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COULD AGILE DEVELOPMENT HAVE PREVENTED THE FIRECONTROL PROJECT FAILURE?

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Abstract

The case is examined of the UK Department of Communities and Local Government (CLG) FiReControl Project (which was terminated in December 2010 at a loss of £469 million) in the light of the influential report by the Institute for Government's (IfG) 'System Error: fixing the flaws in government IT' *report which argues that the UK government should tackle its continuing history of failed IT project implementation by adopting an 'agile' approach to IT/IS development projects in conjunction with the adoption of common hardware/software platforms across all IT/IS applications. We attempt to assess the likelihood of success with the agile + common platform approach by modelling how the approach could have been applied to the failed FiReControl project. This exercise makes use of publicly available central and local government sources and the opportunities and challenges in accessing and analysing data from these sources are reviewed. This preliminary analysis identifies some of sources of difficulty with the FiReControl. This includes the attempt to merge the working practices of each of 49 local autonomous fire and rescue services (FRS) into one national call-handling and mobilisation system and the role of the CLG as a barrier between developers and users. Another difficulty relates to the challenge of trying to implement an IT solution based on the customisation of a number of existing off-the-shelf system components.*

Keywords: project management, agile, project failure, government IT

1.0 Motivation.

This paper takes advantage of the relative ease of gathering data about failed IT implementation projects in the public sector to examine some of the factors influencing the outcome of the FiReControl project which was terminated in December 2010 with a loss of £469 millions (National Audit Office, 2011). To put this in context, this sum was the equivalent of spending £400,000 for each of the fire controllers who would have used the system (according to the evidence of hearings of Public Accounts Committee on 6th July 2011 Question 98).

A motivation for the examination of project failure is to identify measures that can be taken to prevent the occurrence of further failures in the future. The recent report *System Error: fixing the flaws in government IT* (Stephen *et al*., 2011) of the independent think tank, the Institute for Government (IfG), has argued for a two-

pronged approach to dealing with the '*well-documented history of too many high-profile and costly failures*' (Stephen *et al*., 2011, page 2). On the one hand there should be action on the platforms on which government IT applications run to ensure greater sharing of infrastructure and the reduction of duplication across public services. On the other hand, there should be increased use of agile development approaches. The Cabinet Office's *Government ICT Strategy* document (Cabinet Office, 2011) presented an acceptance in principle of this dual approach. It called for '*increased standardisation and modularisation of business processes and supporting technologies to create a platform from which government delivers new models of open and innovative public services'* (page 7) and also stated that '*Government will apply agile methods to ICT procurement and delivery to reduce the risk of project failure'* (page 11). One way of evaluating and refining this strategy is to examine how its adoption might have prevented specific instances of failure, in this case that of the FiReControl project.

The remainder of this report is structured as follows. Firstly the recommendations of the IfG *System Error* report will be examined critically. In particular the interpretation by the writers of what constitutes a common platform and an agile approach will be explored. We will then very briefly outline the scope of the FiReControl project and discuss the key reasons for its failure. This will be followed by an evaluation of the degree to which the IfG recommendations could have been effectively applied to the FiReControl project.

2.0 The Institute for Government Report: *System Error: fixing the flaws in government IT*

The Institute is a registered charity funded by the Gatsby Foundation which is one of the Sainsbury Family's charitable trusts (Institute for Government, 2012). Its aim is to provide research and development which will increase the effectiveness of government. Its governing body contains a cross-section of the great and the good. The 'task force' that oversaw the creation of the *System Error* report included current top civil servants such as Ursula Brennan of the Ministry of Defence and Bill McCluggage of the Cabinet Office and there was active co-operation by several government departments which for example contributed case studies.

As noted earlier, the findings of the report centred on two sets of recommendations, namely those relating to a common platform and those relating to agile development practices. The two sets of recommendations are considered below.

2.1 The platform

A key recommendation of the report calls for a relentless focus on *'commoditisation, rationalising the management of common elements of government IT and setting common standards'* (Stephen *et al*. 2011, page 14).

