

Platform Domain Roadmap

Technology Roadmaps

DOCUMENT CONTROL

Document Details

Document Owner	Tony Bright
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Current Version	1.1
Issue Date	25 th April 2008
Programme Reference	Enterprise Architecture
Project Reference	Enterprise Architecture Platform Domain

Revision History

DATE	VERSION	CHANGE DETAILS
10 th April 2008	1.0	Initial Version
25 th April 2008	1.1	Incorporate feedback

Distribution

DATE	VERSION	DISTRIBUTION
10 th April 2008	1.0	Tony Bright, Kaila Munaweera, Phil Burnham and Terry Pyle for initial review
25 th April 2008	1.1	Architecture Program Board

TABLE OF CONTENTS

1.0	Introduction.....	4
1.1	Objectives.....	4
2.0	Executive Summary	5
2.1	Optimising use of Resources.....	5
2.2	Potential for Outsourcing	6
3.0	Platform Domain Architecture Description	7
3.1	British Council's Enterprise Architecture Approach	7
3.2	Position of the Platform Domain within the overall British Council Enterprise Architecture.....	8
3.3	Capability Summary	8
4.0	Direction of Travel	9
4.1	Business changes impacting the Platform Domain	9
4.2	The current overseas architecture.....	10
4.3	Architectural and technical opportunities.....	10
4.3.1	Reducing the number of servers.....	11
4.3.2	Simplifying and Standardising the Desktop and Server Platform .	14
4.3.3	Moving the desktop to Thin Client	14
4.3.4	Web-hosted applications	14
4.3.5	Outsourcing	14
4.3.6	Leasing of spare resources	15
4.4	Overview of Change	15
5.0	Detailed Description	17
5.1	Logical Domain Models	17
5.1.1	Scenario A – Original Mapping	18
5.1.2	Scenario B – Maximising use of Thin Client	18
5.1.3	Scenario C – Simplistic 50/50 Split.....	20
5.1.4	Scenario D - Back Offices use Thin Client, Front Offices use Standard Virtualisation	22
5.1.5	Cost Assumptions.....	24
5.2	Physical Domain Models	27
6.0	Making it Happen	28
6.1	Technology Choices	28
6.2	Key Organisation Processes	28
6.3	Resources and Skills	28
6.4	Provision Assumptions	28
6.5	Milestones and Deadlines	28
6.6	Domain Strategic Roadmap	32
6.6.1	Step 1 – Server Reduction.....	32
6.6.2	Step 2 – Platform Simplification & Standardisation	32
6.6.3	Step 3 – Thin Client Desktop	32
6.6.4	Step 4 – Full Outsource	32
6.7	Domain Technical Roadmap	33

7.0	Appendix 1 – Principles Guiding the Platform Domain.....	34
7.1	Business Principles	34
7.2	Functional Principles	34
7.3	Technical Principles.....	34
7.4	Implementation Principles	34
7.5	Governance Principles	34
8.0	Appendix 2 – Platform Domain Standards	34
9.0	Appendix 3 – Key figures extracted from [Ref 8].....	35
10.0	Appendix 4 – References	36

TABLE OF FIGURES

Figure 1 - British Council Enterprise Architecture Approach.....	7
Figure 2 - British Council Enterprise Architecture domains.....	8
Figure 3 - Typical overseas office	10
Figure 4 - Current Back Office Server Architecture.....	11
Figure 5 - Virtualised vs. Consolidated Back Office Server Architecture	12
Figure 6 - Back Office Servers Consolidated into Single Site	13
Figure 7 - Enterprise Architecture Benefits Matrix	16
Figure 8 - Scenario 'A', showing original mapping of office type to technical option from Ref 2.....	18
Figure 9 - Scenario B, showing maximum use of Thin Client	19
Figure 10 - Scenario C (simplistic 50:50 split).....	21
Figure 11 - Scenario D, Back Offices use Thin Client, Front Offices use Standard Virtualisation.....	23
Figure 12 - Comparison of overall cost distributions	25
Figure 13 - BC vs. Outsourcing spend	25
Figure 14 - Outsourcing decision tree	30
Figure 15 - Platform Domain High-Level Architectural Roadmap	31
Figure 16- Platform Domain High-Level Strategic Roadmap	32
Figure 17- Platform Domain Low-Level Technology Roadmap	33

TABLE OF TABLES

Table 1 - Platform Domain Strategic Approaches.....	5
Table 2 - Summary of scenarios	24

1.0 Introduction

This document describes the target architecture roadmap for the Platform Domain.

1.1 Objectives

The objectives of this document are:

- To provide a summary of the roadmap for the Platform Domain
- To communicate an understanding of the Platform Domain target architecture to stakeholders at an appropriate level of detail
- To position the Platform Domain within the overall British Council enterprise architecture and describe the capabilities covered by this domain
- To describe how the business direction and technology opportunities have shaped the target domain architecture
- To explore the options available to British Council for this domain
- To identify the major deadlines and milestones for the delivery of the capabilities provided by this domain
- To identify at a high level the resources and skills required to implement the capabilities
- To describe the Platform Domain roadmap

2.0 Executive Summary

The British Council's enterprise architecture is currently organised into seven domains; data, applications, collaboration, platform, networks, system management and security. This document focuses on the platform domain.

While in practice the platform domain covers both the UK and overseas, the UK infrastructure is outsourced to LogicaCMG and therefore responsibility for the detailed architecture is not within scope and is not further considered in this document.

Thinking around the overseas platform domain within the British Council is significantly advanced, however there may be opportunities for optimising benefits even further.

