IT Strategy for Watford Borough and Three Rivers District Councils

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Executive Summary

Watford Borough Council and Three Rivers District Council are local councils based in South-West Hertfordshire. This document presents the findings and recommendations arising from a review of the provision of Information Technology and Information Systems across both Councils, undertaken by Actica Consulting Ltd. The aim of this review was to identify and recommend a number of tactical improvements to address any immediate issues identified and to propose a set of strategic recommendations to improve the longer term provision of IT services to the Councils.

The approach used to deliver this strategy consisted of three stages: information gathering; analysis and reporting. The information gathering stage involved holding a number of stakeholder meetings with key staff across both Councils, running a number of analysis tools on the ICT infrastructure and reviewing current IT support documentation.

Applications

The information systems that are used by both of the Councils can be split into three categories, namely:

- desktop PCs, with standard desktop applications and network connectivity (including internet access). There is a mixture of thin and thick client used to provide applications on desktop PCs;
- applications which are provided to both Councils as a shared service;
- applications which are hosted centrally and used by an individual Council. These could be supported by the ICT team or one of the Council client services.

The applications used by WBC and the shared service applications are all delivered using thin client technology, which is based at WBC. This means that the applications effectively run on the server rather than the PC and thus transfer the majority of the system resource requirements needed to run the applications back to the server. The applications used by TRDC (non shared services) are delivered using traditional thick client technology. Thick client allows the equipment provided to the users to be tailored to meet their individual computing needs, but at additional expense and complexity.

Currently, the majority of the applications used by both Councils are managed and supported by the ICT team. A small number of applications e.g. Three Rivers Uniform are supported on a day to day basis by staff within the business areas rather than the ICT team. There are plans to continue harmonising applications across the two councils in order to reduce duplication and costs.

Governance

The Councils' combined their IT governance as a result of the shared service initiative in 2009. An ICT service plan focusing on establishing the ICT shared service and a joint ICT network which is aligned to the strategic objectives of both Councils has been in place since the start of shared services. There is a shared services joint committee and a shared services management team which meets fortnightly that is responsible for the delivery of all shared services to both Councils. The lead management responsibility for the ICT shared service is the Executive Director, Resources, Watford Council.

Key decisions on ICT strategy, projects and budget are made by initially by the Shared Management Team and then by the individual Council boards and/or the Joint Committee as needed. However, it is clear that there are numerous demands on the agenda for SSMT and Joint Committee meetings and that the time limitations do not always leave room for clear and detailed discussions on ICT matters such as project

prioritisation. The impact of this is that ICT does not always have clear guidance on priorities, or support in communicating messages to all Council services.

ICT for both Councils is managed by a single Head of ICT who reports to the WBC Executive Director, and manages the IT teams that provide both the shared and the individual applications.

At present, the relationship between TRDC and WBC in regard to ICT services has the appearance of a traditional customer and supplier relationship, although this is was not the intention when the shared services were created. The expectation in TRDC seems to be that the service they should receive from WBC is identical to that which was provided by Steria, albeit at a lower cost.

ICT service provision and performance is regularly discussed with the Heads of Service from both Councils by the Head of ICT. There are plans to formalise arrangements for these meetings and to share the responsibility between the Head of ICT, the ICT business team manager and the ICT infrastructure manager.

Issues identified

A number of issues were identified with both the current infrastructure and management of the ICT services.

The infrastructure issues can be summarised as follows:

- All of the Watford RDP servers (which are used to provide the thin client services) have insufficient memory to meet the current loading on each of the servers. This is causing daily usage issues for most WBC staff;
- The user perception of the Appgate remote access solution used in Watford and Netilla VPN in use at TRDC is very poor. The situation at Watford is likely to be a result of two factors – the configuration of the Appgate application and the thin client service. The thin client service issues described above affect remote users in the same way as local users. The situation at TRDC is likely to be due to the age and lack of support for the Netilla product;

- The backup system hardware is not capable and fails regularly – this has recently resulted in the irretrievable loss of data for the Watford network;

- Air conditioning in the Watford Town hall server room is not stable leading to the requirement of temporary cooling solutions, although it is understood that this situation has not been addressed due to the pending move of the Watford servers to the Apsley data centre.

- All external web traffic from the TRDC domain is routed via the Watford ISP, this is a single point of failure for both networks.

It is also noted that the ICT network is currently performing as needed. The level of network traffic across the network is relatively low and the hardware currently in place is sufficient to manage these levels, with the exception of external web traffic as noted above.

The strategic issues at both organisations can be summarised as follows:

- The current ICT management and governance is not fully effective, particularly around project prioritisation, defining and managing the role of ICT and standardisation;
- Client services tend to make ICT decisions in isolation rather than collaboratively with ICT and other client services;

- There are disparate IT systems across both Councils leading towards higher cost of ownership and lower integration opportunities. Additionally, business areas define solutions rather than requirements which leads to higher cost and poor support availability;

- There is a lack of an integrated approach to data and information which reduces efficiency and customer service;

- There is a lack of guiding architecture design and governance to ensure best fit of new or changes to technology leading to lack of interoperability along with longer lead times to implement;

- There is a lack of documentation on ICT infrastructure and IT management and support processes;
- Members of the public are unable to get all the information they require to run their lives effectively via a range of electronic medias;

- The current ICT systems do not support common working and processes which is a fundamental element of successfully delivering ICT shared services;

- There is a lack of joined-up ICT procurement approach, leading to lower service levels and ability to deliver and support the objectives of both councils through IT;

- There is a lack of flexibility in providing ICT solutions that meet the needs of staff, members and the public.

Recommendations

The recommendations made to improve the current provision of ICT to the Watford and Three Rivers Councils are:

Recommendation 1: Address the current infrastructure risks and issues: This will involve taking the following actions:

- Improve the Watford thin client user experience by ensuring sufficient computing resources are available to provide a fast and reliable service to all users, including local and remote. This will involve upgrading or replacing the current Watford RDP servers. This is likely to improve the thin-client experience but may highlight further issues with the infrastructure not currently apparent as the load shifts to other servers, such as application servers;
- Upgrade or replace the other Watford servers noted to be operating near their limits;
- Upgrade the TRDC servers which are currently operating near their limits in order to prevent any related problems or incidents;

- Conduct a full network infrastructure audit and address any issues identified to allow the IT support staff to manage the IT services appropriately, easily and quickly. This is needed to address the current severe lack of documentation and knowledge of the IT infrastructure.

- Improve the system wide monitoring currently in use for both Councils to allow early identification of faults and issues.

- Improve the remote user experience.
- Define and document clear governance processes and procedures for the backup of systems and data.

- Configure the (unused 8Mbit) Easynet ISP connection at TRDC to be used to create a failover internet access point.

Recommendation 2: Governance and management of the ICT shared service: Create an ICT steering group (with responsibilities as defined in Appendix A) and continue to make progress towards delivery of all ICT applications as shared services. This will require the Councils to agree a Terms of Reference for the ICT steering group and its membership, and agree ICT responsibilities across the SSMT, Joint Committee and ICT steering group. The expectation is that the ICT steering group will be chaired by the Head of ICT and report to the Joint Committee or SSMT. One of the first actions of the steering group will be to discuss and agree the roadmap for harmonising ICT systems across both Councils. This will need to take into account current software contracts, hardware limitations, user licences and user training in order to agree migration plans for each duplicated system, and will also be dependent upon IT resource usage and availability.

Recommendation 3: ICT service delivery: Implement ITIL-based process to cover all service delivery activities and in parallel review existing agreed SLA's. This option is likely to deliver a similar service in terms of quality to the outsourcing approach, but will avoid any costs and other difficulties associated with role-guarantees, redundancy and TUPE. It will also ensure that the Council is well placed to take advantage of any of the government ICT initiatives such as G-cloud and the PSN without having to change contracts with a 3rd party.

It is then recommended that the Council review the implementation of this option after up to 24 months to ensure that services have improved in line with expectations. If they have not, an outsourced delivery of ICT services should be considered in order to ensure that requirements are met.

Recommendation 4: IS Architecture: Audit the ICT infrastructure and implement a clear set of technology standards and a unified architecture framework. This includes:

- Consolidation of applications using the same technology: Continue to consolidate the operation of similar services which operate in different divisions to save maintenance and licensing costs, for example SQL databases and web content management;
- Virtualisation of hardware: Continue the use of virtualised servers and cloud computing to reduce hardware requirements;

- Support and guidance: Provide support and guidance, through the formal and informal information sharing mechanisms, relating to the best us of the architecture.

It is also recommended that the Councils review the implementation of this option after up to 24 months to ensure that it is meeting their requirements. If this is not the case, outsourcing of the IS architecture provision should also be considered.

Recommendation 5: Performance management: Medium term the creation of individual SLAs with all client services for all ICT services should be considered. This would mean that specific SLAs suited to the service being provided and the business unit's requirements, e.g. for reliability and support would be discussed regularly with the Heads of Service to ensure quality of service and the provision of future capabilities. These SLAs should be in line with ITIL V3 best practice as this will ensure internal processes are in line with the industry standard. In addition, the current benchmarking activities should continue and the results widely communicated. A review of the existing SLA's agreed through the inception of Shared Services should take place in line with recommendation 3.

Recommendation 6: Flexible working: Adopt enabling technologies and review options to enable applications for remote working. This will ensure that the council continues to provide flexibility for staff, members and the public around the use of IT systems and access to council information.

The table below maps these recommendations against the key issues identified earlier.

Recommendation	Issues addressed
Recommendation 1: Address the current infrastructure risks and issues	• The current IT systems do not support common working • Lack of flexibility
Recommendation 2: Create an ICT steering group	• Lack of time for ICT governance • Client services make decisions in isolation • Disparate IT systems • Lack of IT architecture design and governance • Current systems do not support common working and processes • Lack of joined up ICT procurement
Recommendation 3: Implement ITIL based processes	• Client services make decisions in isolation • Lack of IT architecture design and governance • Lack of documentation • Lack of joined up ICT procurement • Lack of flexibility
Recommendation 4: Implement technology standards and an ICT architecture framework	• Disparate IT systems • Lack of integrated approach to data and information • Lack of IT architecture design and governance • Lack of documentation • Customers unable to get information needed • Current systems do not support common working and processes • Lack of flexibility
Recommendation 5: Create individual SLAs with Council departments	• Client services make decisions in isolation • Disparate IT systems • Lack of integrated approach to data and information • Lack of IT architecture design and governance • Lack of documentation • Current systems do not support common working and processes • Customers unable to get information needed • Lack of joined up ICT procurement • Lack of flexibility
Recommendation 6: Adopt additional enabling technologies	• Lack of flexibility

Timeline

It is recommended that the tactical and strategic recommendations are implemented in parallel, beginning as soon as possible. This will ensure that the service to users is improved as quickly as possible, whilst also

ensuring that once the service is improved a framework is in place to continue running the IT services effectively and to make improvements as needed. The time taken to implement these recommendations will also depend on the resources available to IT (i.e. whether a full complement of staff is recruited) and on the relative priority of these recommendations versus existing projects. These priorities will need to be set by the ICT steering group.

Costs

The expected costs of implementing this strategy are listed in Table 6-2 below. These are all based on previous experience of implementing similar projects.

Capital Costs	Ongoing Costs
£5k external support for ICT steering group	£40k for extra ICT resource to develop processes
£50k external support for new ICT processes	
£10k for updated SLAs	
£150k for IS architecture improvements	
Totals	
£225k over 1 to 2 years	£40k p/a for up to 2 years

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1 Introduction

1.1 Overview

1.1.1 Watford Borough Council and Three Rivers District Council are local councils based in South-West Hertfordshire. This document presents the findings and recommendations arising from a review of the provision of Information Technology and Information Systems across both Councils, undertaken by Actica Consulting Ltd. The aim of this review was to identify and recommend a number of tactical improvements to address any immediate issues identified and to propose a set of strategic recommendations to improve the longer term provision of IT services to the Councils.

1.2 Definitions

1.2.1 For the purpose of this strategy the following definitions are used:

a. Information Systems: Information systems (IS) are those systems which are used by users to process and store information and data. These include finance systems, human resources systems, bookings systems, office automation systems and systems processing public data, such as housing and benefits.

b. Information Technology: Information technology (IT) is defined as the hardware and infrastructure which supports the information systems; this will typically include Desktop PCs, servers, switches, cables and onward connectivity to the Internet, as well as technical support and development.

1.3 Purpose of this strategy

1.3.1 The Councils are both undergoing prolonged periods of change driven by changing public expectations, changes to budgets and funding models and changes to local government strategies across the UK. Additionally Watford and Three Rivers Councils have recently entered a shared services agreement for a number of key functions, including IT, and are continuing to review, understand and manage the implementation of these.

1.3.2 The purpose of this Information Systems and Communications Technology (ICT) strategy is to therefore support the Councils in achieving their strategic objectives through appropriate utilisation of ICT, and to support the short term improvement to IT services through recommending a series of tactical improvements.

1.4 Status

1.4.1 This is the final version of the strategy and risk report.

1.5 Consultants' brief

1.5.1 The aim of this assignment was to review the current ICT infrastructure and services, and make recommendations to mitigate any risks identified and for strategic improvements to the current ICT provision to the Watford and Three Rivers Councils. The scope includes the shared services, the local services and the internal support services.

1.5.2   The current service incorporates desktop provision to all Council staff, a range of business applications used by one or more divisions and an analogue voice communications system that is approaching its end of life.

1.5.3   The review assessed how well this provision meets the needs of the individual Councils and how ICT can support the requirements of the Councils' ongoing business strategies for the next five years.

1.5.4   The scope of the review included four phases:

    a.   Phase 1 – Assess the current ICT infrastructure and services to identify immediate risks to service.

    b.   Phase 2 – Assess the current operational, and future strategic needs of the individual client services within both Councils.

    c.   Phase 3 – Assess how the needs are satisfied by the current ICT services provided by the ICT team. Identify any gaps between requirements and provision, and any issues.

    d.   Phase 4 – Present a range of contrasting options for the delivery of ICT. Recommend the optimal solution to support the current and strategic needs for a 5-10 year time horizon. Produce a comprehensive strategy document (this document).

1.6   Approach

1.6.1   The approach used to deliver this strategy consisted of three stages: information gathering; analysis and reporting. The information gathering stage involved holding a number of stakeholder meetings with key staff across both Councils, running a number of analysis tools on the ICT infrastructure and reviewing current IT support documentation. Interviews were conducted by Actica consultants. Each interview followed a standard questionnaire in order to gain a consistent and comparable understanding of both the requirements for IT across each division in the Councils' and their overall business objectives for the next five years.

1.6.2   Interviews have also been conducted by Actica consultants with the WBC and TRDC Infrastructure manager to understand the existing state of the infrastructure and systems. Visits have been made to each of the WBC and TRDC sites holding server equipment.

1.6.3   In order to identify any opportunities for short term improvement, network monitoring has been performed on the relevant different parts of the network to ascertain if the hardware is fit-for-purpose. Documentation of the different networks has also been reviewed where it existed.

1.6.4   The analysis stage involved documenting the information gathered at the interviews and from the network monitoring, and reviewing it to identify any key issues and common themes. This information was then used to generate a number of short term, tactical options to address the immediate issues and to generate a set of strategic recommendations to improve the Councils' ICT in line with their overall business strategy.

1.6.5   The final reporting stage consisted of delivering a draft version of this strategy document and then updating that to include any comments made on the draft version by Council staff.

1.7   Structure

1.7.1   The remainder of this report is structured as follows:

    a.   Section 2 details background information to this report;

b.   Section 3 summarises the current situation;

c.   Section 4 lists the risks and issues identified;

d.   Section 5 discusses the emerging options and proposed recommendations for the IT Strategy;

e.   Section 6 presents the consolidated IT Strategy for the Councils;

f.   Appendix A is a draft Terms of Reference for an ICT Steering Group;

g.   Appendix B is a copy of the questionnaire used for the stakeholder meetings;

h.   Appendix C details the methods and tools used to identify risks with the current ICT infrastructure;

i.   Appendix D is a glossary of terms used.

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2 Overview of the Councils

2.1 Background

2.1.1   Watford Borough Council (WBC) is the local authority for the Watford non-metropolitan district of England. Watford is located in the south-west of Hertfordshire, in the East of England region.

2.1.2   WBC consists of 37 elected members. 36 of them represent the twelve electoral wards of the borough; each of the wards elects three councillors. In addition, the mayor of Watford is one of the directly elected mayors in the United Kingdom.

2.1.3   At the time of writing, the Council is currently controlled by the Liberal Democrats, who hold 28, or 76%, of the 37 seats. The Conservatives, Labour, and Green Party each hold 3 seats. One of the Liberal Democrat seats is the elected-mayor, Dorothy Thornhill, a Liberal Democrat.

2.1.4   Three Rivers District Council (TRDC) is the local authority for the Three Rivers non-metropolitan district of England. Three Rivers is located in the south-west of Hertfordshire, in the East of England region. TRDC itself is based in Rickmansworth, the largest settlement in the district.