Although not referenced in the report, the philosophy of this policy reflects that articulated by Ross, Weill and Robertson (2006). The two dimensions on which Ross *et al.* build IT strategy are standardisation and integration (Ross *et al*, 2006, page 27). Standardisation refers to using common processes and technologies across an organisation, while integration focuses on the sharing of data. This is clearly relevant to IT/IS functions, many of which are generic across a wide range of businesses as the frequent adoption of ERP solutions for common administrative processes such as payroll, purchase orders and payment processes attests (Hughes 2008).

Ross *et al.* identify four models that categorise the way an organisation operates:

- Diversification – low standardisation, low integration
- Co-ordination – low standardisation, high integration
- Replication – high standardisation, low integration
- Unification – high standardisation, high integration

These models can be illustrated by looking at local government IT applications. A local authority will have a wide range of responsibilities which can have little that is obviously common except the geographic area served, such as fire and rescue services, refuse collection and disposal, schools, local road maintenance, and the approval of planning applications. Within a local authority there is a limited scope for integration between these services. With this *diversification* Ross *et al*. would recommend that the emphasis be on common support applications such as payroll and purchase orders and common IT such as email and desk-top systems. This is consistent with the common platform that the IfG wishes to promote, but is modest in scope.

With the *co-ordination* model, within an organization there are distinct processes and revenue streams but the data used is integrated and shared. This aligns with the IfG concern for '*rationalising the management of common elements of*

government IT'. In the case of local authorities, for example, some services share the need for data about properties, for example, council tax collection and town planning. Here it makes sense to share data, especially where there are interactions between functions, for example, planning permissions may lead to changes in the council tax database as new properties are developed.

In the case of *replication,* processes are common but the data varies. In the case of local authorities, the same services are replicated throughout the country, but in each case the data used relates to a particular locality and population. This would suggest that the most efficient way of conducting business is to use the same IT applications but to implement each with a separate database.

The final model is *unification* where there is a single monolithic application with a single database that is used by everyone.

Ross *et al*. argue for a generic organizational strategy which aims first to implement standardised technology, and then to develop an 'optimised core' of applications that share data and common processes. This strategy, however, raises four questions.

Firstly, there appears to be a potential conflict between this common platform policy and agile development. According to Ross *et al*., the least developed state of an organisation's enterprise architecture is when it comprises a number of relatively isolated business silos. However, business silos have advantages (p 73): there are few external constraints on application development so that innovation can flourish; the needs of local managers and users can be catered for effectively; and the benefits of developments are clearly identified. This is an environment in which agile approaches to development would be ideal. However, the systems that are developed may duplicate data and processes and thus be more costly for the organisation as a whole than integrated corporate systems.

Secondly, the movement away from business silos to common platforms will mean that the traditional principle that business need should drive technology will need to be modified as now new applications have to conform to the standards imposed by the shared technical platform. The benefits of centrally delivered new applications will not always be obvious: some local costs may increase or capability be reduced in order to achieve corporate objectives.

Thirdly, standardisation of smaller, high volume, technology items often allows these to be become commodities (comparable to printer paper) (Porter 1985).

Here a large number of suppliers could be competing and driving prices down. However, with more complex technology items such as ERP applications covering basic processes such as payroll, the government may initially have a favourable bargaining position, but after a contract is signed may be locked into an increasingly unfavourable relationship with a supplier because of the prohibitive cost of changing systems and suppliers.

A final disadvantage of standardisation is where users already have tools from various sources and replacing them before their natural obsolescence incurs extra costs for no obvious benefit. It might therefore be argued that standards should be established as soon as a new technology emerges, but what the de facto standard will actually become may not be clear at that point (Fichman and Kemerer, 1993).