2.1 Optimising use of Resources

The fundamental approach suggested here is based on optimising the use of resources and reducing the IT footprint in overseas locations. This approach can reduce the overall IT infrastructure and operational cost, while maintaining or improving the levels of service delivered to the business.

This approach also has the added benefit of optimising the overall carbon footprint because it makes the most efficient use of physical IT resources.

Based on current understanding, a strategy based on adopting the following approaches is suggested:

Priority	Initiative	When	Key Benefits
High	Reduce number of servers (outside UK) through consolidation, virtualisation and centralisation	By early 2009	<ul style="list-style-type: none"> • Reduced hardware costs • Reduced support cost (depends on mix of consolidation, virtualisation and centralisation) • Less space requirement • Reduced carbon footprint
Medium	Simplify and standardise the desktop and server configurations	By end 2009	<ul style="list-style-type: none"> • Reduced support costs • Reduced operational risk
Medium	Deploy thin client desktops	Pilot By early 2009 Deploy by end 2010	<ul style="list-style-type: none"> • Reduced hardware costs • Reduced support costs • Less space requirement • Reduced carbon footprint

Table 1 - Platform Domain Strategic Approaches

Each of the above approaches individually can help to increase efficiency, reduce IT costs and improve the quality of service delivered to the business. The maximum benefits will come from a combination of all three approaches.

Even greater benefits can be realised by combining the above approaches with elements from other domains, in particular the *Systems Management* domain. In some cases, developing the systems management capabilities will be a pre-requisite for achieving some of the approaches

described above.

Further work is required to develop detailed business cases for each of the above scenarios. The above approaches may create additional demands on the capacity and performance of the network services and may have specific service management prerequisites. Therefore, any business case must consider the impact on all architecture domains.

Until the strategic platform, roadmap described above has been agreed and the associated business cases signed off, there is limited work that can be done to develop the detailed technical roadmap.

2.2 Potential for Outsourcing

In the longer term, once the infrastructure has been optimised, there may be a case for outsourcing the overseas platform. However, careful analysis of the cost benefit will need to be made, especially as currently the cost of IT operational support overseas is relatively low. It may also be difficult to find an outsource partner with sufficient global reach.

The timing of projects to deliver these priority actions also significantly affects the outsourcing approach. Ideally, the Council should complete these activities well before the end of the current LogicaCMG contract for UK support. This would give a period in which to evaluate the real internal service costs of supporting the optimised overseas platform. That evidence could then be used to inform outsourcing and contracting decisions.

Should there be a delay in the Council implementing these platform changes (slippage, lack of funds or other BC priorities taking precedence), a simple and well informed “outsource or not” decision/business case may not be as possible. In that event, the Council may choose to:

- Continue to run the projects to optimise and consolidate the overseas platforms themselves in parallel to any new contract and then take the decision to outsource or not at a later date
- Require the main contractor to take a significant role in some or all of those optimisation projects
- Future proof their options by requiring the contractor to confirm that they have the capabilities to manage and support the infrastructure once optimised and price for it separately (even if the Council eventually decides not to outsource to them)

This suggests a significant “check point” on outsourcing scope and strategy at least two years prior to new contract date and then “updates” as the procurement process runs.

The above approaches are described in more detail in the following sections of this document.

3.0 Platform Domain Architecture Description

The Platform Domain contains the underlying server and desktop hardware, operating systems and basic end-user office applications that comprise the core of the British Council infrastructure. Microsoft-based, it is an evolving mix of both centralised and distributed facilities, with both outsourced and locally provided hosting and support strategies.

In the UK, support for servers and desktops is provided by LogicaCMG. This is provided as a service, and responsibility of architecting the service is believed to be that of the outsourcing provider.

Further analysis of the UK architecture is therefore not considered in this document. Support for the overseas platform (servers and desktops) is provided by the British Council, and this document focuses on that architecture.

3.1 British Council's Enterprise Architecture Approach

The Enterprise Architecture is a comprehensive framework used to manage and align an organization's business processes, Information Technology (IT), software, hardware and information requirements with the organisation's overall business strategy.

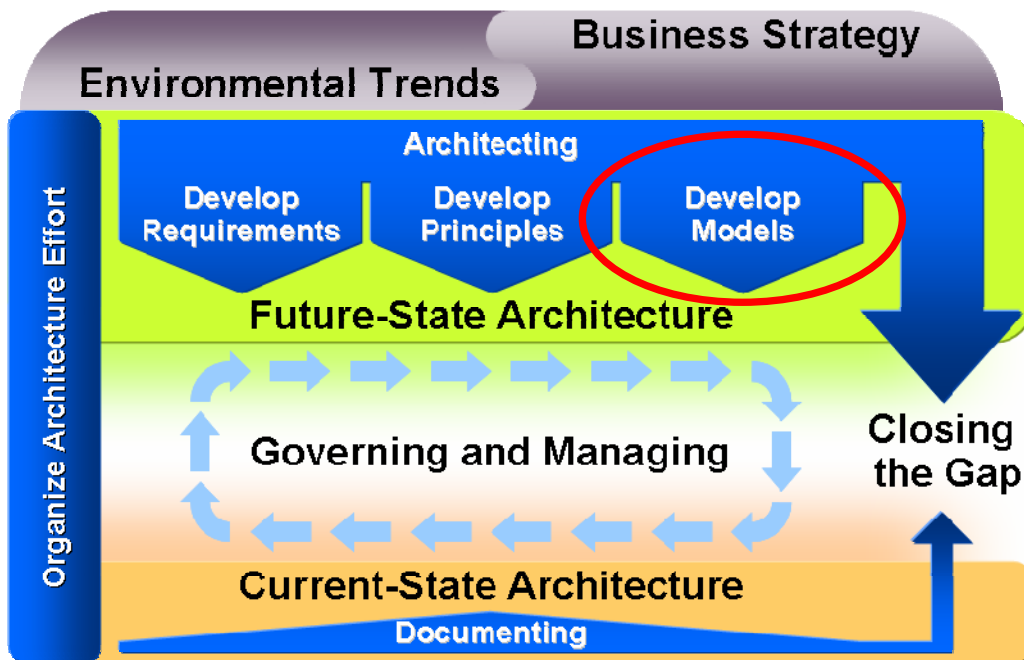


Figure 1 - British Council Enterprise Architecture Approach

This document focuses on developing the architecture model for the Platform Domain.