2.1.5   The Council consists of 48 elected members, representing twenty electoral wards. The Council is also currently controlled by the Liberal Democrats, who hold 30, or 63%, of the 48 seats.

2.1.6   The services provided by both councils include:

    a.   Business services; Finance, HR, ICT, Legal and CSC

    b.   Environment, Licensing, Planning and Development Control;

    c.   Community;

    d.   Leisure;

    e.   Revenues and Benefits;

    f.   Housing.

2.1.7   The management of both councils' housing stock was recently sold off to community housing trusts, although TRDC maintains responsibility for its garage stock.

2.2 ICT history

2.2.1   WBC has always provided its own IT infrastructure and services, growing its ICT capability in line with demand. Its ICT servers are based at Watford Town Hall and the support team, originally also based in the Town Hall is now split between there and the TRDC building, Three Rivers House.

2.2.2   TRDC has taken a different approach and has chosen to outsource its ICT requirements over the past ten years to a number of different suppliers. Most recently, the service has been provided by Steria, who took over the contract in 2005.

2.2.3   In November 2009, WBC and TRDC established a shared ICT service for both councils to provide a number of common applications. They are currently planning to continue to harmonise the ICT infrastructure and front-line applications in order to realise benefits such as:

      a.   reduced costs;

      b.   improved performance;

      c.   increased resilience.

2.2.4   This shared service is fully in-house following the end of the TRDC contract with Steria in March 2010. It is based at TRDC under a single Head of Service, and provides the following services:

      a.   operating a single helpdesk;

      b.   implementing new IT projects including business process re-engineering;

      c.   providing application administration, web development and IT implementations;

      d.   managing the separate network infrastructures of each council.

2.2.5   The ICT shared service currently provides 36 applications to both Councils.

2.2.6   The next step in this process is to create a single network infrastructure for WBC and TRDC. WBC and TRDC have agreed a model for the creation of this network.

2.3   Corporate plans

2.3.1   Both councils have published corporate plans covering the next three to four years. These plans focus on the delivery of services to the public, the green agenda, safety and the environment. The plans also maintain that the successful delivery of these strategic objectives is underpinned by council governance, the effective and efficient management of resources and by forming effective partnerships with other public sector organisations. The specific objectives of both councils are listed below.

Watford Borough Council

2.3.2   Watford Council's stated objectives are:

      a.   Improve the health of the town and enhance its heritage;

      b.   Enhance the town's 'clean and green' environment;

      c.   Enhance the town's sustainability;

      d.   Enhance the town's economic prosperity and potential;

      e.   Supporting individuals and the community;

      f.   Securing an efficient, effective, value for money council;

      g.   Influence and partnership delivery.

Three Rivers District Council

2.3.3   Three Rivers stated objectives are:

      a.   We will work with partners to make the district a safer place;

      b.   We will provide a safe and healthy environment;

c.   We want to provide equal access to services and facilities for the public within the district and surrounding area and in particular address the needs of vulnerable residents such as elderly, disabled and young people;

d.   We want to maintain a high quality local environment and reduce the eco-footprint of the district;

e.   Customers – We will deliver our services to a standard that meet the needs and expectations of all of our customers;

f.   Governance – We will manage our resources to deliver our strategic priorities and service needs.

2.3.4   ICT clearly plays a large part in the successful delivery of these objectives as it underpins both the efficient management of internal services and resources, and directly enables a number of the requirements needed to meet the external objectives.

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3 Current Situation

3.1 Purpose of this section

3.1.1 In this section, the information which emerged from the Stakeholder interviews with senior staff and workshops with staff is presented and analysed to identify the key issues and common themes regarding the ICT systems in use and supported today.

3.2 Information Systems

3.2.1 Information systems overview

Applications

3.2.1.1 The information systems that are used by both of the Councils can be split into three categories, namely:

    a. desktop PCs, with standard desktop applications and network connectivity (including internet access). There is a mixture of thin and thick client used to provide applications on desktop PCs;

    b. applications which are provided to both Councils as a shared service;

    c. applications which are hosted centrally and used by an individual Council. These could be supported by the ICT team or one of the Council client services.

3.2.1.2 The business applications in use by WBC are identified as:

    a. AKS e-Genda committee application;

    b. Anite document management system;

    c. APLAWS content management system;

    d. BACS electronic money transfer;

    e. AtriumProperty asset management;

    f. Ebase Eforms online forms;

    g. Weberos and Halarose elections and electoral roll systems;;

    h. JAAMA fleet management system;

    i. Lagan CRM systsm;

    j. Limehouse planning application;

    k. Macfarlane telephony system;

    l. OMS legal costing system;

    m. Radius cash receipting system;

    n. Snap questionnaire application;

o.   Gauge job evaluation application.

3.2.1.3   The business applications in use by TRDC are identified as:

a.   Albany BACS electronic money transfer;

b.   Capita housing for garage management;

c.   Capita REMIT income management;

d.   Express elections and electoral role system;

e.   EShopworks content management;

f.   Proactive CRM system;

g.   M3 EHL environmental health;

h.   Solcase legal system.

i.   Bartec Waste Management

3.2.1.4   The business applications in use by both Councils are:

a.   ESRI GIS system;

b.   Public Access planning application;

c.   Site Improve website tool;

d.   Total Land Charges system;

e.   Uniform environmental, planning and building control system;

f.   OAK call management system;

g.   Modern.Gov E-Petitions.

3.2.1.5   The business applications provided as a shared service are:

a.   Capita Academy Revenues and Benefits;

b.   Cedar COA finance;

c.   In-Case fraud system;

d.   NorthgateArinso Payroll;

e.   ResourceLink;

f.   Touchpaper ICT helpdesk application.

3.2.1.6   There are also a small number of business applications in use that the Councils plan to decommission in the future. These are:

a.   Aptos – Finance system;

b.   Powersolve – Finance system;

c.   Civica – Revenes and Benefits system;

d.   CHRIS – HR system.

3.2.1.7   A number of these applications could be considered as business-critical in that the operation of the Councils would be seriously impacted if they were not available. These include the

Revenues & Benefits and Finance systems as they handle the Councils' financial records and transactions.

3.2.1.8 The majority of the applications are Windows-based, with a number running on UNIX at Three Rivers.

3.2.1.9 The applications used by WBC and the shared service applications are all delivered using thin client technology, which is based at WBC. This means that the applications effectively run on the server rather than the PC and thus transfer the majority of the system resource requirements needed to run the applications back to the server. This allows the desktop PCs to be a lower specification (and hence extends the hardware refresh cycle) and makes application support and maintenance easier as the applications are all installed in one place. However, it does require the servers and network to be of sufficiently high specification to deliver the applications successfully and effectively. As the number of users grows, the server capacity must be increased to handle the additional workload. Over loaded servers or a poorly performing network will result in users experiencing delays and sluggish response. If taken to the extreme users would not be able to log on to their accounts. Maintaining sufficient network and server capacity is critical to thin client architectures.

3.2.1.10 The applications used by TRDC (non shared services) are delivered using traditional thick client technology. Thick client allows the equipment provided to the users to be tailored to meet their individual computing needs. More powerful equipment can be provided to power users in terms of either graphics processing or number crunching. This flexibility increases the complexity associated with managing the IT assets and software builds. The increased complexity in the IT real estate requires additional staff and funding.

3.2.1.11 Currently, the majority of the applications used by both Councils are managed and supported by the ICT team. A small number of applications e.g. Three Rivers Uniform are supported on a day to day basis by staff within the business areas rather than the ICT team. ICT provide regular additional support when required. There are also some applications hosted by external suppliers e.g. Atrium Property Asset Management, E-Petitions.

3.2.1.12 There are plans to harmonise applications across the two councils in order to reduce duplication. A roadmap for this is currently being produced as part of the ICT service plan.

Data

3.2.1.13 The information types that the Councils use can be broadly described in two categories, business enabling data and public data. The business enabling data is all the data which supports the function of the business of the Councils and includes finance, payroll, HR, certain websites and payment systems. The public data is the data which is held about members of the public, businesses or property and is needed to ensure that the Councils can provide their services. All data held needs to be handled in accordance with current legislation such as the personal data with regard to the Data Protection Act 1998, and the Councils are also Public Authorities for the purposes of the Freedom of Information Act 2000.

3.2.1.14 The Councils use a number of systems which hold personal data, including the Human Resources system (Staff data) and the CRM system (customer data), however at present each of these systems hold copies of the database of users, and there is no single authoritative source for data on either Council staff or the public.

3.3   **Information Technology**

3.3.1   **Information Technology overview**

3.3.1.1   Information Technology consists of the infrastructure that is used to support the provision of applications. This traditionally consists of desktop, server and network hardware, the operating systems that run those devices and the cabling / connections between them.

3.3.1.2   The main Ethernet network used by the Councils' connects Watford Town Hall, Three Rivers House, Apsley and a number of other Council buildings. The network currently has sufficient bandwidth and performance to meet user requirements and can support Quality of Service (QoS).

3.3.1.3   The external network (WAN) includes a mixture of physical and wireless links as described in Figure 3.1 below.
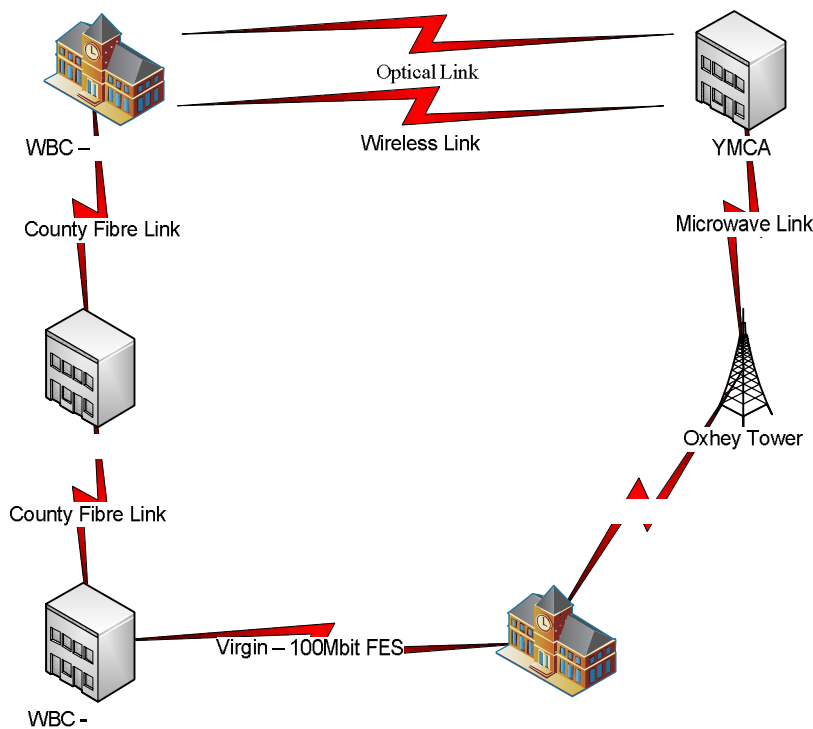
Figure 3.1: WBC and TRDC WAN connections

3.3.1.4   Provision is also made for wireless access to the network at a number of places in the Council building at Three Rivers.

3.3.1.5   There are three server rooms used by the Councils: dedicated rooms are in place at Watford Town Hall and Three Rivers House, and the Council makes use of the 3rd party data centre in Apsley for a number of the test servers and servers within the DMZ, until the Watford server room is relocated.

3.3.2   **Servers**

3.3.2.1   The Councils have approximately 150 servers in total, housed across the three server rooms. They are primarily small Windows-based servers which are either mid-cycle or reaching end of life.

3.3.2.2   Currently, the majority of WBC business application servers are provided and supported on the basis of dedicated servers per application.

3.3.2.3   The majority of TRDC business application are provided on single servers, with multiple applications per server.

3.3.3   Desktops

3.3.3.1   The Council mainly uses desktop PCs rather than laptops. There is no set or documented hardware refresh cycle for these, however the average age at replacement is approximately four years. There is a budget set aside for desktop hardware replacement, but it is not currently used and there are no clear plans to do so.

3.3.3.2   The provision of IT is underpinned by some generic Service Level Agreements (SLAs) for shared services and desktop services. The aim of these is to ensure that all client services and users get the same level of service for Desktop, and appropriate service levels for business applications.

3.4   Network configuration

3.4.1   AD structure

3.4.1.1   WBC and TRDC each have their own Active Directory (AD) Domains as well as new domains in the merged network. Work has started already to migrate WBC users and servers to the new domain. When this process is complete TRDC users and servers will be migrated in 2011. Figure 3.2 shows a summary of the AD domain design. Arrows denote the direction of trust between the different domains.
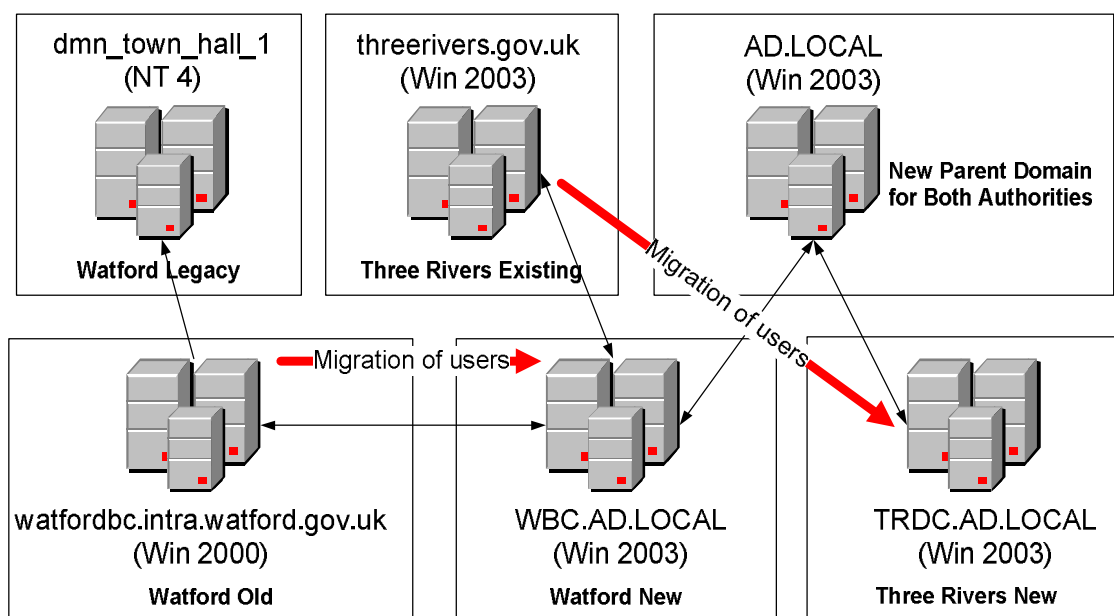

Figure 3.2: AD design for WBC and TRDC

3.4.2 Client Architectures

3.4.2.1 The desktop service used by each council prior to the creation of the shared services is different. Watford primarily provides desktop services using thin client architecture whilst Three Rivers utilize thick client.

WBC Thin Client Architecture

3.4.2.2 The Thin client architecture utilised by WBC provides the advantages of centralized management, commonality across desktops, ease of administration, remote access and reduced TCO. These advantages are offset against the need to provide high performance resilient servers and a network capable of supporting the required capacity. As the number of users grows, the server capacity must be increased to handle the additional workload. Over loaded servers or a poorly performing network will result in users experiencing delays and sluggish response. If taken to the extreme users would not be able to log on to their accounts. Maintaining sufficient network and server capacity is critical to thin client architectures.

TRDC Thick Client Architecture

3.4.2.3 The Thick client architecture used by TRDC allows the equipment provided to the users to be tailored to meet their individual computing needs. More powerful equipment can be provided to power users in terms of either graphics processing or number crunching. This flexibility increases the complexity associated with managing the IT assets and software builds, and also requires additional staff and funding, making the Total Cost of Ownership (TCO) of thick client solutions generally higher than thin-client.

3.4.3 WAN sites and connectivity

WBC

3.4.3.1 All WBC clients are situated at the Watford Town Hall premises. Servers are currently hosted at both Watford Town Hall and Apsley data centre (a data centre owned by Hertfordshire County Council). These servers host services on both the watfordbc.intra.watford.gov.uk (WATFORDBC) domain and the WBC.AD.LOCAL (WBC) domain. The intention is to move all servers currently in the Watford Town Hall server room over to Apsley as soon as a full DR Test has been completed.

TRDC

3.4.3.2 The primary TRDC network (servers and firewalls) is sited at Three Rivers House in Rickmansworth. A secondary Domain Controller (DC) is situated at the South Oxhey site. South Oxhey and Batchworth Depot are both remote sites which predominantly host clients. All these hosts and clients are on the threerivers.gov.uk (TRDCDOM1) domain

3.4.3.3 Shared services systems are hosted at the Watford Town Hall premises – Finance, Revs and Bens and Touchpaper (ICT) systems.

