accessed 10 May, 2016.

xxviii Information on style sheets is available upon request.

xxix Report on 'Using information and communication technologies to reduce the compliance burdens faced by small businesses,' July 2004, Association of Chartered Certified Accountants. Available at: http://www.oasis-open.org/committees/download.php/9410/ACCA%20e-compliance%20proposal.pdf. Last accessed 10 May, 2016.

xxx The Office of HM Paymaster General (OPG) was established in 1836. The OPG held accounts at the Bank of England on behalf of government departments and selected public bodies. However, the OPG was closed in 2008, and became incorporated into the Government Banking Service. For more information, please visit: https://www.gov.uk/government/groups/government-banking-service-gbs. Accessed 10 May, 2016.

xxxi For more Information please visit: http://www.xbrl.org/ProgressReports/2006_5_XBRL_Progress_Report.pdf, and https://www.corefiling.com/products/magnify/magnifyhmrcfilers.html. Accessed 10 May, 2016.

xxxii 'HMRC and CoreFiling lead the way with iXBRL,' 14 December 2009. Available at: http://www.fsn.co.uk/channel_financial_reporting/hmrc_and_corefiling_lead_the_way_with_ixbrl. Accessed 10 May, 2016.

xxxiii Report on 'Mandatory online filing of Company Tax Returns: managing the transition,' 9 February 2011, HM Revenue & Customs. Available at: http://www.tax.org.uk/sites/default/files/HMRC%20Transitional%20arrangements.pdf. Accessed 10 May, 2016.

xxxiv 'Will you be ready for XBRL filing?' April 2008, Tax Adviser. Available at: http://old.tax.org.uk/attach.pl/6689/7834/008-011_TA_0408.pdf. Accessed May 10, 2016.

xxxv XBRL stakeholders included representatives from software companies, accounting practices, and professional accounting bodies (H1, H3, H4, H5). For more information, please visit: http://webarchive.nationalarchives.gov.uk/20140109143644/http://www.hmrc.gov.uk/ria/carter-ia-final1.pdf and http://webarchive.nationalarchives.gov.uk/20140109143644/http://www.hmrc.gov.uk/better-regulation/new-relationship.pdf . Accessed 10 May, 2016.

xxxvi XBRL UK's latest taxonomy development project has successfully produced the final version of XBRL taxonomy that covers the reporting requirements for commercial and industrial companies, including financial statements and notes. The taxonomy was released on the 31st January 2010. For more information, please visit: http://www.xbrl.org.uk/techguidance/taxonomies.html. Accessed 10 May, 2016.

xxxvii Common data taxonomy is adjunct to the UK GAAP. It provides a number of reporting concepts such as the name of the business entity, language, currency and reporting period.

xxxviii For more information on corporate compliance with iXBRL, please visit: http://www.accountingweb.co.uk/tax/hmrc-policy/a-guide-to-integrated-accountsct-ixbrl-tools and http://www.fsn.co.uk/channel_financial_reporting/xbrl_for_tax_is_a_ticking_time_bomb.html. Accessed 10 May, 2016.

xxxix Report on 'Corporation Tax: The Income and Corporation Taxes (Electronic Communications) (Amendment) Regulations - 2009 No. 3218,' 7 December 2009, Commissioners for HM Revenue & Customs. Available at: http://www.legislation.gov.uk/uksi/2009/3218/pdfs/uksi_20093218_en.pdf. Accessed 10 May, 2016.

18.   APPENDIX

Table 1: Summary of Interviewees' Details

Interviewee	Position	Relevance to the Case Study
HMRC 1	Manager of Online Services	Responsible for leading XBRL project. The participant has 37 years of experience working for HMRC, and has been involved in many of HMRC's major information technology projects. Since 2001, HMRC 1 has been involved in HMRC electronic filing projects and initiated HMRC's first online CT system.
HMRC 2	Technical Architect	Works as a system strategy architect for HMRC's CT online service. HMRC 2 is Chartered Information Technology Professional with over 28 years of experience as a software engineer.
HMRC 3	Process Advisor	Used to work as a corporation tax inspector in the Large Business Services area at HMRC. Currently, HMRC 3 works in the Corporation Tax and VAT Directorate, and is responsible for interpreting tax elements that comprise the taxonomy, and advise tax software developers.

Table 2: Sample of Archived Documentation

H1:	Corporation Tax e-Service Program. Information Technology Solutions Breakout Group Workshop, Inland Revenue, 2001.
H2:	Corporation Tax e-Service Program. Customers and Intermediaries Breakout Group Workshop, Inland Revenue, 2001.
H3:	CT e-Filing Proposal Review Workshop – Outcome, Inland Revenue, 19 February 2002.
H4:	Corporation Tax e-Service Program. Business Process Change, Breakout Group Workshop, Inland Revenue, 2003.

H5:	Corporation Tax e-Filing Scoping Workshop, Inland Revenue, April 2003.
H6:	e-Services Program, XBRL and Company Tax e-filing. Presentation delivered at XBRL International Conference, Amsterdam, May 2003.
H7:	E-Filing of Company Tax Return. Presentation delivered at XBRL International Conference, London, 2006.
H8:	XBRL Consultation document for Birmingham Business School, University of Birmingham, 2008.
H9:	Corporation Tax Compulsory Online Filing: The HMRC Perspective. Presentation delivered by Jen Little, HMRC Carter Program, 2009.
H10:	HMRC Online Services. Presentation delivered by Julian Hatt and Anne Marie McNab, HMRC Carter Program. 26 March 2009.
H11:	Online Filing for Corporation Tax. Presentation delivered at the 2nd Annual Conference on XBRL and Online Reporting: Developing the Interface. Birmingham Business School, University of Birmingham. 13 November 2009.