2.2 Agility

The IfG report speaks of the need for an agile approach but does not mention any specific method. Agile approaches include methods of software development such as XP i.e. eXtreme Programming (Beck and Andres 2004), methods taken from more general product development such as Scrum (Schwaber 2007), approaches based on manufacturing models such as Lean and Kan Ban and incremental/iterative IT business change methods such as Dynamic System Development Method/Atern (DSDM Consortium 2008). Instead the IfG report summarises four core agile principles seen as essential (Stephen et al 2011 page 13).

- Modularity – splitting up complex systems and projects into manageable components. Each component should be able to work on its own as well as with other components. This should allow staff to use some parts of the system before the full implementation of the system. Software engineers would normally refer to this approach as incremental rather than modular, as modularity usually refers to the internal structure of the code – although clearly the two concepts are inter-related (Pfleeger and Atlee 2006). The report claims that the modular approach makes changes less problematic. This is partly true as a good modular software design should comprise self-contained components with a minimum of communication between them. This reduces the possibility of unexpected knock-on effects of a change in one function causing errors in other components. However, a problem with incremental development is ‘software breakage’ the where new requirements that emerge as later functions are developed require changes to earlier increments.
- An iterative approach – rather than trying produce a complete design before any system building, a number of versions of an application are created with the users reviewing the way each one works. Their comments are used to develop further versions closer to their requirements.
- Responsiveness to change – the iterative approach described is designed to make developers more responsive to user and management needs. In order for this to be effective, the user requirements need to be prioritised. What the IfG report does not explicitly prescribe is time-boxing: having inflexible delivery dates for completed system components, but being willing to drop or postpone the implementation of less important requirements in order to meet deadlines (DSDM Consortium, 2008). It is true that this

approach is indirectly touched upon in its description of the Amberhill agile project exemplar, but the fixed deadline, variable scope principle is so important and well-established (see, for example, Gilb, 1986) it is surprising that it was not more prominently flagged.

- Putting the users at the core – user representatives should be embedded within the project team to provide continuous input and refinement.

Thus the IfG definition of agile development is at a very high level and some key principles are not spelled out, such as the principle of dynamically modifying scope size in order to maintain schedule and cost targets. Another missing principle is that development teams which contain user representatives need to be empowered to make decisions about functionality and scope without having to refer to higher levels of authority. An understanding and acceptance of these principles would be needed by high-ranking civil servants and ministers for an agile approach to work.

3.0 The FiReControl project

In this section there will firstly be a description of where the data for this study came from and some of the advantages and limitations of using these sources. This is followed by a brief overview of the background to the FiReControl project and its original objectives and then a summary of the key events in its execution.

3.1 Sources of information for the study

The fact that the FiReControl project is in the public sector and has been the subject to considerable parliamentary scrutiny means that there are several hundreds of pages of documentary evidence. The sources we have used so far include:

- *Our Fire and Rescue Service* (Office of the Deputy Prime Minister, June 2003, 74 pages). A white paper which included a proposal to move responsibility for control rooms from local Fire and Rescue Services (FRS) to a new regional level of organisation and management.
- *The Future of Fire and Rescue Service Control Rooms in England and Wales* (Office of the Deputy Prime Minister, December 2003, 33 pages). This outlines and justifies the decision to replace local FRS control rooms with nine regional ones. It contains three sentences on implementation.
- *Signature of EADS contract and related implications: frequently asked questions.* March 2007 23 pages. This addresses issues raised by stakeholders in local FRSs about the implications of the IT award of the contract to EADS (East Sussex FRS, 2007).
- *FiReControl, report of Communities and Local Government Select Committee, Fifth report of the season 2009-10.* (The Stationery Office HC 352 March 2010, 191 pages). This is a report on the project while it was still live, but was in a critical state. This contains oral evidence and a written submission providing an insight into the viewpoint of the IT contractor, EADS.
- *The failure of the FiReControl project.* (The Stationery Office HC1272, July 2011, 35 pages) This is a Report by the Comptroller and Auditor General on the reasons for the failure of the project.