WAN connections and broadcasts

3.4.3.4 The different WBC and TRDC sites are connected using a variety of different methods (as shown in figure 3.1):

a. Hertfordshire County Council Fibre network;

b. Leased Line Fibre Links provided by Virgin;

c.   28 GHz Microwave links;

d.   Secure Wireless links;

e.   Optical (Infra-Red) links.

3.4.4   LAN separation and connectivity

3.4.4.1   Each different domain has its own subnet and IP address range. These are broadcast between the different sites, and connection is possible to all TRDC services from WBC sites and vice versa. Firewalls are configured at each of the sites to allow these broadcasts. Figure 3.3 summarises where the different LANs are situated and how they are separated.
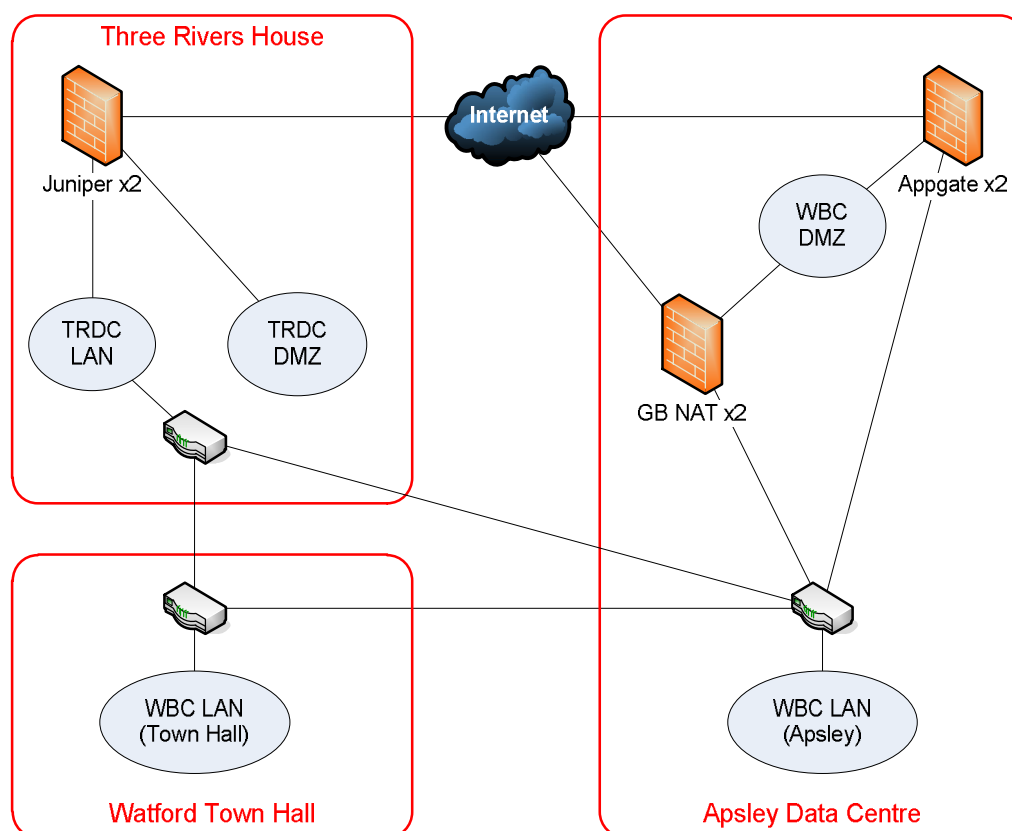
Figure 3.3: Basic interconnections between TRDC and WBC networks

3.5   Governance and Service Provision

3.5.1   Governance

3.5.1.1   The Councils' combined their IT governance as a result of the shared service initiative in 2009. An ICT strategy exists in the form of the ICT Service Plan. This is aligned to the strategic objectives of both Councils and is a detailed strategy that shows the costs and risks associated with the provision of ICT and details the projects and other improvements to be made over the strategy period.

3.5.1.2   ICT for both Councils is managed by a single Head of ICT who reports to the WBC Executive Director, and manages the IT teams that provide both the shared and the individual applications.

3.5.1.3   The ICT structure changed in Jan 2011 such that the Head of ICT has three direct reports, an Infrastructure manager, a Service Desk manager and a Business manager. The Infrastructure manager is responsible for the day to day running and management of the ICT services provided to both Councils and to the public. The Service Desk manager is responsible for dealing with queries and problems reported by users, and for directing problems to the appropriate teams as needed. Previously the service desk role was the responsibility of the IT/Contracts Manager, with a high level of support required from the Business Team. The ICT Business manager is responsible for maintaining business systems and relationships between ICT and the Council client services, as well as for the delivery of ICT projects.

3.5.1.4   Figure 3.4 below shows the new ICT structure:
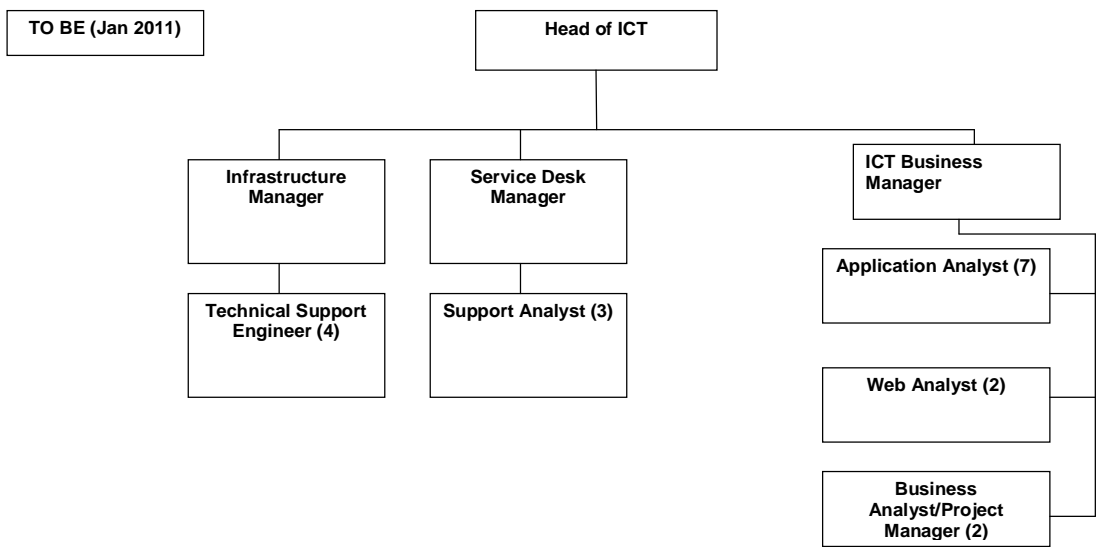
Figure 3.4: New ICT team structure

3.5.1.5   A client manager role was also in the original business case for the shared services. This would have placed two client managers – one at each Council – with responsibility for liaising with the business at all levels, setting expectations, advising the shared services on priorities and requirements from the client authorities. This would then have enabled the ICT service to make plans to provide the best possible support to the business. This role was deleted before implementation due to budget issues, with the responsibilities of the role absorbed by the s151 officers at each council.

3.5.1.6   Additionally, there is a shared services joint committee that is responsible for the delivery of all shared services to both Councils. The responsibility for the delivery of the ICT shared service is allocated to one of the WBC Directors.

3.5.1.7   Key decisions on ICT strategy, projects and budget are made by initially by the individual Council boards, and then by the Shared Services Management Team (SSMT) and/or the Joint Committee as needed. However, it is clear that there are numerous demands on the agenda for SSMT and Joint Committee meetings and that the time limitations do not always leave room for clear and detailed discussions on ICT matters such as project prioritisation. The impact of this is

that ICT does not always have clear guidance on priorities, or support in communicating messages to all Council services.

3.5.1.8 At present, the relationship between TRDC and WBC in regard to ICT services has the appearance of a traditional customer and supplier relationship, although this is was the intention when the shared services were created. The expectation in TRDC seems to be that the service they should receive from WBC is identical to that which was provided by Steria, albeit at a lower cost.

3.5.2 Service Provision

3.5.2.1 The ICT service is provided to both Councils by the ICT team that reports to the WBC Directors. This team is based in Three Rivers House and has recently been restructured to include three teams – the infrastructure team, the service desk and the business team.

3.5.2.2 ICT service provision and performance is regularly discussed with the Heads of Service from both Councils by the Head of ICT. There are plans to formalise arrangements for these meetings and to share the responsibility between the Head of ICT, the ICT business team manager and the ICT infrastructure manager.

3.5.2.3 The Head of ICT reports to Leadership Team, Corporate Resource and Governance group, Shared Services Management Team, Joint Committee and on occasion TRDC Management Board.

Infrastructure team

3.5.2.4 The infrastructure team is responsible for providing second and third line support for all Council ICT hardware and the majority of application systems. They are also responsible for implementing changes and all ongoing maintenance of the infrastructure. There are five staff in the infrastructure team, including the infrastructure manager.

3.5.2.5 The team has a rota to ensure that staff spend roughly equal amounts of time in both Watford Town Hall and Three Rivers House to gain physical access to the hardware as needed. They travel to Apsley when required to access the hardware there.

3.5.2.6 Team members in Three Rivers House also take service desk calls from users when required, to ensure that an acceptable service is provided. This can take up much of their time, particularly when there is an ongoing problem or incident.

Service desk

3.5.2.7 The service desk was only formed in Jan 2011 and is still in its infancy.

3.5.2.8 There is currently one service desk manager and three agents to handle first and second line support to all users across both Councils. These resources are added to through the ICT staff as needed, dependant on call volumes. This happens frequently, particularly when any service desk agents are away on holiday or sick.

3.5.2.9 The aim of the service desk is to log calls from users to do with ICT problems, and either to fix them (in the case of simpler queries such as password resets) or to pass them on to the appropriate staff within the infrastructure or business teams to progress with the problem and find a fix.

Business team

3.5.2.10   The business team is responsible for maintaining and developing the business applications that are supported by ICT, relationships with the Councils' business areas and for managing ICT projects, or the ICT element of other projects.

3.5.2.11   The business team work with the Council heads of service and business areas as needed for projects, the function tends to react to business demand rather than be proactive with ICT opportunities to drive business change.

3.5.2.12   Members of the business team also have to take on some service desk responsibilities when required, which impacts resources.

3.5.2.13   There are 12 staff in the ICT business team, including the ICT business manager.

Tools and processes

3.5.2.14   The tools used by the ICT team include:

    a.   service desk software to manage calls from users;

    b.   remote access software to manage servers remotely;

    c.   office automation tools as needed, such as Word, Excel and Powerpoint.

3.5.2.15   A number of the ICT team members have received ITIL foundation training, and there are plans to provide further ITIL training to ensure that the ICT team has sufficient knowledge to implement and manage ITIL-based service delivery processes.

3.5.2.16   There are a small number of ICT service delivery processes currently in place, however there are plans to develop these processes through business process re-engineering following the completion of the ITIL training, and to roll these out to ICT staff via a number of workshops and change management sessions.

3.6   Security and information assurance

3.6.1   Security was not a key theme identified by the Stakeholders, who appear mostly concerned with being able to do 'business as usual'. However, the Councils have obligations under legislation such as the Data Protection Act 1998 to ensure that personal data is not compromised, for example from the finance, human resources or other administration systems.

3.6.2   The Council uses Windows Active Directory to authenticate all users to the desktop PC system and further systems use additional logins normally in the form of a username and password to access additional services. There is a desire for a move towards a single sign-on solution based on the Windows Active Directory credential.

3.6.3   At present the standard desktop PC provides users with a basic user account – whereby they cannot install software or modify the system or its settings. Administration can be done remotely by the service desk; however, certain categories of users felt that being only a normal user was restrictive to their business as usual. The account type can be changed in light of a business need, via a call to the help desk. It is noted that security best practice is that users should be enabled, by default, as normal users without administration privileges.

3.7   Costs

3.7.1   The current cost for delivering ICT services to Watford and Three Rivers Councils are as follows:

a.   Operating costs (revenue) are approximately £1.5m p/a. This is split approximately 60/40 between Watford and Three Rivers respectively. This has been reduced from approximately £1.8m from 2010/11 due to the in-sourcing of the Three Rivers IT service from Steria. The major portion of this cost (circa £1.1m) is for employees;

b.   There is a capital investment of £190K in 2010 to fund the new SAN implementation, of £30K p/a for hardware replacement for the shared services and £70k p/a for hardware replacement for WBC. A budget for hardware replacement for TRDC has been requested for 2011/12 onwards.

4 Risks and Issues identified

4.1 Purpose of this section

4.1.1 This section presents the risks to current service provision and the strategic issues identified during the information gathering stage. The methods and tools used to identify the risks to the current ICT infrastructure are detailed in Appendix C.

4.2 Current infrastructure risks and issues

4.2.1 Potential system risks

4.2.1.1 The infrastructure monitoring focussed on looking for a number of common problems with ICT infrastructure in both Councils. These were:

a. High CPU Utilisation - Prolonged high CPU usage will leave little capacity on the server to handle the multitude of competing tasks running on a modern system. This will result in an overall sluggish response for all applications and the inability to run further applications on a server. High CPU load for a prolonged period of time will also shorten the lifetime of the hardware.

b. Excessive Paging - The physical memory (RAM) installed on a system is a fixed resource. As the system is asked to do more it will supplement the RAM by utilise space on the HDD, this space is the Pagefile. As access to information on a HDD is many times slower than from RAM the CPU will spend time waiting for memory to be swapped between RAM and the HDD. A bottleneck of waiting processes will form as the CPU waits for the much slower memory to be read in/out of the Pagefile. As a result the

CPU load may not be high. The use of the Pagefile and the number of Page/Sec copied to and from the HDD are indicators of how much paging is occurring on a system. If insufficient RAM is made available to meet the needs of the system then the system will become increasingly unresponsive as it waits for the pages of memory to be read from the HDD. A balance must be struck between the memory provided installed in a system and the amount of work that system is expected to do.

c. Low Disk Space - The amount of free HDD space on any system is likely to decrease over time as more applications or data is added. This gradual change needs to be monitored to ensure that additional HDD space can be added or data removed before the HDD is full. Additional consideration needs to be given to the more dynamic users of disk space. Automated batch jobs may stall if there is insufficient room to write temporary files or logs. If the disk space on a computer becomes low or runs out this may cause the server to hang or even to crash.

d. High Network Usage - Saturation of the network card with traffic will cause a system to run slowly and user experience will also be debilitated. Automated backup processes often require the highest amount of network capacity; these must be managed and performed outside of peak user hours.

e. Poor Response Times - The time taken for a ping packet to make the roundtrip between a device and another. If a device is displaying a high response time it may indicate that it is overloaded, there is a problem in the network path or alternatively it has attributed a lower priority to ping packets. A high response time is indicative of network congestion and often occurs at aggregating switches.

4.2.2 Monitoring and analysis results

Classification

4.2.2.1 The data collected by the network monitoring tool was analysed and servers have been grouped into different categories (Red, Amber and Green) for four of the sensors recorded. Table 4.1 below defines these categories.

	Sensor Type			
	CPU Utilization	Memory Availability	Pagefile Usage	Disk Space
Red	> 90 %	0 – 5 %	> 15 %	0 – 15 %
Amber	50 -90 %	5 – 10 %	7.5 – 15 %	15 – 30 %
Green	< 50 %	> 10 %	< 7.5 %	> 30

Table 4.1: Classification for different sensors

4.2.2.2 Where activity on an individual server was identified as being either Amber or Red, this was noted as an issue that may need to be addressed.

4.2.2.3 Network traffic for all systems was well below the capacity of the network adapters, and was not deemed to be a risk for the servers. Peaks were observed during backup periods, no out of the ordinary activity was observed.

4.2.2.4 Servers that appear in more than one risk category are listed in bold.

4.2.2.5 **CPU Utilization**: Table 4.2 lists the servers in the red and amber risk categories for available memory.

Risk Category	Red	Amber
Server name	None	**trdclgdc02**

Table 4.2: TRDCDOM1 CPU risks

4.2.2.6 **Memory Available**: Table 4.3 lists the servers in the red and amber risk categories for available memory.

Risk Category	Red	Amber
Server name	None	ex01, trdclga12, trdclga7, **trdclgdc02**, trdclgios02

Table 4.3: TRDCDOM1 Memory risks

4.2.2.7 **Pagefile Usage**: Table 4.4 lists the servers in the red and amber risk categories for Pagefile usage. The average is given in brackets.

Risk Category	Red	Amber
Server name	**trdclga10** (49%), **trdcgldc01** (19%), **trdcgldc02** (36%), trdclgis02 (55%), trproxy (41%)	Ex01 (14%), trdclga14 (8%), trdclga7 (8%)

Table 4.4: TRDCDOM1 Pagefile Usage risks

4.2.2.8 **Disk Space**: Table 4.5 lists the servers in the red and amber risk categories for the combined disk space on each server.

Risk Category	Red	Amber
Server name	trdclgras1, trproxy	**trdclga10**, trdclga7, **trdclgdc01**

Table 4.5: TRDCDOM1 Disk space risks

WATFORDBC Domain

4.2.2.9 **Memory Available**: Table 4.6 lists the servers in the red and amber risk categories for available memory.