3.2 Position of the Platform Domain within the overall British Council Enterprise Architecture

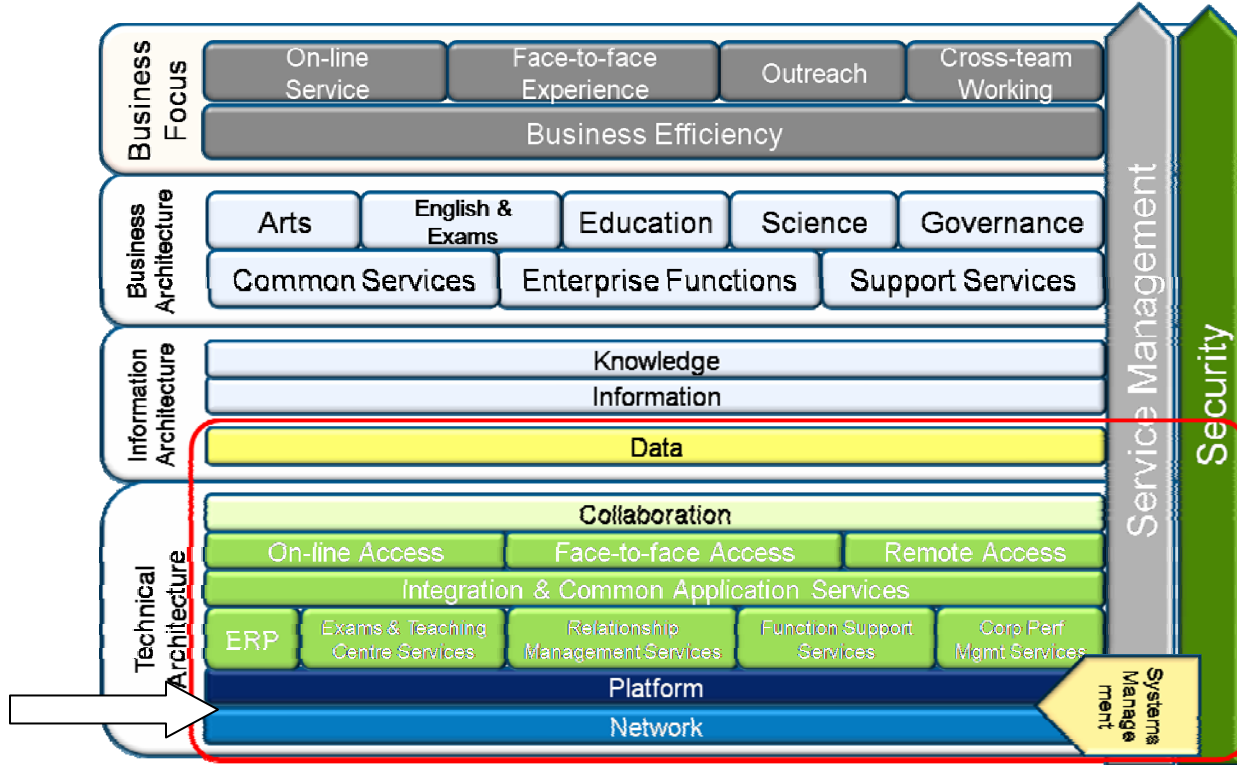


Figure 2 - British Council Enterprise Architecture domains

The platform domain is one of seven enterprise architecture domains currently identified within the British Council. The 'in-scope' domains are shown within the red box in the picture above. The platform domain incorporates the physical environment together with desktop accessed end-user and support capabilities. For example, Microsoft Office, including Outlook is included in this domain.

These capabilities are listed in detail below.

3.3 Capability Summary

The key end-user capabilities provided by the domain will not change as the target state is achieved.

The key capabilities, now and in the future, can be split between desktop and server-accessed capabilities, as well as core and support capabilities:

Desktop-accessed end-user capabilities:

- Web browser
- Office applications (word processing, spreadsheets, presentation)
- Desktop productivity tools (Photo/video editing, drawing)
- Email
- Rich media (e.g. Flash animations, mpegs, etc)

Desktop-accessed support capabilities:

- Security services
- Low-level interactive enablers (e.g. JVM, .Net framework, VB RTE)
- Systems management (monitoring, backup, audit, remote management)

Server-accessed end-user capabilities

- Mail hosting
- Web hosting
- Database hosting
- Collaboration services

Server-accessed support capabilities

- Security services (malware scanning, web content filtering)
- Terminal services / Citrix
- Systems management (monitoring, backup, audit, remote management)

What will change is **how** these capabilities are provided and the costs involved, with the changes being transparent to the end-user. The revised architecture supports the Council's business priorities and principles, as explained in section 4.0 below.