- *Failure of the FiReControl project* (The Stationery Office HC1397, September 2011, 53 pages). This is a report by the Parliamentary Accounts Committee. This too contains submitted written evidence and transcripts of question and answer sessions with witnesses.
- *The future of fire and rescue control services in England. Consultation* (Department Communities and Local Government, January 2011 77 pages). This is a document providing a briefing, including a history of the now defunct FiReControl project, as the basis for a consultation on what should be done next.

It can be seen that there is a considerable volume of material which we are currently processing and in fact there are still many relevant documents that we have not yet accessed.

Each document is a snapshot of the beliefs and perceptions of various project actors at particular points in time. Thus developments in thinking about the project can be observed, including where actions are based on particular beliefs which turn out to be incorrect. If research is based solely on the recollections of project participants gathered retrospectively through interviews there might be some unconscious correction of memories to reflect what is known now about the actual outcomes. Another advantage is the relatively wide number of witnesses. This can reveal intriguing differences in perceptions. One example is the perceived degree of resilience of the buildings that were to house new regional control centres. A memorandum from the Fire Brigades Union (FIRE 27) to the CLG Select Committee suggested that the construction (brick and glass) and location of the new control centres undermined claims that they would be 'resilient'. On the other hand, the president of the Chief Fire Officers' Association (CFOA), John Bonney, suggested in oral evidence that in fact the new centres had been over specified in terms of resilience (oral evidence 8th February 2010 Question 5).

Despite the large amount of documentation, much of which is quite frank as it is protected by parliamentary privilege, there are gaps. The CLG Select Committee were unable to get sight of the reports of project reviews conducted by the Office of Government Commerce (OGC) in October 2008 and October 2009. One of the reasons given for non-disclosure was commercial confidentiality. From a research point of view, this is unfortunate because at the time the OGC advised on project management standards, and this project failure creates questions about the effectiveness of PRINCE2 project management processes and the OGC Gateway framework. The committee were also denied access to the contents of a November 2009 technical review of the IT systems development of EADS by Professor Peter

Brook of Qinetq and Gordon Hextall, a former CIO of the NHS Programme for IT. This means that the wider IT community is denied insights which might reduce risks in future complex system integration projects. Generally, while there is a large volume of comment from the user and top civil service management on the reasons for project failure, the developers involved in the project appear to be effectively silenced by commercial confidentiality. While there is some evidence provided by EADS in the proceedings of the CLG Select Committee, we have found almost nothing from EADS' subcontractors.

3.2 Background and Motivation for the FiReControl project

Fire and Rescue Services (FRSs) in each locality in England are owned and run by local authorities (FRSs in Wales and Scotland come under the respective national assembly). The FRSs have a statutory duty to make provision for fire-fighting in their area. The local political control of the FRS is exercised through what is effectively a sub-committee of the local authority. At national level what is currently the Department for Communities and Local Government (CLG) has responsibilities for setting standards, carrying out inspections, and pay negotiations.

The origins of the proposal for the FiReControl project are contained in the 2003 government white paper *Our Fire and Rescue Service* (Office of the Deputy Prime Minister 2003a). This white paper was written with the 11th September 2001 attack in New York and a recent strike by fire fighters in the UK still fresh in people's minds. Among the recommendations was that a new, regional, level of organisation be added which would assume responsibility for the control rooms that take calls for assistance and mobilise resources in response.

The main motivations for this change were stated to be the following.

- Regional control centres could improve resilience and respond to major threats such as terrorist attacks by co-ordinating resources over a wider area.
- Figures were presented which showed a wide difference in the cost per incident among FRSs, ranging from £18 to £168. A move from 49 local control centres to nine regional ones was seen as making substantial savings in costs, mainly by reducing staffing.
- The devolution of powers in Wales and Scotland was in place and there was at the time a drive by the UK government to create regional bodies in England – this subsequently petered out.