Risk Category	Red	Amber
Server name	PECUNIA, **TOULVDB01730**	EROLVAP02804, **frolvcn01717**, **TLCTEAP01725**

Table 4.6: WATFORDBC Memory risks

4.2.2.10 **Pagefile Usage**: Table 4.7 lists the servers in the red and amber risk categories for Pagefile usage. The average is given in brackets.

Risk Category	Red	Amber

Server name	gislvap01737 (1%), **INFLVFS01712** (30%), **TLCTEAP01725** (23%), **TOULVDB01730** (79%)	wbc02281 (10%)

Table 4.7: WATFORDBC Pagefile Usage risks

4.2.2.11 **CPU Utilization**: Table 4.8 lists the servers in the red and amber risk categories for available memory.

Risk Category	Red	Amber
Server name	None	ANILVSS02850, ANILVSS02850, CIVLVDB01727, **INFLVFS01712**, nightflight, **TOULVDB01730**

Table 4.8: WATFORDBC CPU risks

4.2.2.12 **Disk Space**: Table 4.9 lists the servers in the red and amber risk categories for the combined disk space on each server.

Risk Category	Red	Amber
Server name	**frolvcn01717**, frolvcn01718, FROLVAP01720	capsdb, frotedb02076, frotnap02073, idox, nightflight, sterculias, CIVLVDB01727, **INFLVFS01712**

Table 4.9: WATFORDBC Disk space risks

WBC Domain

4.2.2.13 **Memory Available**: Table 4.10 lists the servers in the red and amber risk categories for available memory.

Risk Category	Red	Amber
Server name	**EXCLUS01**	**rdp01**, **rdp02**, **rdp04**, **rdp06**, **rdp07**

Table 4.10: WBC Memory risks

4.2.2.14 **Pagefile Usage**: Table 4.11 lists the servers in the red and amber risk categories for Pagefile usage. The average is given in brackets.

Risk Category	Red	Amber
Server name	**EXCLUS01** (6%), **rdp01** (9%), **rdp02** (10%), **rdp04** (14%), rdp05 (13%), **rdp06** (9%), **rdp07** (10%)	None

Table 4.11: WBC Pagefile Usage risks

4.2.2.15 **CPU Utilization**: Table 4.12 lists the servers in the red and amber risk categories for available memory.

Risk Category	Red	Amber
Server name	ACADWBCLIVE	None

Table 4.12: WBC CPU risks

4.2.2.16 **Disk Space**: Table 4.13 lists the servers in the red and amber risk categories for disk space.

Risk Category	Red	Amber
Server name	touchapp	touchweb

Table 4.13: WBC Disk space risks

4.2.3 Summary of current ICT infrastructure issues

4.2.3.1 121 servers were monitored in a number of batches over a period of weeks to assess their current loading. The loading on servers varied considerably, and there are a number at or approaching the limits of their capacity. There are 15 servers noted that should be replaced or upgraded in the near future in order to prevent further issues occurring. These include all servers in bold above.

Three Rivers District Council

4.2.3.2 A total of 27 servers at TRDC were analyzed, of these:

    a. 1 has high CPU usage,

    b. 5 were low on memory;

    c. 5 were low on disk space;

    d. 8 exhibited excessive paging.

4.2.3.3 This suggests that, although performance seems to be meeting users' requirements at the moment, there may be problems in the near future if usage of the servers increases due to changes in demand (increase in users or data, changes to applications etc.)

Watford

4.2.3.4 The batch of WBC servers consisted of a total of 94 servers and includes the servers for the thin client. Of these:

    a. 7 exhibit high CPU usage;

    b. 11 were low on memory;

    c. 13 were low on disk space;

    d. 12 exhibited excessive paging.

4.2.3.5 This suggests that the RDP (thin client) servers are experiencing particular issues and that a number of other servers also have resource issues. It is possible that resolving the issues on the RDP servers will address the current poor user experience, however it is also possible that

resolving this will only move the performance bottleneck to a different batch of servers. This will need to be reviewed as part of any planned improvements.

Thin Client Servers

4.2.3.6 All of the Watford RDP servers (which are used to provide the thin client services) are paging excessively. This is due to insufficient memory to meet the current loading on each of the servers. As the number of users logged in to each server increases the server are forced to use disk space in lieu of memory, this is termed paging. Paging is a normal on all systems but when it is used excessively the responsiveness of the server will suffer. On initial investigation this problem was identified and the IT department installed additional memory. Unfortunately the currently installed operating system is unable to make use of the increased memory.

Remote Access

4.2.3.7 The user perception of the Appgate remote access solution used in Watford is very poor. This is likely to be a result of two factors – the configuration of the Appgate application and the thin client service. The thin client service issues described above affect remote users in the same way as local users. In addition, it is possible that the Appgate software is configured to download a large amount of data to remote hosts (i.e. users laptops) when a connection is made, and before the service can be used. This should be reviewed further.

4.2.3.8 It is understood that TRDC users have also noted that Nutilla remote access solution is poor, and that a number of those users have moved over to the Appgate solution. Those users are happy with the Appgate solution, which suggests that the problem noted by Watford users may be mainly due to the thin-client server issues.

4.2.3.9 For those utilizing the remote facilities outside of the core working hours a better experience should be had. Unfortunately due to the large volume of backup and replication traffic which flow across the network during the evening hours, the user experience is further blighted. User experience may be improved if the hours of large network traffic are notified to the users and if the backup and replication traffic can be delayed to later in the evening or routed through a different segment of the network infrastructure.

Network

4.2.3.10 Overall the network traffic on each site and between sites is low. The affect of burst traffic is difficult to assess without further analysis. There are 2 switches which have a poor response time and a number of ports which are recording high numbers of errors. The ICT team is aware of these issues.

Other issues identified

4.2.3.11 A number of other risks outside the ICT infrastructure have also been identified as a result of the information analysis. These are:

    a. The backup system hardware is not capable and fails regularly – this has recently resulted in the irretrievable loss of data for the Watford network;

    b. Air conditioning in the Watford Town hall server room is not stable leading to the requirement of temporary cooling solutions;

    c. All external web traffic from the TRDC domain is routed via the Watford ISP, this is a single point of failure for both networks.

4.3 **Key strategic issues**

4.3.1 **ICT Governance and management**

4.3.1.1 The key issues identified with the Councils current governance are:

4.3.1.2 **ICT strategy implementation**: The IT infrastructure across both Councils has suffered from a lack of strategic direction over the last five years. Neither Council has adhered to a clear strategy for the provision of IT services to its staff and to the public – projects to provide specific services have instead been undertaken on a piecemeal basis, driven mainly by the individual client services rather than as a corporate priority. Whilst many of these projects have been successful this has lead to a lack of consistency and co-ordination across the ICT services. Whilst a single ICT strategy does now exist for both councils, there is no clear evidence that that is being implemented or is driving business behaviour. This is likely to be a result of the current resource issues in IT and may indicate a lack of buy-in or focus by both Councils' senior management.

4.3.1.3 **Relationship between the Councils**: The current relationship for ICT services has WBC as the provider of all ICT and TRDC as a customer who has some steering input through the shared services joint committee. The recent history of TRDC having ICT provided as a managed service has left them expecting the same thing at a lower cost through the shared services / WBC ICT provision and it does not appear that enough ownership for ICT improvement has been taken or allocated to the TRDC directors. This uneasy relationship is likely to be a barrier for making improvements to ICT, and also means that TRDC are unaware of the current issues with the ICT infrastructure and hence are unable to properly plan or budget for the required changes.

4.3.1.4 **Nature of relationship between business and IT teams**: There is currently no clear process for managing the relationship between the ICT teams and the client services within the Councils. This relationship should exist to provide information to the client services on the ICT services that they currently use, including their performance, issues potential changes or upgrades and how they could be made better use of. The relationship should also be used to make sure that ICT have a good understanding of the client services aims and objectives and can advise on how ICT can be used to help achieve these cost-effectively and efficiently. Currently, ICT solutions tend to be driven and led by business areas rather than ICT which leads to increased cost and support complexity through a lack of coordination and cohesion across the Councils.

4.3.1.5 Currently a relationship does exist, but at a basic level and thus not able to provide a high level of advice and guidance to client services at the right time. Client services therefore tend to make their own decisions on ICT requirements, priorities and budgets and look to ICT to support and deliver these rather than to provide a cross-council service. Improving these relationships would help to cement the idea of ICT as a partner rather than a supplier, and would ensure that ICT changes and projects could be viewed at a Council level rather than a business unit level, helping to reduce costs and improve services.

4.3.2 **ICT delivery**

4.3.2.1 The key strategic issues identified with the Councils' current ICT provision are:

4.3.2.2 **Lack of documentation**: There is a critical lack of documentation about the IT infrastructure from both Councils. The result of a poor handover of the Steria contract for TRDC and a lack of processes and high staff turnover in the WBC IT team has resulted in there being very little

information available on the topology of the network, on the setup and configuration of the servers, on server warranties and on the deployment and configuration of the applications. This is leading to a number of support issues in addition to making it more difficult to implement minor and strategic improvements to the ICT infrastructure as there is no baseline to track these against.

4.3.2.3   **Lack of clear processes**: There are few clear, documented processes for much of the daily ICT delivery activities such as incident, problem and change management, configuration management, service desk scripts, service level management, service transition and relationship management. Whilst a lack of documented processes does not mean that these do not happen, there is a lack of consistency and much of the work is reactive rather than pro-active. An example of this is that there is no clear process for managing calls between ICT staff, or for communicating progress to users. Consequently, users often feel that their problem is not being addressed, and then call the service desk again resulting in increased call volumes.

4.3.2.4   This lack of processes allows staff to deal with many of the requirements and calls quickly as they can choose the most appropriate and quickest path for each individual activity, but this happens at the expense of traceability, learning and communication. The impact of this issue is that different actions are taken depending on which ICT staff member is dealing with a query or problem, there is no clear audit trail or management reporting and the risk to the ICT services is increased as issues and problems are not being consistently tracked or reviewed.

4.3.2.5   **Lack of resource**: There is currently a lack of ICT resources, particularly for answering calls from users and for implementing ICT projects and change in response to business area requests.

4.3.2.6   It is clear that the steady-state volume of calls (an average of 50 calls per day in total) to the service desk is manageable by the four service desk staff (including service desk manager). However the current condition of the ICT infrastructure and network results in a large number of problems and incidents which lead to an influx of calls to the service desk that are often far more than the four service desk staff are able to cope with. This results in other members of the ICT team being asked to cover calls and hence stopping the work that they are doing. The net result of this is that ICT changes, fault fixes and projects can take much longer than originally anticipated due to the lack of focus that results from resources continually moving between roles. It also results in a reduction in customer service as the temporary service desk staff are unlikely to understand service desk processes and may not have the knowledge needed to deal with the call effectively.

4.3.2.7   This situation has also resulted in users calling particular ICT staff directly rather than calling the service desk, as this tends to lead to a quicker solution. The impact of this is that those staff that are called end up being very busy and often unable to deal with calls routed through the service desk and can lead to a lack of knowledge sharing between ICT staff as new problems and fixes are not communicated effectively. This can also lead to a lack of management information about user activity as these calls may not be logged.

4.3.2.8   This lack of resources also makes it difficult for the ICT teams to respond to all requirements from the different business areas, particularly as there is no clear governance to manage and prioritise ICT projects and to ensure that there is no duplication of requirements or effort.

4.3.2.9   **Low understanding of infrastructure**: The lack of documentation and legacy issues detailed above has led to a situation where the Council ICT team does not have a complete understanding of the infrastructure, including the age and supportability of the hardware. There is also a very variable level of knowledge on the infrastructure and applications within the ICT

teams. This has many impacts on users, including higher risk of changes, lower levels of support and more difficulty in implementing new or updated services.

4.3.2.10 **Lack of ICT staff knowledge**: The Councils current ICT staff suffer from a lack of knowledge about the ICT systems and infrastructure. There are two reasons for this: one is that the legacy nature of the IT and the lack of handover from the Steria TRDC contract has left a knowledge gap and the other is that there is currently no process or mechanism for sharing knowledge within the ICT infrastructure team. This means that there are 'pockets' of knowledge where one individual understands how a particular server or piece of network hardware is set up but this is not documented or shared with any of the other team members. Where there is a lack of knowledge due to the legacy nature of the systems, no resource has been made available to review the infrastructure and fill in the knowledge gaps so this currently happens only if that element of the ICT infrastructure is affected by an issue. The impact of this is that ICT issues take much longer to address then they should, and that the ICT risk is considerably higher than needed due to the lack of distributed knowledge. If the correct person is not available then a problem is unlikely to get fixed.

4.3.2.11 This problem is compounded by the current lack of team activities. The ICT infrastructure and service desk teams have irregular team meetings and have very few opportunities to share knowledge and ideas with each other outside of immediate problems or business projects.

4.3.2.12 **Little or no monitoring**: The IT infrastructure and applications hosted on it have very low levels of monitoring. There are no applications used by the ICT team to view statistics on the usage levels of the servers (including CPU use, memory use etc.) and there are no applications that monitor the ongoing usage and performance of the individual services in use by Council staff and the public. There is a tool available that monitors the network usage over the Councils data network, however this has only recently been put to use and is only a trial version of the tool and hence can only monitor a small portion of the network at any one time. The impacts of this are that potential problems are not identified until they impact users and that it can take longer to find and fix faults.

4.3.2.13 **Poor performance**: Users in WBC are currently suffering poor performance on the majority of their ICT services. This seems to be due to the use of thin client technologies, most likely due to the thin client servers being overloaded. This is impacting their efficiency as well as their ability to deal with customer queries. Users in TRDC do not report similar problems, however, with the exception of shared services, they are using thick clients. It is clear from detailed server monitoring that the servers hosting TRDC applications are running very close to their resource limits and are likely to start experiencing problems in the near future.

4.3.2.14 **Duplication of functionality between Council systems**: Both Councils have a number of IS applications in use in addition to the shared services. There is a large amount of duplication in these applications due to the separate purchasing done before the Councils agreed to the shared services strategy and current lack of ICT procurement governance, for example election systems, content management and CRM systems. This duplication leads to an increase in costs when viewed as a whole and is likely to hinder the Councils' exploring further efficiencies through shared service delivery.

4.3.2.15 **Low level of inter-operation or data sharing**: The piecemeal approach to IS application sourcing and implementation, and lack of consistent approach to IS architecture has meant that many of the Councils' applications are not currently able to communicate with each other or share data. This lack of integration means that Council staff often have to re-enter or duplicate data across systems, leading to inefficiency. It is also likely to impact on the quality of services delivered to the public, as staff are likely to find it difficult to find all information about an individual or family when that information is stored across multiple systems. This is also likely

to impact on the implementation of public self-service facilities as these are likely to require access to a complete set of information about any particular individual or family – this would be very difficult to provide at present.

4.3.2.16 **Redundancy levels**: The level of redundancy on many of the Councils' systems is low, leading to a high risk and a number of recent incidents. Many of the systems do not have a high level of redundancy as a result of the high usage levels and low level of hardware specification. Where this is not an issue the low level of documentation and technical knowledge often means that the potential redundancy is not best used or correctly enabled. Additionally, the WAN infrastructure is overcomplicated with many points of failure that further impact the overall redundancy of the infrastructure.

4.3.2.17 **Training**: There is a lack of training for both users and ICT staff currently. Both of these can be put down to the current resource problems in the ICT team: there is little time for ICT staff to take extra time off for training courses and there is no time for ICT staff to provide training for users or to create self-help facilities such as web-based guides for application use. This ultimately results in more problems for users and more calls to the ICT service desk because ICT staff are not able to address an ICT problem quickly, or because users call for help that could have been provided elsewhere.

4.3.2.18 **Software provision**: The levels of software provided to Council staff are often older versions. Whilst this does not have a particular impact for some applications such as accounting packages or CRM systems, other software such as web browsers is causing issues for users when newer releases are not implemented. For example: provision of an older web browser prevents Council staff from accessing some of the newer web services as the required functionality does not exist in the older version. This often prevents Council staff from being able to access the same services or information as members of the public, and hence they are not able to provide appropriate advice and guidance.

4.3.2.19 **Lack of self service**: There are very limited automated and self-service tools available to Council staff, members and the public in order to allow them to access ICT services easily or manage problems themselves. Outlook Web Access (OWA) is in place at TRDC and is currently being piloted at WBC to allow staff and members easier access to their council email. There are further tools that could be implemented to allow increased functionality for these stakeholders, including automated password resets, online forms and improved web search tools. The implementation of more self-service type applications will provide greater flexibility for staff, members and the public alike when interacting with Council systems and is likely to reduce ICT support costs.