4.0 Direction of Travel

4.1 Business changes impacting the Platform Domain

The British Council's business-driven enterprise architecture strategy [Ref 7] includes a number of Priorities and Principles that drive the Platform Domain. These are:

- Business Priority 7 - Increase Efficiency
- Business Principle 1 - Climate Change and Environmental Policy
- Business Principle 2 - Business Agility
- Business Principle 3 - Maximising Efficiency

The following sections describe the existing overseas architecture and discuss how alternative architecture may increase alignment with the Priorities and Principles shown above.

4.2 The current overseas architecture

Before we explore the options for change, we will characterise the current architecture.

GTI2 Network Diagram – Madrid Main Office, Spain

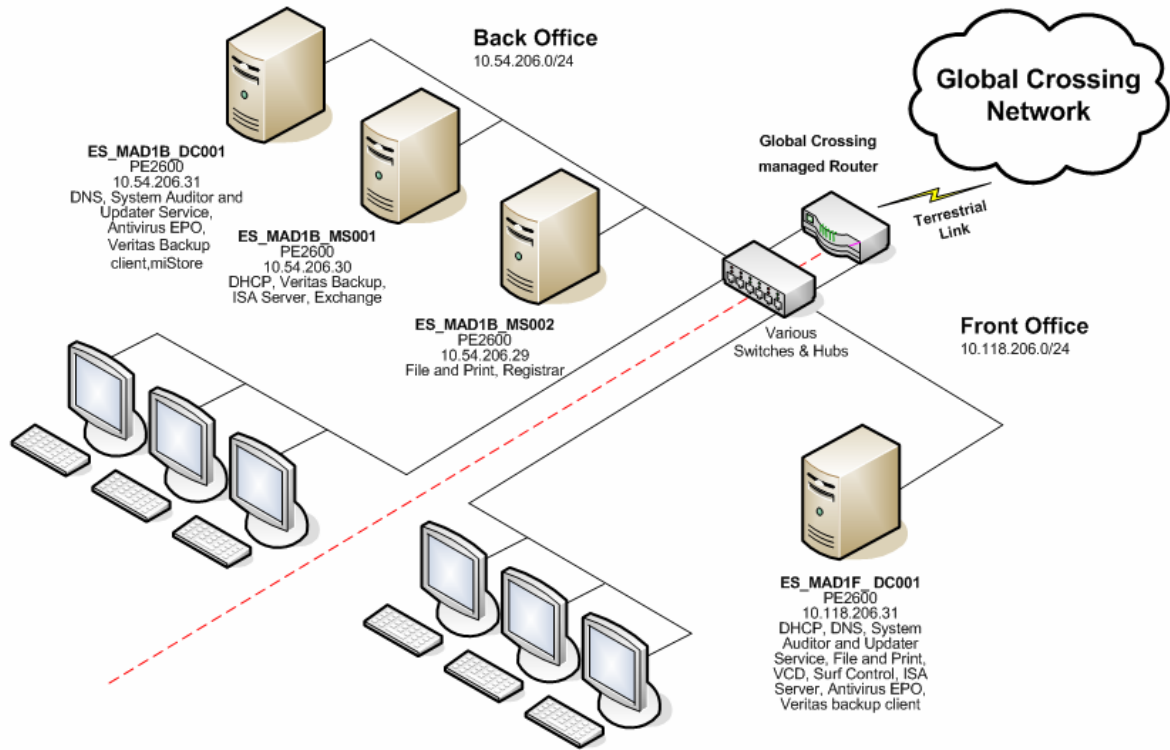


Figure 3 - Typical overseas office

The overseas environment is spread over more than 200 separate offices. The diagram above shows the key infrastructure in a typical single overseas office.

Offices differ in that some have no Front Office environment, and the number of both Front Office and Back Office desktops varies dramatically.

Although the staffing levels of these offices ranges from a few staff to a few hundred staff, each office carries the same core multi-server infrastructure and fully provisioned desktop PCs. With average CPU, memory and disk utilisations of only 4%, 40% and 48% respectively^[Ref 2], this represents a significant over-provisioning of computing resource.

Alternative architectures may present opportunities to reduce both hardware and software spends as well as indirect additional costs such as extra IT support staff. There could also be an opportunity to move to an architecture that better supports the current Council business priorities and principles, as described in section 4.1 above.

4.3 Architectural and technical opportunities

A variety of architectures that might provide improvements is explored below.

4.3.1 Reducing the number of servers

There are ~460 servers currently deployed (excluding Exchange servers ^[Ref 8]). Each office has multiple servers, with each server dedicated to a single IT function, such as “file and print”. There are three key possibilities here, namely *virtualisation*, *consolidation* and *centralisation*.

- With virtualisation, the existing servers are converted into individual virtual machines that execute in parallel inside a single server.
- With consolidation, the multiple functions are all provided by a single server.
- With centralisation, multiple instances of a distributed function are replaced by fewer instances co-located in a single geographical location. This is already happening to some parts of the Council infrastructure. Exchange servers from overseas are being removed and replaced with a centralised Exchange facility based in the UK. This could save up to 180 ^[Ref 2] servers, although the more business-critical sites might retain their own local servers. [Ref 2] also notes the replacement of 81 Netware servers by FABS.

Note that centralisation can be of individual servers, virtualised servers or consolidated servers, or indeed any arbitrary mixture of the three arrangements.

To better understand the differences, please refer to the diagrams below, each representing one of the architectures explained above. For the sake of clarity, only the Back Office portion is shown.