The proposal for regional control centres was fleshed out in the document *The Future of Fire and Rescue Service Control Room in England and Wales* (Office of the Deputy Prime Minister, 2003b) written by the consultants Mott MacDonald and published in December 2003. This examined various options for re-organisation: for example 'horizontal' integration where the control rooms of the police, ambulance

and fire services would be integrated, and 'vertical' where the control rooms of adjoining FRSs could be merged. The report plumped for the creation of nine regional fire and rescue control centres in England. It should be noted that the thinking employed here is very similar to that of Ross *et al.*'s thinking on the efficiency gains to be had through increased standardisation and integration.

3.3 Execution of the FiReControl project

The start of the project was announced in December 2003 and work actually started in 2004. CLG expected the roll-out of the operational system would start in late 2007 and be completed in late 2009.

Two important top-level requirements can be identified.

- Each one of the nine regional control centres would be able to take calls and mobilise resources for every FRS. The aim here was that if a centre was put out of action, then the remaining centres could take over its functions. This meant that the system had to be a national one. In terms of the Ross *et al*. operating mode classification seen earlier, this was a unification strategy, not replication, where both processes and data were shared.
- All 24/7 activities relating to call-handling and resource mobilisation at local FRSs would be replaced by the regional centres. If cost savings were to be made by implementing regional centres, then there had to be the removal of any possible duplicated effort at FRS level.

The project had three components: (i) acquiring sites and constructing buildings for the new regional control centres (ii) developing and installing IT/IS systems (iii) re-engineering the organisational and operational processes needed for the new system.

Work on creating the new control centres went ahead rapidly using private companies who took ownership of the buildings when completed and then leased them back to local authority controlled companies (LACCs) responsible for the operation of the centres. The first two centres were completed by June 2007. As will be seen the IT development was so delayed that the Department of Communities and Local Government ended having to pay up to £2m a month for the leasing and upkeep of control centre buildings that were empty.

The FiReControl project had mutual dependencies with a parallel project, FireLink, tasked with the introduction of a standard, state of the art, radio network using Airwave technology to support radio communications between FRSs and also between the three emergency services. It was planned that the completion of FiReControl should coincide with that of FireLink in May 2007. In fact the FiReControl IT procurement activity of selecting suppliers and negotiating contracts was not completed until March 2007, so EADS, which won the contract, was starting on a project which was already behind its original schedule.

An FAQ document (East Sussex FRS 2007) published when EADS was awarded the contract is revealing. Clearly some already had doubts about the project. One question was *'Is the FirReControl project in trouble?'* Another was '*Was there a problem with the technology?'* Part of the answer to this was '*All the features of the technology employed... are already in use in the FRS in England although no FRS currently has all the features'*. In an answer to another question, it was stated: '*FiReControl is based on tried and tested technology and the project is being managed in such a way as to avoid the potential dangers – "big bang implementation" and "over-customising" of solutions....The Office of Government Commerce provides strict project assurance'*.

The project was quite complex from the developer viewpoint. As well as the main contractor, EADS, there were seven subcontractors: Ericsson, Frequentis (UK), Hewlett-Packard, IMass, Innogistic Software, Multitone Electronics and Telent. The principle was to integrate, and where necessary customise, existing proven component technologies. In fact there were 50 different technical products that had to be integrated. There were 2000 requirements and 8000 'sub-requirements'. The requirements were constantly changing, and even where they were not they often needed to be expanded to add necessary detail.

A number of milestones were included in the contract. Payments to the contractor were dependent upon these, and as they tended to occur towards the end of the contract, EADS took the main burden of risk for the IT development project.

In October 2007, EADS found that the planned mobilisation system would not be able to meet the demanding performance requirements needed for this application. The problem areas were identified as the originally planned database and hardware products. EADS had to work out an alternative approach. In the meantime, various milestones were either not met or were moved. In April 2008, EADS communicated the technical problem with the mobilisation system to CLG. In November 2008 there was a formal ministerial announcement by the CLG that the 'go live' for the project would be delayed for nine months. At the same time the contract with EADS was re-negotiated and new milestone dates set. In May 2009 EADS brought in Intergraph to develop an alternative mobilisation system and in December Intergraph took over that part of the project from Ericsson. In the meantime further milestones were missed. During 2009 steps were taken to create better communications between end users and

developers by the introduction of joint workshops and a CLG quality assurance group was collocated with the development team in Newport, Gwent.