4.3.3 Security and information insurance

4.3.3.1 The key issues identified with the current security and information assurance procedures are identified below.

4.3.3.2 **Data security**: The Councils, whilst aware of their legal obligations, do not have strong procedures in place to safeguard data. In particular, if the Councils wish to enhance home and remote working, then there is a need to ensure that sensitive data accessed remotely by employees and members is secure, both in transit and if used on a personal, non-Council, PC. The current VPN solution secures the channel used to access council systems and data but does not secure the end point. Similarly, Outlook Web Access (OWA) and personal email accounts that have Council email forwarded to them do not ensure that the device being used to access them is secure and hence any data accessed (and cached) is at risk.

4.3.3.3   There does seem to be a lack of understanding across most Council staff about the importance of data security and the potential implications of any breaches. This is particularly true when discussing restrictions around the use of portable data devices such as USB memory sticks.

4.3.3.4   **Personal computer use**: The use of personal PCs for business purposes should be reviewed with a view to stopping this practice, and suitable training and management processes need to be developed. The Councils have no control over the security of the PCs and the network they are attached to potentially enabling these PCs as an attack vector to Council data if they are not correctly patched or anti-virus software is not run. Additionally, the Councils need to carefully consider the licensing of software, as if home PCs are used, they may not have appropriately licensed software to undertake Council business. The security policy for off-site working needs to be carefully considered to ensure that the Councils' data is protected.

4.4   Summary of key strategic ICT Issues

4.4.1   The key issues detailed above can be summarised as the following:

a.   There is a lack of time for and focus on clear ICT governance at the highest level in both organisations;

b.   Client services tend to make ICT decisions in isolation rather than collaboratively with ICT and other client services;

c.   There are disparate IT systems across both Councils leading towards higher cost of ownership and lower integration opportunities. Additionally, business areas define solutions rather than requirements which leads to higher cost and poor support availability;

d.   There is a lack of an integrated approach to data and information which reduces efficiency and customer service;

e.   There is a lack of guiding architecture design and governance to ensure best fit of new or changes to technology leading to lack of interoperability along with longer lead times to implement;

f.   There is a lack of documentation on ICT infrastructure and IT management and support processes;

g.   Customers are unable to get all the information they require to run their lives effectively via a range of electronic medias;

h.   The current ICT systems do not support common working and processes which is a fundamental element of transforming the way the Council works;

i.   There is a lack of joined-up ICT procurement approach, leading to lower service levels and ability to deliver and support the objectives of the council through IT;

j.   There is a lack of flexibility in providing ICT solutions that meet the needs of staff, members and the public.

4.5   Key Strategic Requirements and Themes

4.5.1   Strategic requirements

4.5.1.1   In undertaking the analysis and understanding where the Councils are today with regards to ICT provision and then reviewing where the Councils need to be, a number of key requirements and strategic themes have been highlighted.

4.5.1.2 Key strategic requirements to the provision of ICT have been identified as:

    a.   Fitness for purpose;

    b.   Reliability;

    c.   Agility;

    d.   Flexibility;

    e.   Efficiency;

    f.   Security;

    g.   Cost effective.

4.5.2 Key Themes

4.5.2.1 A number of key strategic themes have been identified as a result of the information analysis. The strategic options and recommendations will be developed around these themes in order to make it clear what issues the individual recommendations will address.

4.5.2.2 The themes that have been identified are:

    a.   ICT Governance and Shared Services;

    b.   ICT Service Delivery;

    c.   IS Architecture Management;

    d.   Performance Management;

    e.   Flexible Working.

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5 Options analysis and recommendations

5.1 Purpose of this section

5.1.1 This section presents the recommendations for addressing the ICT infrastructure issues and develops the options and recommendations for an updated ICT strategy for Watford and Three Rivers Councils.

5.1.2 The recommendations made for addressing the current ICT infrastructure issues are a clear list of actions focussed on improving the users' experiences in Watford and on ensuring that the Three Rivers infrastructure does not start to present issues.

5.1.3 The strategic options and recommendations will be developed around the strategic themes identified in Section 4 in order to make it clear what issues the individual recommendations will address.

5.1.4 The strategic themes that have been identified are:

    a. ICT Governance and Shared Services;

    b. ICT Service Delivery;

    c. IS Architecture Management;

    d. Performance Management;

    e. Flexible Working.

5.1.5 The potential options for each theme are introduced, reviewed and finally recommendations are made to address the identified issues.

5.2 Current ICT Infrastructure

5.2.1 The recommendations for addressing the issues and risks identified with the current ICT infrastructure are as follows:

5.2.2 Improve the Watford thin client user experience by ensuring sufficient computing resources are available to provide a fast and reliable service to all users, including local and remote. This will involve:

    a. Upgrading RDP servers with a 64 bit operating system to enable them to make use of the recently installed RAM – the current operating system cannot make use of the additional RAM without making changes to the core software that will invalidate the support agreement;

    b. Obtaining definitive sessions-per-server scaling from the 3rd party provider to understand what the current capacity is supposed to be;

    c. Deploying additional or further upgraded (e.g. more memory and higher specification CPUs) RDP servers to ensure that enough hardware resources are available to provide services to the current number of users. The number of servers required can be calculated from the scaling information in the task above;

d.   Ensuring that there are identical server specifications across all RDP servers – this will ensure that the servers are supportable and allow load-balancing to make best use of the hardware available.

5.2.3   A further option to improve thin client performance may be to reduce the thin client requirements by deploying thick client solutions to some Watford staff. This should only be done as a last resort as it will further complicate the IT support arrangements and may only end up moving the ICT hardware resource issues on to different servers.

5.2.4   Address the servers at both WBC and TRDC that are currently operating near their limits by upgrading or replacing them as relevant. This will prevent any related problems or incidents occurring and enable server monitoring to be improved. It should be noted that once the identified issues with all of the servers have been addressed, further issues may come to light that are currently masked, particularly by the thin-client problems. Further investigations may be needed at that stage to identify the cause of these.

5.2.5   Conduct a full network infrastructure audit to allow the IT support staff to manage it appropriately, easily and quickly. This will involve:

a.   documenting and mapping the network, including all network hardware such as switches, routers and load balancers, its type, configuration, physical connections, firmware and IT services supported;

b.   documenting the configuration of all servers, and the applications that use them;

c.   documenting the suppliers of all infrastructure items, contact details and warranty information;

d.   documenting the support matrices for all ICT infrastructure;

e.   adding or updating labels to all ICT infrastructure hardware and cabling to allow quicker identification and resolution of issues.

5.2.6   Improve the system wide monitoring currently in use for both Councils to allow early identification of faults and issues by:

a.   Deploying a licensed hardware monitoring tool, such as PRTG Admin to provide in depth server metrics and warnings;

b.   Establishing a baseline for network and network equipment utilization – this will allow alerts to be automatically produced if utilisation peaks are experienced;

c.   Establishing a baseline for each individual server – again these will allow alerts to be generated if issues are likely to be experienced, potentially allowing problems to be averted. The baselines will require data covering an entire working cycle spanning a day, week and month;

d.   Set and monitor the alerts or alarms based on acceptable levels of equipment and network capacity utilization.

5.2.7   Improve the network reliability by:

a.   Ensuring that the SolarWinds network monitoring tool is used to confirm that switches and routers are operating correctly and issue alerts if issues are likely to be seen;

b.   Segmenting the network into separate pools of users accessing different resources. This will help to reduce the numbers of users impacted by any problems and will allow the IT support teams to address and resolve any issues much more quickly and easily;

c.	Identifying the IT hardware and services that make the most demands on the network (using the network monitoring tool) and ensuring that the network bandwidth available to them is as large as possible. This could be further addressed by providing replicated or duplicated resources across the network to provide more opportunities for applications and users to access data, and hence reducing delays.

5.2.8	Improve the remote user experience by:

a.	Ensuring that users requiring remote access are able to use an appropriate application. For example, users requiring access to email only (such as Council members) can make use of Outlook Web Access and do not need to use VPN applications. This will reduce the demands on the VPN applications and allow a faster, more appropriate service to be provided to all remote users.

b.	Ensuring that the capacity on the VPN concentrators is sufficient to meet the identified user needs;

c.	Reviewing the current backup, replication and other out of hours activities and ensuring that they do not clash with the most common remote user access times;

d.	Communicating with remote users to make them aware of the optimum times to access the system, particularly those that need to access the full set of applications over the VPN solution.

5.2.9	Define and document clear governance processes and procedures for the backup of systems and data. This will ensure that all information is routinely back-up as appropriate, that back-up processes do not clash and that support problems that impact or are caused by back-ups can be identified and managed.

5.2.10	Configure the (unused 8Mbit) Easynet ISP connection at TRDC to be used to create a failover internet access point to address the current single point of failure based on the access at Watford.

## 5.3	ICT Governance and Shared Services

### 5.3.1	Introduction

5.3.1.1	Both Councils clearly have a number of challenges ahead based on the spending cuts announced and increasing expectations of the public in terms of services delivered. Successful ICT governance will allow the Councils to make the best use of ICT in order to achieve their organisational objectives and meet these challenges. It has three components:

a.	What decisions need to be made?

b.	Who has decision and input rights?

c.	How are decisions formed and enacted?

5.3.1.2	Effective ICT governance will also:

a.	Ensure that all ICT investment priorities are aligned with the corporate priorities;

b.	Help the Councils make better and faster ICT-related decisions;

c.	Effectively manage risks;

d.	Build trust through transparency;

e.	Synchronise ICT with business strategy;

f.   Encourage desirable behaviours in the use of ICT and sharing of best practice;

g.   Increase the business value of ICT and lower total cost of ownership.

5.3.1.3   Given the central role of ICT within the organisation, it is critical that ICT participates fully within a wider organisational Governance structure to ensure 'joined-up' thinking and consistent decision-making right across the organisation.

5.3.1.4   A robust ICT governance structure will detail roles and responsibilities, and who inputs to and who makes different types of strategic and operational decisions relating to ICT. The governance framework also controls the prioritisation of ICT projects and investments. The governance framework should be owned by an individual and communicated to all stakeholders. All ICT decisions should go through that person, should be communicated in a timely manner and effectively followed through.

5.3.1.5   The likely benefits of having an ICT Governance framework are:

a.   Improved effectiveness: Ensures that 'good' decisions are made in acceptable timescales.

b.   Improved efficiency: Ensures that ICT expenditure and activities are strategically aligned, minimising wasted investments.

5.3.1.6   At present, the ICT governance for the Councils is mainly part of WBC, with TRDC acting as a customer for all of their services and providing some input to the SSMT and Joint Committee. However, as the these cover other services (e.g. HR) in addition to ICT the time available to discuss and plan ICT developments is minimal.

5.3.1.7   The development of ICT is being held back by the half-way house of the current Shared Service arrangement, and by the lack of a clear partnership arrangement between the two Councils. In addition to this, the current ICT service is not able to provide a sufficiently proactive ICT function that helps drive the business and fosters a partnership between ICT and business areas. Currently, ICT is very much seen as a (poorly performing) service rather than a valued partner by the business areas in both Councils. The key challenge for ICT governance is to elevate the status of ICT, improve the service being delivered and form a partnership with the business.

5.3.2   Governance Options

5.3.2.1   The governance options focus on how the two Councils work together to discuss and agree ICT policy, requirements and strategy. The options identified are:

a.   **Option 1a: No change**: WBC continues to manage IT with TRDC as customer and deliver some applications as shared services, moving towards application harmonisation.

b.   **Option 1b: Create an ICT steering group and accelerate delivery of all ICT as a shared service**: This option would involve speeding up the harmonisation of all ICT systems and the creation of an IT steering group with officers from both Councils, chaired by the Head of ICT.

5.3.3   Governance Discussion

Option 1a: No change

5.3.3.1   Making no change to the current ICT governance and shared services management would be likely to prevent ICT from moving away from the current position into being a functional and trusted partner to all business areas. The current governance does not allow IT to be managed as

a partnership with the clients services teams in WBC, struggles to drive the full involvement of TRDC and does not allow detailed discussions to be held to fully link and harmonise the ICT strategy with the business strategy and ensure that all directors are bought in to the value of ICT. This will not help the councils meet their strategic objectives, and for this reasons this option is discounted.

Option 1b: Create an ICT steering group and accelerate delivery of all ICT as a shared service

5.3.3.2 This option involves a closer engagement with TRDC for managing ICT services through setting up an ICT steering group to replace the ICT element of the shared services board and agreeing to the delivery of all Council IS requirements as a shared service.

5.3.3.3 The ICT steering group would be formed of senior representatives from both Councils and would be tasking with setting and agreeing the ICT strategy for both Councils, for setting and agreeing ICT budgets and for managing the direction of Council ICT services on a month-by-month basis. The steering group would also be responsible for prioritising projects and managing any conflicts between client services over the use of ICT resources. It should be chaired by the Head of ICT, and would report to the SSMT or Joint Committee.

5.3.3.4 The creation of this steering group would support the ICT element of the shared services boards, meaning that a clear focus would be given to ICT issues and plans for both Councils and providing a forum with the appropriate seniority and knowledge to make decisions and drive the implementation of these within both Councils. This steering group would also foster a closer working relationship (for ICT purposes) between the two Councils that would enable all ICT services to move more quickly towards harmonisation.

5.3.3.5 Removing the current duplication in IS across both Councils will allow for greater economies of scale, easier information sharing and will simplify the support requirements. The current plans for harmonising the seven duplicate systems are likely to be difficult and protracted to deliver because of the lack of governance and prioritisation. The implementation of clear governance is likely to enable the harmonisation roadmap to be delivered more quickly and thus the cost savings and efficiency benefits can be delivered sooner.

5.3.3.6 These benefits include ensuring that each Council receives the best system, better integration of systems through a reduction in complexity and the provision of a much greater scope for flexibility and continuous improvement, without negatively impacting the delivery of services to the public.

5.3.4 Governance recommendation

Recommendation

5.3.4.1 The recommended option for Governance and Shared Services is Option 1b: Create an ICT steering group and deliver all ICT as a shared service. This would require the Council to agree a Terms of Reference for the ICT steering group and its membership, and hold discussions to agree the split of responsibilities ICT responsibilities between the shared services boards and the ICT steering group. A sample Terms of Reference for this group is presented at Annex A.

5.3.4.2 This will then require the steering group to discuss and agree the roadmap for harmonising ICT systems and decommissioning old applications across both Councils. This will need to take into account current software contracts, hardware limitations, user licences and user training in order to agree migration plans for each duplicated system.

5.3.4.3 The implementation of a harmonised ICT environment is also likely to be contingent on improvements to the management of the ICT Architecture.

5.3.4.4 It is further recommended that the Councils review and update the communication and processes around IT and data security to ensure that all staff are aware of the requirements, of the potential impacts of security lapses and of the Councils' processes for managing IT and data security. This could include IT and data security training for all staff and implementing clear policies and guidelines for accessing and transferring Council data, particularly data on individuals. This should also cover the use of portable devices for storing and accessing data.

Benefits

5.3.4.5 This is likely to lead to an improved ICT service to both Councils and a reduction in complexity of the ICT systems which will improve support and reduce costs in the long term. It will also improve the understanding of ICT across directors in both Councils and provide a clearer path for providing ICT guidance and making strategic decisions that support the objectives of both Councils.

5.3.4.6 It is also likely to enable much easier integration with ICT services provided by other public sector organisations in the future, allowing expansion of the shared services concept and allowing the Council to take advantage of government ICT initiatives such as G-cloud as they become available.

Costs

5.3.4.7 The cost of running an ICT steering group in addition to the shared services joint committee is likely to be minimal. Some external costs may be required to support the implementation of the ICT steering group, however these are unlikely to be more than £5k. A time commitment from those on the steering group will also be required.

5.3.4.8 The cost of harmonising the ICT systems is already being calculated by the Council ICT team as a result of the roadmap development. Our experience suggests that the costs for this are likely to be split between the cost of resources to manage the project and the cost of any additional licences or hardware required to add additional users to a current system, however this cost is likely to be offset by a reduction in costs due to the decommissioning of current ICT systems that are not to be shared. It is expected that the resource requirement for this project will be 1.5 person-years, on the basis that the harmonisation is achieved using existing applications rather than selecting and implementing new ones.

Timescales

5.3.4.9 The likely timescale for implementation of an ICT steering group is three to six months to agree the Terms of Reference and transfer responsibility. The harmonisation of all ICT systems is likely to take longer, it is anticipated that this will take between one and three years to fully harmonise all ICT between the two Councils, however the benefits will start to be delivered as soon as the first harmonised system is implemented. This is likely to take longer if an ICT steering group is not implemented.

5.4 **ICT Service Delivery**

5.4.1 **Introduction**

5.4.1.1 ICT Service Delivery covers the management of the ICT infrastructure and applications together with the relationship management of customers and users. The areas that this area normally includes are:

    a.   IT operations, including incident, problem and change management;

    b.   IT support teams;

    c.   IT service management;

    d.   IT service transition.

5.4.1.2 The main function of this area is to ensure that the IT services being delivered are fit for purpose and to maintain a relationship with users to ensure that the services will remain fit for purpose in the future.

5.4.1.3 A set of best practice guidance called the IT Infrastructure Library (ITIL), together with the ISO20000 accreditation exists for service delivery.