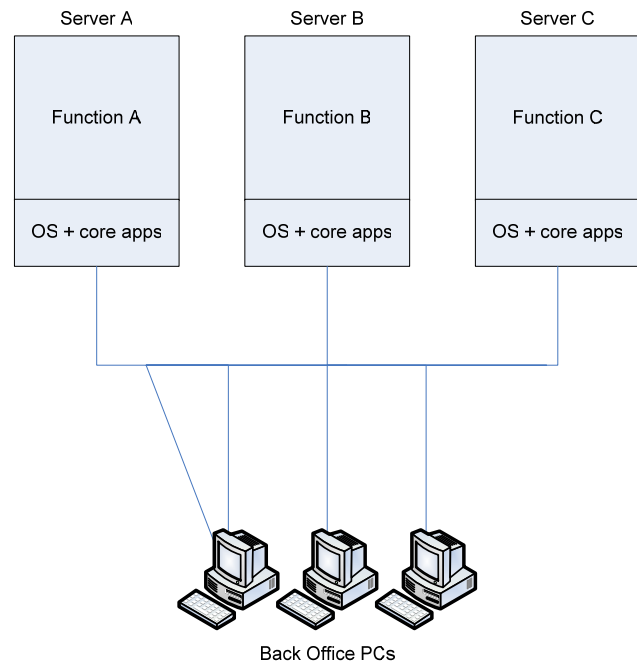


Figure 4 - Current Back Office Server Architecture

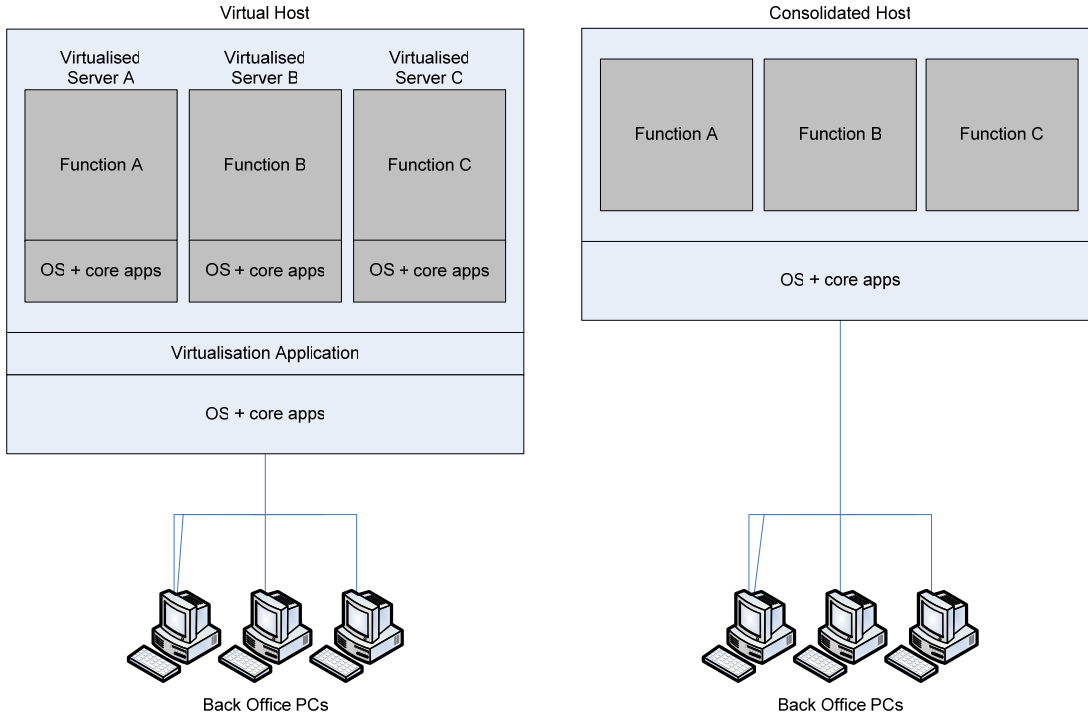


Figure 5 - Virtualised vs. Consolidated Back Office Server Architecture

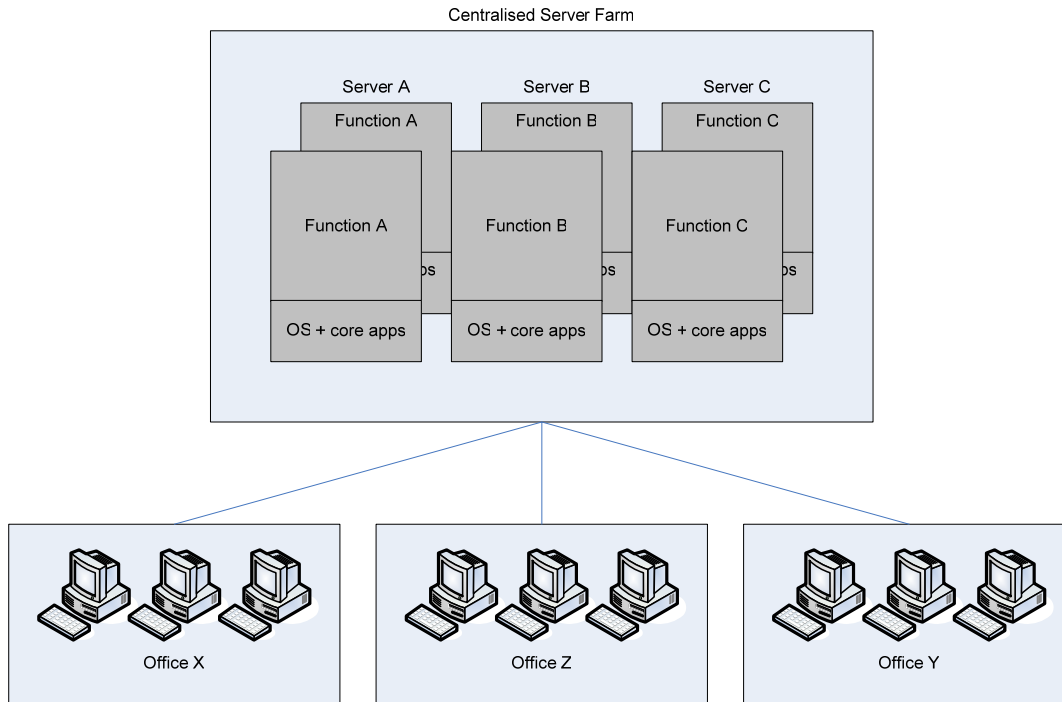


Figure 6 - Back Office Servers Consolidated into Single Site

Notes:

- Virtualisation, consolidation and centralisation are not mutually exclusive options, and all three forms of reduction can be performed at a local, regional or global level, or any mixture of levels.
- Virtualisation and consolidation provide the same reduction in server numbers.
- Virtualisation and consolidation provide different levels of operational complexity and thus risk:
 - Consolidation introduces the risk of potential incompatibilities between N functions executing inside one operating system. This can be mitigated by appropriate testing.
 - Virtualisation introduces the extra operational complexity of having an additional fully-fledged operating system for the hosting server¹. There are also the additional impacts of introducing this extra technology, for instance staff training, licensing costs, new test and development environments, etc.
- Virtualisation introduces a range of potential operational benefits such as reduced system backup and recovery times for virtual hosts, cloning and migration of virtual hosts, etc.
- Both virtualisation and consolidation can represent a single-point-of-failure scenario if the host server fails. Whether this represents a change in the overall operation risk profile would depend on existing redundancy measures, and in both cases can be easily eliminated by the introduction of common additional technologies.

¹ This assumes a Microsoft-based approach to virtualisation, rather than the use of VMWare ESX.

4.3.2 Simplifying and Standardising the Desktop and Server Platform

There is an ongoing process to simplify and standardise the overseas server platforms. This process includes:

1. Standardised hardware builds
2. Standardised software builds
3. Removing non-standard software components where this is appropriate
4. Remove all non-business software and data

Step 3 can be challenging in some locations as local business requirements may force the use of non-standard components, especially media support components for teaching purposes. However, over time and with stronger governance it should be possible to simplify the platform environment with significant benefit.

4.3.3 Moving the desktop to Thin Client

There are ~8800 desktop PCs currently deployed. Some of these are used for Back Office roles, i.e. for general business administration purposes. They run the typical office applications such as word processing, spreadsheets, etc. Considering that today's typical PC has more computing power than the business-class servers of only a few years ago, it is easy to see that these desktop systems again represent a huge over-specification of computing resources.

The Front Office systems are similarly over specified. They are used for different purposes, typically as customer-facing classroom systems or public "Internet café" type roles.

Whilst PCs are designed for stand-alone operation, their use in the Council's business context relies heavily on additional server-based services accessed via the local LAN and the global WAN. The Council has already performed some analysis on replacing these "thick" clients (i.e. fully featured, independent desktops) with "thin" clients [Ref 1, Ref 2].

Thin clients are highly simplified computers. They generally do not run applications locally. Instead, they provide a graphical "window" to a server on which the applications execute. Therefore, they need a far simpler specification, typically eliminating the need for local disk drives. Thin clients are thus far cheaper to purchase and maintain than traditional PCs. The servers that host and deliver the applications to the thin clients can be realised using any of the options described in 4.3.1 above.

4.3.4 Web-hosted applications

In line with its research into server-based/thin client capabilities, the Council has also made a first pass at the option of replacing some desktop-based office services, such as word-processing and spreadsheets, with web-hosted functionality. Refer to [Ref 3] for more details.

4.3.5 Outsourcing

Many organisations choose to outsource the supply and support of their IT infrastructure. The British Council already has experience with outsourcing:

- UK-based servers and desktops are supported by LogicaCMG;
- The global WAN is provided and supported by Global Crossing;

- The SAP (FABS) infrastructure is provided and supported by HP;
- Websites are hosted by a variety of third parties.

The benefits of outsourcing vary according to many factors, the key ones being the complexity of the infrastructure and the existing support costs. This latter factor can vary widely. Labour costs differ dramatically across the globe, as demonstrated by the recent trend for “off shoring” support to the Far East and Latin American subcontinents.

The Council's widely distributed overseas infrastructure currently is not an ideal candidate for outsourcing. Even though the “box count” is unnecessarily high, labour costs for support are relatively low.

4.3.6 Leasing of spare resources

Spare computing resources could potentially be leased internally to other areas of the Council. For instance, areas with suitable WAN connectivity could provide web-hosting space. However, such a scheme would require highly effective and efficient governance, security and service management frameworks.

4.4 Overview of Change

Ultimately, the British Council should be looking to consider outsourcing the support of its overseas servers and desktops, so that it can concentrate its resources on its core business activities. However, since currently the main IT costs are believed to be related directly to the amount of IT equipment rather than the indirect costs to support the infrastructure, the massively distributed state of the overseas infrastructure makes outsourcing an unattractive proposition. Simplifying the existing overseas infrastructure, using a mixture of the technologies outlined in 4.3 above, is a necessary precursor to outsourcing. As demonstrated in the following sections, such an exercise would reap significant benefits for the Council even if outsourcing did not then take place.