Despite these measures in June 2010 the CLG started to explore the feasibility of terminating the contract. A key concern was that radical changes to the organisation of FRS operations should not happen during the 2012 Olympics. EADS was placed in material breach of contract in November 2010 and in December an 'amicable' termination of the project was negotiated. Under this agreement EADS had to pay CLG £22.5m. Given that CLG had previously paid EADS £40m, but retained IT assets valued at £5.7m, this meant that EADS received payments totally £11.7m. This can be compared to the £60m paid by CLG to consultants on the project of which £42m went to PA Consulting.

4.0 Some key factors in the project's failure

This was a very large and complex project and the study described here is exploratory in nature. Its aim is not to address all the factors that contributed to its failure, but where the circumstances of the project match the concerns of the IfG *System Error* report. We have identified three key issues: the overall organisation of the project and in particular the role of CLG as the project sponsor, the complexity and ambition of the requirements and the suitability of the technical solution adopted.

4.1. Organisation of the project

Earlier, in 3.2, we noted that local FRSs are part of the English local authority structure. As such they are not controlled directly by the central CLG. Their duty to provide fire and rescue services is placed on them directly by acts of parliament. The attempted insertion of regional control centres did not affect this basic legal structure. An FRS, in principle, could have refused to join the regional set-up if it felt that it was an obstacle to its carrying out its legal responsibility.

Despite the local government nature of the FRS, the central government department, CLG was the driver for this project. Thus the contract for the IT development was between the CLG and EADS and its sub-contractors. The CLG thus became a barrier between those developing the new systems and the people who actually operated the current systems – which appears to be contrary to the IfG principle of putting 'the user at the core'. In some ways, the position of the CLG is understandable. The current local FRS control rooms were to disappear, and the new regional ones would work with different technologies. The local users might not

become new regional users. However, even if the local control centre staff were not relevant, the local firefighters would certainly be users of the new system. Towards the end of the project's life in 2009 workshops were introduced, some five years after the start of the project..

One reason why agile approaches are efficient is that they get rid of lengthy and time-consuming chains of communications. Thus, developers need to have direct access to actual users. Ideally the two should be able to agree requirements and approve design decisions without having to refer questions upwards. Clearly the role of the CLG as the customer, as far as EADS was concerned, prevented this close, productive relationship with existing users with knowledge of the current system.

The IfG principle of creating a common platform was clearly applied as a single new IT/IS application was going to replace a large number of different local systems. However, as the experience of the national programme for information technology in the NHS shows (Hendy *at al*. 2005) such an approach can be problematic. As each set of local system users will have experience of different practices and tools, it is difficult to find a single user representative to speak for all. This challenges the aspiration for a more user-centred, agile approach.

Hendy *et al.* identified differences in the quality of current IT systems and tools to be replaced in different local units in the NHS. Users would hope that the new developments would improve facilities, but some may have to give up at least some local functionality superior to that to be provided by the unified system. There is also the problem of 'planning blight': once it is known that an existing application is to be replaced then any enhancements to that system are likely to be abandoned. This uncomfortable period of uncertainty and inactivity is made worse where the implementation of the replacement application is delayed. Even without unplanned delays, once the new IT/IS application is ready for delivery, it is convenient to roll out the system to groups of users in phases. Those who are last on the schedule can feel particularly frustrated.

4.2. The technical solution

On the developer side, the structure of having a main contractor and then sub-contractors also creates barriers to direct developer-supplier interaction. This obstacle was worsened by the reliance on off-the-shelf components. Many agile practices have developed from software development practices. These practices can be transferred to other situations where a product is being developed – for example, a jointly produced

book – as long as the product is a malleable one that can be easily shaped and modified. The FiReControl project was based on the principle of integrating existing off-the-shelf products. Most of these could only be modified, not by EADS developers, but by developers working for sub-contractors. In at least one case (Intergraph), changes to its core functionality could only be done as part the product's annual release cycle. This makes it difficult to envisage an agile relationship as recommended by the IfG report between potential users and developers based on the ideal that modifications suggested by users could be rapidly implemented and assessed.