5.4.1.4 ITIL is a set of standards and recommended processes for IT Service Management used by the majority of global IT suppliers. It covers a broad scope of service elements and processes and includes guidance on roles and responsibilities as well as process flows and timescales.

5.4.1.5 The ITIL guidelines, and good service management in general, allow ICT to remain closely linked to the business that it supports in order to continue to deliver appropriate, well managed and cost effective services.

5.4.2 **ICT Service Delivery Options**

5.4.2.1 The ICT Service Delivery Options identified are:

    a.   **Option 2a: No change**: The ICT team continues to deliver ICT services with no clear, consistent processes to follow.

    b.   **Option 2b: Implement ITIL-based processes to cover all Service Delivery activities**: This option would review all of the current ICT delivery processes to identify gaps and implement new processes or update existing ones to provide a clear ICT delivery framework.

    c.   **Option 2c: Outsource all Service Delivery activities except service management**: This option would involve outsourcing the delivery of all ICT activities to a 3rd party except for the relationship management with the business areas. In this way the ICT team would be responsible for advising and directing the business on the use of ICT and would use a 3rd party to deliver the required services. These could be hosted on Council owned infrastructure or externally.

5.4.3 **ICT Service Delivery Discussion**

Option 2a: No change

5.4.3.1 The current ICT service delivery is not meeting the needs of the Council users in terms of performance, engagement, flexibility or response. This will not help the councils meet their strategic objectives, and for this reasons this option is discounted.

Option 2b: Implement ITIL-based processes to cover all Service Delivery activities

5.4.3.2   This option involves creating a clear framework under which the Council ICT services will be delivered. The framework will include all aspects of ICT service delivery such as:

a.   transitioning new services and major changes into the live environment;

b.   managing incidents, problems and service changes;

c.   asset and configuration management;

d.   managing service levels and availability;

e.   backup and disaster recovery;

f.   managing relationships with customers;

g.   service desk provision;

h.   continuous improvement;

i.   supplier management.

5.4.3.3   A project will be needed to implement this option. The framework will be created by documenting the roles and processes needed through discussions with the senior ICT management and Council directors, reviewing the current ICT processes and updating them where possible. Where processes cannot be updated or do not exist new ones will be created.

5.4.3.4   Once the documentation for this framework is agreed and signed off, the ICT teams (and business area staff where appropriate) will be trained in the new process and the service delivery will be transitioned on to the new framework in phases over a transition period. The phases will be based on the service priorities as agreed during the planning phase.

5.4.3.5   The project will also include regular, detailed communication to all Council staff and members, and will also focus on team building and cross training to ensure that the processes implemented can be used efficiently and effectively.

5.4.3.6   It is also recommended that this framework includes improved reporting, both to individual business areas and to the user community at large. This reporting would typically include service performance (including reports against existing SLA's), current service use, costs and improvement activities. It is anticipated that the ICT business management team will have sufficient resource to manage the improved and updated customer-management processes.

5.4.3.7   This option is likely to require a significant time investment from existing Council ICT staff, and will require commitment from the business areas to provide support to the ICT team during the transition. This option may also require external support to help generate the new framework and support its implementation.

Option 2c: Outsource all Service Delivery activities except service management

5.4.3.8   Outsourcing the delivery of all ICT services would enable the Council to focus its resources on core Council activities and allow specialist companies to provide the ICT services using best practice processes and with the economies of scale a large organisation can provide.

5.4.3.9   This option will require a procurement phase where the service delivery supplier is chosen, and a transition phase where the responsibility is transferred.

5.4.3.10   The Council ICT team would retain responsibility for engagement with the business areas, and for advising them on ICT use. The Council ICT team would also manage the relationship with the service provider and as such would still require a 'retained layer' which would consist of a number of the existing staff. However, it is anticipated that a number of the current ICT staff would need to be transferred to other jobs in the Council or transferred to the chosen 3rd party supplier under TUPE regulations if this option is selected.

5.4.4   ICT Service Delivery Recommendation

Recommendation

5.4.4.1   It is recommended that the Council initially adopt Option 2b: Implement ITIL-based process to cover all service delivery activities. This option is likely to deliver a similar service in terms of quality to the outsourcing approach, but will avoid any costs and other difficulties associated with role-guarantees, redundancy and TUPE. It will also ensure that the Council is well placed to take advantage of any of the government ICT initiatives such as G-cloud and the PSN without having to change contracts with a 3rd party.

5.4.4.2   The Council should review the implementation of this option after a suitable period of time to ensure that services have improved in line with expectations. If they have not, Option 2c: Outsource all Service Delivery activities except service management should be considered in order to ensure that the Councils' ICT services meet their requirements. The recommendation is that this is reviewed after up to 24 months.

5.4.4.3   Selecting this option will also see the Council develop its skills as an organisation capable of delivering best practice ICT services, and will therefore put it in a good position to offer ICT services to other public sector organisations in the future, as the public service ICT model moves further towards larger shared services.

Benefits

5.4.4.4   The anticipated benefits of implementing this recommendation are:

   a.   IT systems will be more stable, and problems can be addressed more quickly;

   b.   Issues with IT systems can be more easily resolved;

   c.   ICT staff have clearer responsibilities, which can also be communicated to client services;

   d.   ICT can be more easily provided to other organisations as a shared service.

Costs

5.4.4.5   The cost of implementing ITIL-based service delivery processes is likely to include costs associated with back-filling resources in the current ICT team and costs associated with the provision of external support.

5.4.4.6   The cost of providing additional resource in the ICT team is likely to be up to 1.5 person years at the current rate for a junior ICT engineer, approximately £60k including on-costs.

5.4.4.7   External support is likely to be needed for the development of the new processes, and their implementation. This is likely to require between 50 and 100 days consultancy which is £35k to £70k.

Timescales

5.4.4.8   The expectation is that the implementation of this option would require a minimum of two council staff to be trained to ITIL practitioner level. They would then develop the processes and lead the implementation of them. This is likely to take between six months and one year to implement, on the basis that these staff are committed on a ¾ time basis to ensure that they also stay current with the ICT systems.

5.5   IS Architecture Management

5.5.1   Introduction

5.5.1.1   An IS Architecture (or Technical Architecture) is a blueprint that shows how the organisation's different access channels, systems, business applications, platforms, services, tools and infrastructure components fit together. An Architecture would typically include:

        a.   A map of systems and business applications, and the interfaces that connect them;

        b.   Standards for technology platforms and tools;

        c.   A map of hardware infrastructure and data and voice network components;

        d.   A comprehensive data model, showing how data is defined and organised;

        e.   A unified framework in which new ICT developments and implementations are placed;

        f.   A list of applications in use across the various departments.

5.5.1.2   A good Technical Architecture helps ensure that all of these diverse pieces fit together effectively — both now, and in the future. It creates alignment between systems, data, and infrastructure. It provides a standard platform and tools to get new systems and capabilities up and running quickly. An excellent Architecture is scalable and flexible enough to adapt to the organisation's changing needs.

5.5.1.3   The organisation needs to understand its Technical Architecture and be capable of exercising a basic level of control over it. This is evidenced by up-to-date documentation of the Technical Architecture and the existence of risk management. Design principles, policies, standards and rules should be agreed and actively communicated to the organisation and suppliers.

5.5.1.4   The Head of ICT is traditionally responsible for setting the technology standards and defining the way that data is used and stored across the Councils. This section therefore addresses the framework and management of services. The likely benefits of improving these are:

        a.   Improved effectiveness: Risks within the Technical Architecture can be more easily managed.

        b.   Improved efficiency: A stable, well managed Technical Architecture supports improved productivity.

5.5.1.5   The Councils lack a coherent strategy for delivering business applications, and they have often developed in piecemeal fashions to suit the demands and requirements of individual client services, without due regard for the overall synergy of the Council IS requirements. Consequently, a number of key corporate applications do not work well together and there are a variety of different systems used for similar services (e.g. content management, election systems, CRM and document management), which leads to increased effort and cost requirements.

5.5.2 IS Architecture Options

5.5.2.1 The options for IS architecture are as follows:

5.5.2.2 **Option 3a: No change**: The IS architecture continues to cause issues for users;

5.5.2.3 **Option 3b: Audit infrastructure and implement a clear set of technology standards and a unified framework**: This option would involve creating a baseline for the ICT infrastructure and setting up a number of standards and guidelines to ensure it is used and managed appropriately;

5.5.2.4 **Option 3c: Audit infrastructure and outsource IS architecture provision**: This option involves creating a baseline for the infrastructure though conducting an audit, and then outsourcing it's provision and management.

5.5.3 IS Architecture Discussion

Option 3a: No change

5.5.3.1 The current IS architecture is silo based, where individual client services make use of individual applications, and come to ICT with solutions rather than requirements. This is true of both Councils, but seems to be more prevalent in TRDC. The different applications are not linked together and the lack of IS standards and control has led to a complicated IS architecture that is expensive to support and difficult to integrate in order to provide a clear picture of all services and data to staff, members and the public. Continuing in this fashion would lead to further increased costs and would not achieve the Councils' strategic objectives – this option is therefore discounted.

Option 3b: Audit infrastructure and implement a clear set of technology standards and a unified framework

5.5.3.2 This option involves conducting an initial audit of the entire Council ICT infrastructure to ensure that everything is documented and that the ICT support teams understand the topology of the network, the configuration of the infrastructure and the configuration of the individual hardware elements. It then involves the development of an overarching architecture for ICT that enables effective use of IT solutions across the Council based around some key principles to i) drive modular approach to development of business requirements ii) allows better re-use of systems on the estate iii) enables better integration of systems across the Council and iv) enables any new processes to be optimised. A design authority would need to be agreed – this could either be part of the governance committee or could be a separate authority reporting to the Head of ICT. The design authority would own the standards and guidelines associated with the overarching architecture and would have responsibility for resolving conflicts, agreeing variations to the standards and for developing new standards and integration plans and for providing advice to client services as needed. The aim of this work would be to move towards a "Service Orientated Architecture", an architecture that describes an entity (e.g. application or enterprise) as a set of interdependent services. SOA provides for reuse of existing services and the rapid deployment of new business capabilities based on existing assets.

Option 3c: Audit infrastructure and outsource IS architecture provision

5.5.3.3 This option also involves conducting a detailed audit of the current IS architecture.

5.5.3.4 It then involves outsourcing the provision of the IS architecture to a 3rd party company. This would require procuring the service required, implementing it, communicating any new process

information to users and ongoing management of the relationship with the 3rd party. This option would provide flexibility in the provision of services and potential cost savings commensurate with the economies of scale that a 3rd party is able to realise, that are unavailable to the council.

5.5.3.5   In this option the Council ICT team would still manage the relationship with the service provider and as such would still require a 'retained layer' which would consist of a number of the existing staff. However, it is anticipated that a number of the current ICT staff would again need to be transferred to other jobs in the Council or transferred to the chosen 3rd party supplier under TUPE regulations if this option is selected.

5.5.4   IS architecture recommendation

Recommendation

5.5.4.1   It is recommended that the Council initially adopt Option 3b: Audit infrastructure and implement a clear set of technology standards and a unified framework.

5.5.4.2   Additionally, it is recommended that the Councils should adopt the following approaches to ICT Architecture to reduce costs, improve the flexibility of service provision and to better support business processes:

    a.   Consolidate applications using the same technology: Continue to consolidate the operation of similar services which operate in different divisions to save maintenance and licensing costs, for example SQL databases and web content management;

    b.   Virtualise hardware: Continue the use of virtualised servers and cloud computing to reduce hardware requirements;

    c.   Support and guidance: Provide support and guidance, through the formal and informal information sharing mechanisms, relating to the best us of the architecture.

5.5.4.3   It is further recommended that the Council also review the implementation of this option after up to 24 months to ensure that it is meeting their requirements. If this is not the case, Option 3c: Audit infrastructure and outsource IS architecture provision should be considered to provide the efficient and effective IS architecture required by the Councils.

5.5.4.4   One of the main objectives for both Councils is to ensure that they can deal with the public in a number of different ways, and offer the public the opportunity to interact with the Council in the manner most convenient to them. Increasing the number of self service facilities available is therefore key to the Council strategy both for improving public service and for reducing operating costs and improving efficiency.

5.5.4.5   ICT plays a key role in delivering these services, both in providing the front-end functionality and by enabling Council processes to be improved to support increased self service.

5.5.4.6   At present, both Councils offer the public limited self service facilities online and on the telephone, allowing constituents to pay bills, review planning applications, buy tickets for events and make leisure centre bookings.

5.5.4.7   The Council strategies will require self service to evolve from providing transactional facilities to the provision of interactive services where constituents can easily find information, can apply for or change services and can review information held by the Council whenever (and potentially wherever) they like.

5.5.4.8   The provision of increased self service facilities will also enable the Councils to offer improved services to the public, such as visiting them at home to help with service queries or applications as they will no longer require direct access to Council systems to find the information needed to offer the right support.

Benefits

5.5.4.9   The anticipated benefits of implementing this recommendation are:

a.   An improved ICT service to divisions which is more flexible, responsive and better able to meet the differing needs of the divisions;

b.   A more efficient ICT service that makes better use of resources;

c.   An improved Management Information provision due to the centralisation of services, and hence knowledge;

d.   ICT systems which are more able to exploit current and new technologies through a co-ordinated approach;

e.   Easier systems management due to the increased knowledge about infrastructure and applications residing in the ICT team;

f.   Reduced cost of ICT provision through a more co-ordinated approach to development and delivery, reduced infrastructure costs and potentially reduced support costs.

Costs

5.5.4.10   The cost of implementing improved IS architecture management will include Council management time and is also likely to require independent support. The expectation is that three resources will be needed for approximately six months in order to put an architecture framework in place, to review and improve virtualization and to allow the common applications to share data. These resources could be internal resources who have spare capacity, external resources such as contractors or a mixture of the two. The cost of using external contractors only is likely to be around £150k. This does not include any costs for tools or hardware required.

Timescales

5.5.4.11   It is likely to take approximately three months to develop and agree a set of clear IS standards and between six months and one year to develop the Council applications to adhere to these standards.

5.6   Performance Management

5.6.1   Introduction

5.6.1.1   Performance management is about measuring how well ICT is delivered within the organisation. As a minimum, the scope of ICT must be defined and must be supported by performance measures and reporting.

5.6.1.2   Achieving excellence requires a cohesive and consistent ICT performance management framework which contributes to and supports the organisation's corporate performance management framework. An effective performance management framework will allow ICT to objectively evaluate its successes and failures and focus on continuous improvement in line with the holistic objectives of the organisation.

5.6.1.3   The likely benefits of improved performance management are:

   a.   Improved effectiveness: Risks within the Technical Architecture can be more easily managed.

   b.   Improved effectiveness: ICT services are of consistently high quality, resulting in high internal and external customer satisfaction.

5.6.1.4   At present there are a number of areas which could be improved, particularly with regard to reporting IT performance to the different client services and responding to their individual needs. These areas include proactive communication to staff around costs and performance, service management relationships with client services and providing further clarity around the different costs and options for hosting and delivering business applications.

5.6.2   Performance management options

5.6.2.1   The options for performance management are as follows:

   a.   **Option 4a: No change**: Continue to use generic SLAs for shared services and minimal SLAs elsewhere.

   b.   **Option 4b: Create individual SLAs at a Council level for all ICT services**: Create more detailed SLAs that have clear information about all services provided to each individual council.

   c.   **Option 4c: Create individual SLAs with all client services for all ICT services**: Create more detailed SLAs that have clear information about all services provided to each individual business area.

5.6.3   Performance Management discussion

Option 4a: No change

5.6.3.1   Currently there is a generic SLA for the ICT shared services provided to both Councils. This generic SLA covers many of the requirements of the individual client services, but does not allow for flexibility in server-provisioning to meet any differing requirements, such as service times, incident responses and service improvements.

5.6.3.2   The lack of flexibility is likely to be a barrier to achieving a number of the Councils aims, particularly those around cost reduction and improved business process support.

5.6.3.3   This option is discounted on the basis that it does not support the Councils strategic aims.

Option 4b: Create individual SLAs at a Council level for all ICT services

5.6.3.4   This option would involve creating SLAs between ICT and the client services at an individual council level rather than with the client services themselves. This would go some way towards addressing the current gap in communications, but would not drive more direct communication between individual business areas and the ICT team. It is felt that this communication is needed to help build a better understanding between the business and ICT, and hence this option is discounted.

Option 4c: Create individual SLAs with all client services for all ICT services

5.6.3.5   There is a desire from many business areas for the ICT team to have a greater understanding of their specific requirements and as a result to have a well-managed SLA for their specific ICT services as well as general Council ICT services. Improving customer understanding and the management of these individual SLAs could provide more flexibility for these client services around service hours, availability and incident management. The knowledge gained by the ICT team as a result of these improvements would also enable improved scheduling, may lead to reduced support costs and will support improvements in the IT architecture as detailed earlier in this report.

5.6.3.6   The implementation of this option would be likely to require updated service management, reporting and service operations processes to support the different requirements and to improve the communications with divisions.