Of the architectures outlined in 4.3 above:

- **Consolidation**
it is felt that the simplicity of consolidation is outweighed by the benefits introduced through virtualisation.
- **Web-hosted applications**
a key driver to a move to web-hosted applications is typically cost. However, it is understood that the Council is able to leverage its status as both a registered charity and an educational establishment to obtain significant reductions in licensing fees. Furthermore, the functionality provided by 3rd-party web-hosted office applications still lags behind that provided by the thick-client approach. By moving to thin-client desktops, the thick-client functionality can be maintained while still realising the benefits of simplified infrastructure and possible reductions in licensing fees.
- **Leasing of spare resources**
The Council does currently employ an internal charging or cost-recovery model for its existing IT resources.

The options deemed most appropriate are a mixture of **virtualisation**, **centralisation** and **thin-client** technologies. These support the Business Priorities and Principles noted in 4.1 above:

		Platform		
		Platform Standardisation	Server Centralisation/Virtualisation	Virtual Desktop Infrastructure
Prioritisation Rating		16	20	14
Difficulty (1 = easy, 5 = difficult)		2	2	3
Cost (1 = low, 5 = high)		2	2	2
Dependency Factor (1 = has dependents, 5 = no dependents)		3	3	4
Benefit	Importance (1 = low, 5 = high)			
Increase business efficiency	5	1	1	2
Reduce operational risk	3	3	4	3
Faster time-to-market	3	4	4	5
Flexible business relocation	3	5	5	5
Flexible delivery channel support	2	2	4	3
Flexible working (e.g. 3rd parties)	2	1	4	2
Better access to information	4	1	3	1
Improve service quality	3	3	4	3
Improve scalability	3	5	5	5
Reduce IT costs	5	5	5	5
Strengthen compliance & security	4	3	4	4
Reduce training needs	1	2	1	2
Value (Higher = more value)		114	141	130

Figure 7 - Enterprise Architecture Benefits Matrix

The most important and urgent of these are:

- Faster time to market
- Flexible business relocation
- Improve scalability
- Reduce IT costs
- Strengthen compliance and security

5.0 Detailed Description

The following sections expand on the Council's original work in [Ref 2], using current overseas office data from [Ref 8] to provide costing models and technical explorations of alternative hybrid architectures.

5.1 Logical Domain Models

[Ref 2] discusses a particular mixture of cost-reducing options. It starts by categorising offices into one of four models:

- Model 1** Teaching Centre Locations with > 25 FO PC's
Teaching Centres with a High Commercial Value
Generic Locations with > 100 PC's (FO & BO)
Availability Model (99.9%) - < 10 hours down-time per annum
- Model 2** Teaching Centre Locations with < 25 FO PC's
Generic Locations with 50 - 100 PC's (FO & BO)
Availability Model (98.9%) - < 4 days down-time per annum
- Model 3** Generic Locations with 20-50 PC's (FO & BO)
Availability Model (97.9%) - < 7days down-time per annum
- Model 4** Small Locations with <20PC's (FO & BO)
Availability Model (97.9%) - < 7days down-time per annum

It then maps each of the four office models to one or more of the following technical options.

Virtualisation - deploy Microsoft Virtual Server solution and consolidate existing server images across single server within each specific location. Disk and memory upgrades would be required.

- **Standard Virtualisation** This option is based upon virtualisation of all services to a single server.
- **Resilient Virtualisation** This option provides additional resilience and availability through the deployment of virtualised images across two servers. Each server would be sized to accommodate all images in the event of a single server failure.

'Server Based Computing - Thin Client' - deploy 'Thin Client' technology and centralise all server resources e.g. Terminal Services and/or Citrix based solution.

Remote Access - Deploy Remote Access (ROAM) option via standard Internet connection. This solution could be provided as a 'Thin Client' dial in solution.

Assuming more than 200 overseas sites containing servers, the original scenario from [Ref 2] results is a reduction of deployed servers and is summarised in the diagram below:

5.1.1 Scenario A – Original Mapping

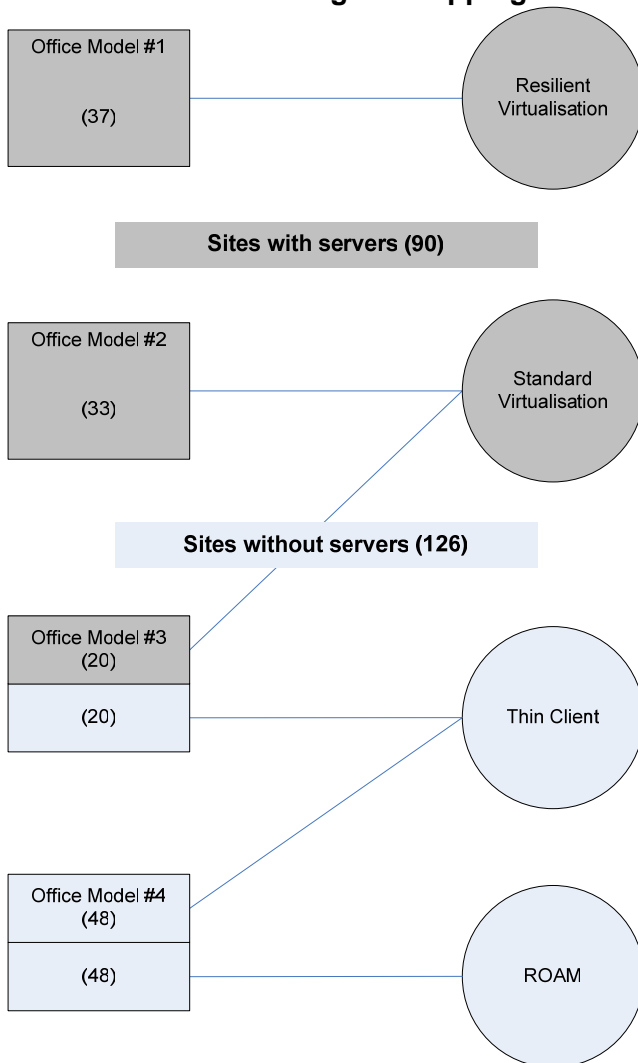


Figure 8 - Scenario 'A', showing original mapping of office type to technical option from Ref 2

In Scenario 'A', offices categorised as models 3 and 4 were thought to require a mixture of solutions, and so in each case a 50:50 split across solutions was assumed.