4.3. The complexity of the project

The ambitious scale of the proposed new application was noted above, that is that all 24/7 call answering and resource mobilisation activities be transferred to the new regional centres. The control centres' functions went much further than would be expected for, say, a call centre dealing with requests for roadside assistance for motorists. The key mobilisation and resource management sub-system (MRMS) needed not just to record incidents, but to identify and mobilise appropriate resources and also support services during the incidents. Many firefighters are 'retained' part-time staff on call. The control centres would need to be able to identify who to contact and where to contact them.

The IfG *System Error* report argued that a modular approach be adopted to deal with system complexities, suggesting an advantage was '*enabling users to access the functionality of modules developed early, without necessarily having to wait until all the original specification has been built'* (page 13). This may work with, say, the typical ERP system where different 'modules' deal with different business functions that are quite discrete even though they have interdependencies, for example, a purchase order may lead some days later to a delivery and a stock update and also trigger a payment. In the case of FiReControl system the different modules would be used in a very tight sequence. It is difficult to see how the various functions of the system could be implemented into a user environment in increments, particularly as the new regional centres would have no existing systems to provide support while the functionality of the new components was being developed.

These challenges were exacerbated by the seemingly sensible decision to implement the new system by integrating already proven off-the-shelf components. IT procurement took 30 months from May 2004 to December 2006. The contracts

awarded in March 2007 specified the delivery and integration of specifically identified products. This suggests that the protracted procurement period was at least partly spent evaluating the suitability of various technologies for the FiReControl application. With hindsight it can now be said that what was missing was a satisfactory 'proof of concept' exercise to see if the technologies would work together. Admittedly it is not clear exactly what contractual arrangements would need to have been in place for such an experimental approach, or what its duration or cost would have been.

5.0 Concluding remarks

The section above is designed to illustrate how the application of agile approaches – such as the earlier use of joint workshops - might have ameliorated some of the difficulties of the FiReControl project. However it is not obvious that agile development processes could have eliminated all the risks in the project, particularly those that stemming from high-level political decisions.

We would like to go further that just critiquing the management of the project and suggest what might have been a more satisfactory way of organising the project. The aim here is simply to stimulate debate which might lead to insights that can be applied to new programmes of work.

We propose that the new system should have been implemented at one selected FRS (not region) focusing on the work practices. Because the FRS would have existing systems in place, an incremental approach to replacing components would have been feasible. Once the feasibility of the new system had been established at one FRS, it could have been introduced at a least one other FRS to establish and refine the broader resilient communication functions. The process of installing the system at a regional level could then have started.

Difficulties would clearly remain with such an approach. It would not have guaranteed the resolution of the integration of the disparate system components at a reasonable cost. It could also be seen as the imposition of the model of working at the first FRS on all the regions and FRS in England.

Successful use of the agile development processes for small-scale developments where there is a clearly defined user has been documented in such pilot applications as the Metropolitan Police Amberhill project (Stephens *et al* 2011). There appears, however, to be little on the application of agile processes in larger projects.

The proponents of Scrum have suggested using a hierarchical structure co-ordinated by a Scrum of Scrums but some have doubts about the practicality of this – for example Richards (2012). Other advice is to break down large projects into smaller ones more amenable to agile approaches. The Government white paper of March 2011 (Cabinet Office 2011 page 5) prescribed a '*presumption against projects having a lifetime value of more than £100 million'*. This may not seem to be a huge restriction, but is a step in the right direction.

It is clear that finding ways of the scaling up agile practices for larger projects is going to be a major challenge for IT/IS practitioners in the next few years and it is hoped that academic research will be able to support these efforts.

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