5.6.3.7   This option is likely to lead to reduced costs of service provision and support, to lead to improved business processes through greater understanding between business and IT and will lead to more flexible and responsive services.

5.6.4   Performance Management recommendation

Recommendation

5.6.4.1   The recommended option for Performance Management is Option 4c: Create individual SLAs with all client services for all ICT services. This would mean that specific SLAs suited to the service being provided and the business unit's requirements, e.g. for reliability and support would be discussed regularly with the head of service staff to ensure quality of service and the provision of future capabilities. The implementation of this is likely to be dependent on the recently implemented IT restructure successfully bedding, the governance recommendations being successfully implemented as well as the implementation of the ITIL processes. This is therefore a medium term recommendation.

5.6.4.2   It is recommended that these SLAs also be implemented in line with ITIL V3 best practice as this will ensure internal processes are in line with the industry standard.

5.6.4.3   It is also noted that the ICT team has already undertaken Socitm benchmarking related to their service. It is recommended that the Head of ICT should continue this benchmarking and ensure this information is effectively and clearly disseminated to the user community.

Benefits

5.6.4.4   The anticipated benefits of implementing this recommendation are:

a.   An improved ICT service which is more efficient as delivers fit-for-purpose services to users and is more aware of their future requirements;

b.   A reduction in support costs based on improved understanding of customer requirements;

c.   Improved customer satisfaction based on more communication and better transparency of service delivery.

d.   ICT systems will be more closely aligned to business unit requirements;

e.   Costs will be more predictable, and the cost impact of ICT decisions easier to understand.

Costs

5.6.4.5 The cost of this option is based on the ICT resources needed to create the SLAs and discuss and agree these with the Heads of Service. The expectation is that approximately 1.5 days will be needed for this, per SLA. Therefore this option is likely to require about 25 days effort in total.

5.6.4.6 If this was resourced externally, using a contractor to write the draft SLAs before the ICT management team discussed them with the business the cost would be around £8-10k.

Timescales

5.6.4.7 The timescale for implementing this option is likely to be four to six months to review and implement updated SLAs for all services. However, it is expected that this recommendation will not be able to be implemented for 18 months while the previous recommendations are in progress.

5.7 Flexible working

5.7.1 Introduction

5.7.1.1 The Councils have a desire to support sustainability, and to improve the working ethos of their employees. One of the enablers of this desire is to facilitate home and mobile working, as this may lead to a more efficient utilisation of space within the Council offices and offer employees flexibility in their work life and greater ability to deliver services to the public at convenient locations for them, rather than just Council offices. At present there is a mechanism to support home working through the use of VPN technology, but this is not seen to meet the needs of all users, particularly those who only want access to email who see the current VPN system as cumbersome and slow. Outlook Web Access is being used by TRDC staff and being piloted at WBC but is not yet available to all WBC staff. There is also no specific requirement for Council applications to be mobile-working enabled, although many are now delivered through an internet browser and hence easier to deliver to use remotely.

5.7.2 Flexible Working Options

5.7.2.1 The options related to remote working are as follows:

a. **Option 5a**: No change: Continue to provide the Netilla VPN solution and Outlook Web Access at TRDC and continue to provide the Appgate VPN solution and pilot / rollout Outlook Web Access.

b. **Option 5b**: Adopt enabling technologies and review options to enable applications for remote working: Investigate the use of VoIP and Internet phone calls, linked into the council's telephony system to enable users to receive phone calls via the Internet at home, as if they were at their desk. Adopt further technologies to support access to council applications and databases from home and other remote locations, including opportunities to support access from mobile devices such as smart phones.

5.7.3 Flexible Working Discussions

Option 5a: No change

5.7.3.1 This option continues to give council staff the ability to access council systems remotely and sees the pilot of OWA through to completion and possible roll-out for WBC staff. This does not give council staff or members the flexibility that they require, and does not allow for applications to be accessed flexibly and via different devices. This option therefore does not meet the current and future needs of the council so is discounted.

Option 5b: Adopt enabling technologies and review options to enable applications for remote working

5.7.3.2 This option looks at providing increased functionality to staff, members and the public for accessing council systems when and where they need to, including support for different devices. The current access methods – VPN and OWA are kept and added to over time with technologies to extend the reach of the council telephone system using Voice over IP, to implement changes to applications to support different devices and operating systems such as iOS, Android and Windows mobile as they are made available by suppliers, and to continuously review requirements and opportunities for further improvements.

5.7.3.3 This would provide much improved functionality for all users, and would enable staff and members to work more efficiently.

5.7.3.4 These technologies would need to be linked to the council overall IS architecture as discussed earlier in this report, and their adoption would need to be discussed and reviewed through the technical design authority.

5.7.4 Flexible Working Recommendations

Recommendation

5.7.4.1 The recommendation is the councils adopt Option 5b: Adopt enabling technologies and review options to enable applications for remote working.

5.7.4.2 This will ensure that the council continues to provide flexibility for staff, members and the public around the use of IT systems and access to council information.

Benefits

5.7.4.3 The potential benefits of implementing this recommendation, based on users being able to access some or all of their key applications and files remotely, are:

    a.   Increased flexibility for users, and potentially increased productivity;

    b.   Potential office space savings based on hot-desking;

    c.   Improved services to the public based on improving response times and the ability to deliver services in remote locations, such as individual's homes.

Costs

5.7.4.4 The costs for implementing flexible working technology vary greatly depending on the capacity and security requirements identified. They are likely to include costs for central hardware, software and implementation as well as user training.

5.7.4.5   There may also be additional costs associated with providing hardware to users (e.g. laptops) and of providing broadband internet connections to staff homes, depending on the solution chosen.

Timescales

5.7.4.6   Timescales for implementation of flexible working solutions can also vary depending on the solution chosen. These could be from one month (to implement simple internet remote access) to nine months (to implement an updated application with provision for full mobile access through a multitude of devices).

5.8   Future considerations for ICT

5.8.1.1   ICT has to been seen as an enabler to deliver business efficiencies and as technology develops so any future procurement model needs to be flexible enough to allow new technology that will benefit Council operations to be considered. A number of innovative ideas currently being promoted in the UK Public Sector by the Cabinet Office, as discussed below.

G-Cloud

5.8.1.2   The main aim of the Government-Cloud (G-Cloud) is to provide applications and services which are hosted on and delivered from the internet or government networks (e.g. GSi, CJSX, GCSX, N3, etc) and accessed via a web browser. The development of the G-Cloud is one of the key initiatives of the UK Governments ICT Strategy. This service will be available to all 400 Councils and other Public Sector organisations in the UK.

5.8.1.3   This will lead to a programme of data centre rationalisation and consolidation that will deliver large cross-government economies of scale, meet environmental and sustainability targets and provide secure, resilient services. Aligned with development of the G-Cloud, this programme will reduce the number of data centres in use from the current many hundreds to provisionally between 10 and 12 highly resilient, secure data centres. Not only will this reduce cooling and power consumption by up to 75% on current infrastructure, it will also reduce IT infrastructure costs by up to £300 million per year.

5.8.1.4   Many organisations such as Microsoft, Citrix, VMware and Gartner have identified cloud computing as a delivery mechanism that offers lower up-front costs compared with on-premise products that IT teams must buy and support themselves.

5.8.1.5   The G-Cloud is a key enabler of savings as it provides a single access point for ICT services, applications and assets.

Software as a Service

5.8.1.6   With a tendency among a vast number of Public Sector bodies to use similar applications - for example payroll, human resources management and enterprise resource planning - the potential savings from delivering such applications via the cloud rather than building and supporting hundreds of separate versions are clear.

5.8.1.7   The idea is that a Government Applications Store (G-AS) is created to enable sharing and reuse of online business applications, services and components across the Public Sector. Rather than create bespoke solutions each time a requirement is identified, reuse will become the norm, with anticipated savings of over £500 million per year.

Open Source Software

5.8.1.8   Open Source software is software that is released for use without payment. Open Source Software is in widespread use, for example the Apache web server and Linux operating system. Open Source Software has less penetration into the office environment because of the need to retrain users and potential issues with interoperability with users of Microsoft Office products.

Public Sector Network

5.8.1.9   The Public Sector Network is a single holistic telecommunications infrastructure that will deliver converged voice and data communications. It is perceived that the Public Sector Network will deliver at least £500 million savings per year by 2014.

Desktop services

5.8.1.10   A new set of common designs for desktop services will be provided for use across the Public Sector. While all Public Sector bodies need to provide their staff with access to functions such as email, word processing, spreadsheets and internet browsing, historically each Public Sector organisation has separately specified, built and run its desktop service – creating additional cost and complexity. Instead, there will be a set of common desktop designs which conform to information assurance and sustainability requirements. All suppliers will be required to deliver common designs and shared services at the lowest price available. A £100 saving in operating cost per Public Sector desktop per year would yield an immediate saving of £400 million per year if all Public Sector bodies adopted best practice.

Bringing Innovation to the table

5.8.1.11   If an authority enters into any new ICT contract without the ability to refresh technology or break from the contract to join wider government initiatives that can clearly benefit the operations of the business then ultimately those legacy provisions will stifle the future development of the authority. It is therefore important to ensure that all future suppliers can update the authority on innovative ideas and that some type of benefit risk reward mechanism is in place to ensure that innovative technologies and ideas for business improvement are always considered.

6 Consolidated Strategy

6.1 Purpose of this section

6.1.1 This section presents the recommendations made against the individual strategic themes together as a complete strategy. It also includes details of the overall timeline, costs and potential benefits of adopting the strategy.

6.2 Recommendations and Next Steps

6.2.1 The recommendations made to improve the current provision of ICT to the Watford and Three Rivers Councils are:

6.2.2 **Recommendation 1: Address the current infrastructure risks and issues**: This will involve taking the following actions:

    a. Improve the Watford thin client user experience by ensuring sufficient computing resources are available to provide a fast and reliable service to all users, including local and remote. This will involve upgrading or replacing the current Watford RDP servers. This is likely to improve the thin-client experience but may highlight further issues with the infrastructure not currently apparent as the load shifts to other servers, such as application servers;

    b. Upgrade or replace the other Watford servers noted to be operating near their limits;

c.   Upgrade the TRDC servers which are currently operating near their limits in order to prevent any related problems or incidents;

d.   Conduct a full network infrastructure audit and address any issues identified to allow the IT support staff to manage the IT services appropriately, easily and quickly. This is needed to address the current severe lack of documentation and knowledge of the IT infrastructure.

e.   Improve the system wide monitoring currently in use for both Councils to allow early identification of faults and issues.

f.   Improve the remote user experience.

g.   Define and document clear governance processes and procedures for the backup of systems and data.

h.   Configure the (unused 8Mbit) Easynet ISP connection at TRDC to be used to create a failover internet access point.

6.2.3   The combined benefit of these actions will improve the user experience at Watford, will ensure users at TRDC continue to experience good ICT service provision and will allow the support teams to easily address future issues and to pro-actively improve the ICT services.

6.2.4   **Recommendation 2: Governance and shared services**: Create an ICT steering group (with responsibilities as defined in Appendix A) and continue to make progress towards delivery of all ICT applications as shared services. This will require the Councils to agree a Terms of Reference for the ICT steering group and its membership, and agree ICT responsibilities across the SSMT, Joint Committee and ICT steering group. The expectation is that the ICT steering group will be chaired by the Head of ICT and report to the Joint Committee or SSMT. One of the first actions of the steering group will be to discuss and agree the roadmap for harmonising ICT systems across both Councils. This will need to take into account current software contracts, hardware limitations, user licences and user training in order to agree migration plans for each duplicated system, and will also be dependent upon IT resource usage and availability. The benefits of this would include:

a.   The development of a closer ICT working relationship between the leadership teams of both Councils;

b.   Improved control over all aspects of ICT, including budgets, project delivery and alignment with Council strategy;

c.   Improved ability to deliver the benefits of ICT harmonisation, including:

1.   Reduced ICT costs including software licences and support;

2.   Reduced ICT costs through better management of ICT procurement;

3.   Improved ICT performance through reduced complexity;

4.   Improved ability to integrate or share ICT services with other organisations;

5.   Improved ICT flexibility and agility.

6.2.5   This recommendation may incur some external costs to support the implementation of the ICT steering group. These are not expected to be more that £5k. Given that the Councils are already planning to harmonise the ICT applications, no further internal or external costs associated with implementing this option are expected.

6.2.6   **Recommendation 3: ICT service delivery**: Implement ITIL-based process to cover all service delivery activities. This option is likely to deliver a similar service in terms of quality to the

outsourcing approach, but will avoid any costs and other difficulties associated with role-guarantees, redundancy and TUPE. It will also ensure that the Council is well placed to take advantage of any of the government ICT initiatives such as G-cloud and the PSN without having to change contracts with a 3rd party.

6.2.7   It is then recommended that the Council review the implementation of this option after up to 24 months to ensure that services have improved in line with expectations. If they have not, an outsourced delivery of ICT services should be considered in order to ensure that they continue to meet requirements.

6.2.8   A successful internal implementation would allow the Councils to develop their skills as an organisation capable of delivering best practice ICT services, and will therefore put it in a good position to offer ICT services to other public sector organisations in the future. Other benefits include:

a.   More stable IT systems;

b.   Quicker resolution of problems;

c.   Improved communications between ICT and client services.

6.2.9   The anticipated cost of this option includes ICT resource to develop and implement new processes and external support for this. The expected costs are £60k for internal resource and £50k for external support.

6.2.10   **Recommendation 4: IS Architecture**: Audit the ICT infrastructure and implement a clear set of technology standards and a unified architecture framework. This includes:

a.   Consolidation of applications using the same technology: Continue to consolidate the operation of similar services which operate in different divisions to save maintenance and licensing costs, for example SQL databases and web content management. This will include moving all users in both Councils to thin client over time to enable this consolidation;

b.   Virtualisation of hardware: Continue the use of virtualised servers and cloud computing to reduce hardware requirements;

c.   Support and guidance: Provide support and guidance, through the formal and informal information sharing mechanisms, relating to the best us of the architecture.

6.2.11   It is also recommended that the Councils review the implementation of this option after up to 24 months to ensure that it is meeting their requirements. If this is not the case, outsourcing of the IS architecture provision should also be considered.

6.2.12   The likely benefits of this include:

a.   Improvements to the ICT service flexibility and response to business requirements;

b.   Improvement in ICT efficiency;

c.   Improved Management Information on ICT use;

d.   Improved agility of ICT systems;

e.   Easier ICT systems management;

f.   Reduced ICT costs.

6.2.13   The implementation costs are expected to be approximately £150k to cover the provision of external contractors to implement these changes. Much of this could also be done internally if resource was made available.

6.2.14   **Recommendation 5: Performance management**: Create individual SLAs with all client services for all ICT services. This would mean that specific SLAs suited to the service being provided and the business unit's requirements, e.g. for reliability and support would be discussed regularly with the Heads of Service to ensure quality of service and the provision of future capabilities. These SLAs should be in line with ITIL V3 best practice as this will ensure internal processes are in line with the industry standard. In addition, the current benchmarking activities should continue and the results widely communicated.

6.2.15   The expected benefits of this are:

     a.   Improvements in the quality and business alignment of the ICT services;

     b.   Reduced support costs through closer alignment;

     c.   Improved customer satisfaction;

     d.   More predictable and controlled ICT costs.

6.2.16   It is expected that this will take approximately 25 days to deliver. If done externally the likely cost would be £10k.

6.2.17   **Recommendation 6: Flexible working**: Adopt enabling technologies and review options to enable applications for remote working. This will ensure that the council continues to provide flexibility for staff, members and the public around the use of IT systems and access to council information.

6.2.18   The expected benefits are:

     a.   Increased flexibility for users leading to increased efficiency;

     b.   Potential office space savings based on hot-desking;

     c.   Improved public services based on improved response times and the ability to deliver services at locations convenient to the customer.

6.2.19   Costs for these technologies are difficult to predict as they vary greatly depending on the exact functionality needed. The costs for central hardware, software, user devices and training would need to be included.

6.3   Mapping between recommendations and key issues

6.3.1   Table 6.1 below maps the recommendations made to the key issues summarised in Section 4.4.

Recommendation	Issues addressed
Recommendation 1: Address the current infrastructure risks and issues	• The current IT systems do not support common working • Lack of flexibility
Recommendation 2: Create an ICT steering group	• Lack of time for ICT governance • Client services make decisions in isolation • Disparate IT systems • Lack of IT architecture design and governance • Current systems do not support common

	working and processes
	• Lack of joined up ICT procurement
Recommendation 3: Implement ITIL based processes	• Client services make decisions in isolation
	• Lack of IT architecture design and governance
	• Lack of documentation
	• Lack of joined up ICT procurement
	• Lack of flexibility
Recommendation 4: Implement technology standards and an ICT architecture framework	• Disparate IT systems
	• Lack of integrated approach to data and information
	• Lack of IT architecture design and governance
	• Lack of documentation
	• Customers unable to get information needed
	• Current systems do not support common working and processes
	• Lack of flexibility
Recommendation 5: Create individual SLAs with Council departments	• Client services make decisions in isolation
	• Disparate IT systems
	• Lack of integrated approach to data and information
	• Lack of IT architecture design and governance
	• Lack of documentation
	• Current systems do not support common working and processes
	• Customers unable to get information needed
	• Lack of joined up ICT procurement
	• Lack of flexibility
Recommendation 6: Adopt additional enabling technologies	• Lack of flexibility

Table 6.1: Mapping between recommendations and key issues

6.4   Outsourcing

6.4.1   If the Councils review the implementation of these recommendations as described above and conclude that an outsourced approach is required, the following should be considered as the best approach:

    a.   The provision of IT infrastructure (including LAN) and common applications (e.g. Microsoft Office and thin client) should be provided by a single supplier;

    b.   The WAN network connectivity should all be provided by a single supplier;

    c.   A managed desktop service, including service desk, should be provided by a single supplier;

    d.   The Councils should have a retained ICT team with responsibility for:

        1.   Managing the relationship with ICT suppliers;

        2.   Managing the Councils' element of ICT projects and changes;

        3.   Supporting the business applications (e.g. Uniform);

4. Managing the relationship between ICT and client services, and advising on ICT strategy.

6.4.2 The minimum size of this retained team is likely to be eight staff, based on the current size of the team and a reduction in the number of business applications needing support.

6.5 Timeline

6.5.1 It is recommended that the tactical and strategic recommendations are implemented in parallel, beginning as soon as possible. This will ensure that the service to users is improved as quickly as possible, whilst also ensuring that once the service is improved a framework is in place to continue running the IT services effectively and to make improvements as needed. The time taken to implement these recommendations will also depend on the resources available to IT (i.e. whether a full complement of staff is recruited) and on the relative priority of these recommendations versus existing projects. These priorities will need to be set by the ICT steering group. Figure 6-1 below outlines the expected timeline for this implementation.
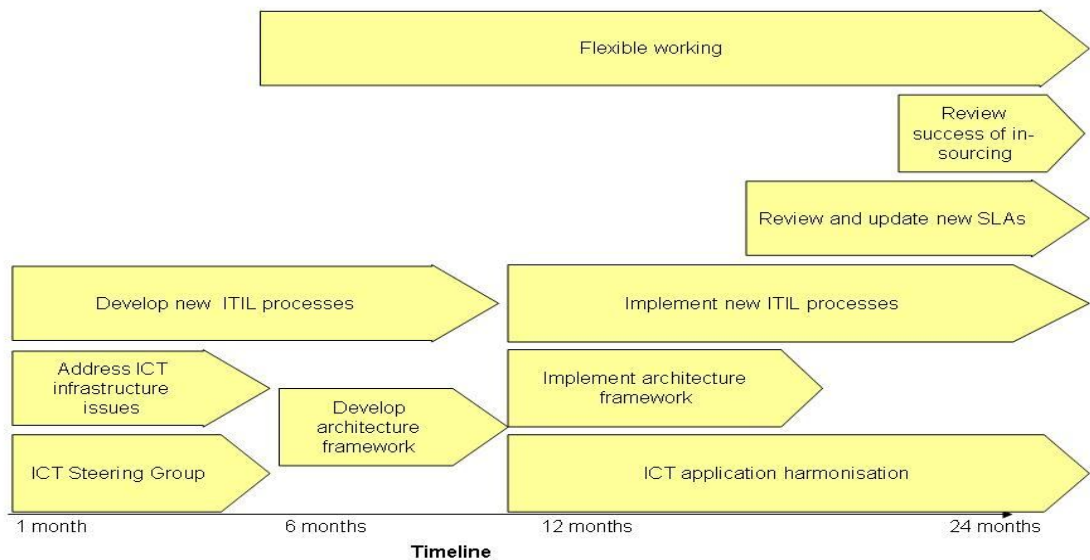
Figure 6-1: Strategy implementation timeline

6.6 Costs

6.6.1 The expected costs of implementing this strategy are listed in Table 6-2 below. These are all based on previous experience of implementing similar projects and include external resource costs.

Capital Costs	Ongoing Costs
£5k external support for ICT steering group	£40k for extra ICT resource to develop processes
£50k external support for new ICT processes	
£10k for updated SLAs	

£150k for IS architecture improvements	
Totals	
£225k over 1 to 2 years	£40k p/a for up to 2 years

Table 6-2: Strategy implementation costs

6.7 Benefits appraisal

6.7.1.1 This strategy document has identified the potential benefits of adopting the strategic recommendations. It is further recommended that the scope of the benefits be further quantified in order to develop a business case for the adoption of the strategy. A list of questions is presented below that will help to identify information that can be used to estimate the potential scale of any cost and time savings resulting from adoption of the strategy:

    a. How much time is currently spent by staff on work-arounds (e.g. finance spreadsheets, web payment management etc.)

    b. How much time is currently spent by management in finding and analysing Management Information?

    c. What were the aims, the project team size and the time taken for each project stage for the last 5 ICT projects across all divisions? Who was involved in the project teams?

    d. How much time is currently spent by ICT staff in responding to queries and requests for proactive support?

    e. What is the current total cost of external service provision and procurement?

    f. What are the current outage figures and the current cost to the business of services not meeting requirements?

    g. What are the opportunities for providing shared ICT services to other public sector organisations.

6.8 Risks

6.8.1.1 This section identifies the risks associated with non-implementation, and those associated with implementation of the proposed ICT strategy.

6.8.1.2 The risks associated with the Councils not implementing the strategy include:

    a. The Councils may not be able to meet their customers demands and expectations;

    b. The Councils may not be able to meet their long term business objectives;

    c. management information will be lacking in both quantity and quality which will be prejudicial to effective day to day management;

    d. the use of ICT resources will continue to be inefficient;

    e. The Councils will not benefit from new ICT developments;

    f. the level of success of the corporate plans will be significantly reduced;

    g. the need for the business to evolve into an organisation fit for the future will not be achieved.

6.8.1.3 The risks associated with implementation of the strategy include:

a. inability to motivate staff to the benefits;

b. staff resistance to change;

c. the new processes may appear too complex for all staff to deal with;

d. staff skills may not reflect the new procedures;

e. training may not be focused to meet staff needs.

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A Terms of Reference for the ICT Steering Group

A.1 The proposed Terms of Reference for the ICT Steering Group are as follows:

a. Information Systems

1. To review annually and recommend to the board(s) amendments to the ICT strategy.

2. To own and set standards, based on the strategic goals of the Councils, for the development of Council Information Systems.

3. To keep informed of current Information Systems developments and best practice, and regularly review the standards in (2) against these.

4. To review, in detail, all proposals to acquire or develop new systems to ensure that they meet the standards defined in (2) above to consider their impact on the current Information Systems and IT Operations and their expected cost and determine whether they should go ahead;

5. To review all proposals to acquire or develop enhancements to existing systems in excess of £10k or 20 days effort; to consider the impact of such proposed systems on the current Information Systems and IT Operations and their expected cost and determine whether they should go ahead;

6. To review any proposals for changes to the standards defined in (2) above made by the business areas to ensure that they are supportable within the Councils and meet the business area's requirements;

7. To ensure that the Councils make best use of their existing Information Systems and expertise by encouraging or requiring business areas to work together on new developments or enhancements.

8. To ensure the proper maintenance of the Corporate Systems Inventory.

9. To ensure the preparation of a staff development programme as outlined in the ICT strategy and regularly monitor its effectiveness.

b. IT Matters

1. To consider individual IT initiatives by institutes, departments or activities not covered by (3) above and to ensure their cost effectiveness and that they pose no threat to the reliable and secure operation of the IT facilities.

2. To approve and keep under review all council IT (information management) and web policies and procedures including: IT Infrastructure Security Policy; Software Policy; IT Project Approval Process; Approved Software List; Asset Management Procedure; IT Procurement Procedure; Standard Desktop Configuration; and PC Rollout.

c. IT Operations

1. To set standards, based on industry best practice and the requirements of both the councils' business areas and the public, for the management of the councils IT operations.

d. General matters

1.   Subject to the approval of the directors to establish sub-groups to carry out any of the functions listed above.

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B   Stakeholder meeting questionnaire

B.1   The questions asked during the stakeholder interviews are listed below.

a.   What are the key roles of your Division within the Council, including provision of internal or external services?

b.   What IT services do you use to support these roles?

c.   Who provides, manages and maintains your IT services?

d.   What is good about your current IT provision, including the network, applications, support and hardware?

e.   What would you like to be improved about your current IT provision?

f.   What happens when things go wrong?

g.   Do you have any service documentation or service levels agreements relating to your IT provision?

h.   How much does your current IT provision cost – including maintenance, servicing etc. (if known)?

i.   What would you like your current IT service to do or provide which it does not?

j.   What changes to IT facilities are required to support your division's business strategy?

k.   What requirements do you have for service continuity and Disaster Recovery around IT services? Do you currently have any processes in place for this?

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C   Data Collection

C.1   Introduction

C.1.1   This Appendix details the tools and methodology used for collecting the data on the current ICT infrastructure usage. It covers both the network data collection and the monitoring of the individual servers.

C.2   Tools used

C.2.1   PRTG Network Monitor

C.2.1.1   PRTG Network Monitor is an application which checks the availability and uptime of servers, computers, routers, switches, printers, etc., It can be used to monitors server load and performance and track bandwidth usage and network traffic. The application uses the Windows Management Interface (WMI) and Simple Network Management Protocol (SNMP) to collect information from a variety of devices. Detailed information about the health and performance of many different devices can be collected simultaneously and stored for later analysis and the evaluation of trends over time.

C.2.1.2   The PRTG application gathers information using a dedicated workstation with PRTG software installed on it. There is no requirement to install any client software on the devices being monitored. The PRTG workstation must be on the same network and PRTG Software must have the appropriate credentials configured for each of the devices being monitored.

C.2.1.3   The PRTG application was used to monitor and record the current performance and state characteristics of the servers used on the network. Only a Trial version of the PRTG Network Monitoring tool was installed to carry out the data capture for this period of analysis. Now that the licence has expired only a small number of devices can be monitored.

C.2.2   Orion Network Performance Monitor (Solar Winds)

C.2.2.1   The Orion Network Performance Monitoring application, produced by Solar Winds, monitors and analyzes real-time, in-depth, network performance statistics for routers, switches, wireless access points, servers, and any other SNMP-enabled devices. The application will periodically scan the network for changes and prompts administrators to monitor new devices. It supports drill down on a device-by-device basis and display of detailed system information on your network devices and servers. The Solar Winds application delivers alerts on real issues using advanced network alerting dependencies for correlated events, sustained conditions, and complex combinations of device states. The application is capable of monitoring a large number of devices and in addition to providing live information on current network metrics, will store historic information to allow the evaluation of trends and previous problems.

C.2.2.2   The Solar Winds application is installed on a server and like the PRTG application, does not require a client application to be installed on the devices being monitored. The application interfaces with AD to obtain the appropriate credentials required to communicate with the devices it needs to monitor.

C.2.2.3   The Orion Network Performance Monitor (Solar Winds) was used to monitor and record the current performance and state of the network equipment.

C.3   Server Monitoring

C.3.1   The PRTG application was used to gather a number of metrics covering the performance and status of the servers. Each metric is monitored using a software WMI 'sensor', on each device. The following types of WMI sensors were most commonly used to monitor the servers on the TRDC and WBC networks:

a.   CPU load (%): This sensor monitors the percentage of time that the processor is executing a non-idle thread. This is a primary indicator of processor activity. It is calculated by measuring the time that the processor spends executing the thread of the Idle process in each sample interval, and subtracting that value from 100 percent. High values may not necessarily be bad. However, if other processor-related counter are also increasing it may indicate a CPU bottlenecks.

b.   Memory Availability (%): This sensor monitors the amount of physical memory that is available to processes running on the computer. The Virtual Memory Manager continually adjusts the space used in physical memory (RAM) and on disk (HDD) to maintain a minimum amount of space for the operating system and processes.

c.   Pagefile Usage (%): This sensor monitors the amount pagefile used. The pagefile is virtual memory used by the computer. It is implemented using hard disk space for data that does not fit into physical memory (RAM). When a computer is using a lot of RAM for the operating system and its processes then the Memory Available will drop and there will generally be a corresponding increase in pagefile usage. Access to the pagefile is much slower than RAM and if users are remotely logged onto the machine then their desktop will become sluggish and intermittent.

d.   Page/Sec: High pagefile usage in itself is only an indicator of possible problems. The metrics monitored by the WMI sensors do not provide a definitive answer in many cases, but must be supplemented by other metrics to pinpoint or confirm a problem. The Page/Sec sensor records the rate at which pages of memory are written to, or read from, memory to satisfy hard page faults. Hard page faults occur when the data required by a process is no longer in memory (RAM) and needs to be read from disk (HDD). These kinds of faults cause system wide delays. High pagefile usage combined with high level of Page/Sec indicates a paging/lack of memory problem.

e.   Disk Free Space (%): This sensor monitors the available space on each of the hard disks used by the computer.

f.   Network Traffic (IN/OUT): This sensor monitors the traffic on the network adapter card. It determines the rate at which bytes are received/transmitted over each network adapter. The data is presented as Kilobits, Megabits or Gigabits per Second (Kbits/s, Mbit/s, Gbit/s). Network cards used by WBC and TRDC will have a capacity of 100 Mbit/s or 1 Gbit/s. Network cards are full duplex and can separately transmit and receive data at the specified capacity of the card. If there is saturation of the network interface then performance of the computer will be affected.

g.   Terminal Services: This sensor monitors the number of Terminal Services running on a server. Each terminal service corresponds to a single sessions (person logged in). In this case only the active sessions are being considered.

C.3.2   The following data items were collected from the servers every 1 minute:

a.   CPU load;

b.   Network traffic.

c.   Page/Sec.

d.   Terminal Services

C.3.3   The following data items were collected from the servers every 10 minutes:

a.   Memory availability;

b.   Pagefile usage;

c.   Disk free space.

C.4   Network Monitoring

C.4.1   Basic network monitoring was carried out using the PRTG application. This permitted the recording of network traffic in/out of each network card on a server. Further network monitoring was carried using the Solar Winds application. The Solar Winds application provides detailed statistics on network traffic for switches and routers. This provides a better overview of the overall network traffic flow, rather than a server centric view.

C.5   Data Collection

C.5.1   The following servers were monitored (grouped by domain):

a.   Watford Borough Council:

1.   **WATFORDBC** domain (47 servers):

aptlvdb01726	arclvap01722	arclvap01728	capsapp
capsdb	caxton	civlvdb01727	frolvap01720
frolvcn01717	frolvcn01718	froteap02075	frotedb02076
frotnap02073	gisvap01737	hersilias	idox
inflvap01723	inflvts02802	mssql2	mssql3
nightflight	pericles proxyserver		remus
romulus	sca02851	sterculias	tlcteap01725
tlcvap01731	ufiteap01724	ufitnap01733	virtualcentre
wbc02281	ANILVSS02850	APLLVWS0172	APTLVWS02212
CIVLVDB01727	EROLVAP02804	FROLVAP01720	GISLVAP01737
INFLVFS01712	INFLVWS01736	PECUNIA PLUTOS	
TLCLVAP01731	TLCTEAP01725	TOULVDB01730	UFILVAP01719

2.   **WBC** domain (32 servers):

anilvcs02849	argus	ictdocs1	plutostest
printlv02864	rdp01	rdp02	rdp03
rdp04	rdp05	rdp06	rdp07
rdptest2	touchapp	touchdbtouchweb	
watford_man1	wbcpak001	wdc1 wdc2	
wqem ACADWBCLIVE		ACADWBCTEST	CEDAPP
CEDDB CEDOCR		CEDTEST	EXCLUS01
EXCLUS02 EXHUB01		RDC1	RDC2

3.   **Watford DMZ** (2 servers):

martello   redoubt courier

b.   Three Rivers District Council:

1.   **TRDCDOM1** domain (25 servers and 2 XP workstations):

trdclga10	trdclga11	trdclga12	trdclga13
trdclga14	trdclga7	trdclgas01	trdclgas02
trdclgcn01	trdclgcn02	trdclgdc01	trdclgdc02
trdclgfs01	trdclgis02	trdclgps01	trdclgras1
trdclgts01	trdclgts01_2	trdclgts03	trdclgts04
trdclgts05	trdcsodc01	trdctlclive	trdctlctest
trdcxp350	trdcxp456	trproxy	

C.5.2   To monitor the main WAN connectivity links various different network switches were monitored on each domain.

D   Glossary

BT	British Telecom
ICT	Information & Communications Technology
IP	Internet Protocol
LAN	Local Area Network
Mbit/s	Megabits per second
OWA	Outlook Web Access
QoS	Quality of Service
SLA	Service Level Agreement
TCP/IP	Transmission Control Protocol / Internet Protocol
VoIP	Voice over IP
VPN	Virtual Private Network
WAN	Wide Area Network