5.1.2 Scenario B – Maximising use of Thin Client

Alternative mappings are possible, each with their own benefits or costs. The first of these is shown in Figure 9 below.

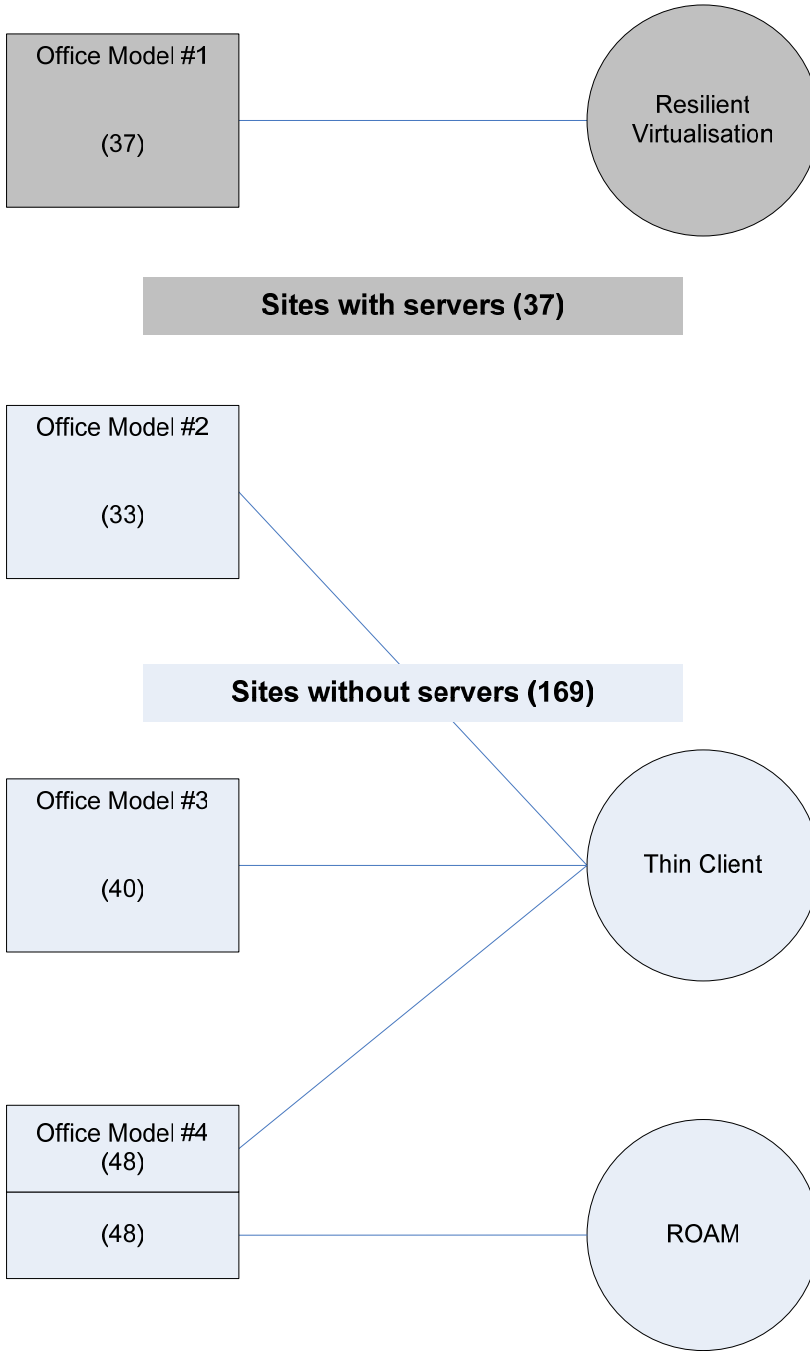


Figure 9 - Scenario B, showing maximum use of Thin Client

In this scenario, the WAN is assumed more resilient than any single non-resilient server-based service. This allows for the removal of “Standard Virtualisation” as a technical option.

The rationale behind the revised mix of architectural options is that the Platform infrastructure and office environment are heavily dependent upon WAN connectivity.

For instance:

- Given the centralisation of Exchange servers into the UK for all but the largest and most business-critical offices (Office Model #1), a lack of WAN access would prevent inbound and outbound email.

If the WAN is assumed more resilient than any single non-resilient server-based service, then there is less risk involved in depending upon WAN-delivered services. This therefore allows those sites that originally would be using non-resilient virtualised servers to now leverage centralised, outsourced servers access via thin client desktops. The result would be that only ~18% of the original 200+ sites would retain servers. Furthermore, the increased use of thin-clients instead of thick clients reduces the total cost of ownership for each individual desktop, allowing for even greater savings.

A possible drawback in Scenario B is that a number of offices are believed to stream media to student desktops as part of the teaching environment. The WAN-based thin-client approach *may* be inappropriate in such cases. This led to Scenario C, shown in Figure 10 on page 21 below. Various alternatives to support streaming are possible. Cascading media to thin-client systems from local servers is one example. Whilst technologically simple, the options would all require testing so that the optimal balance of WAN vs. server costs can be determined, whilst ensuring that the overall user experience is not significantly degraded.

5.1.3 Scenario C – Simplistic 50/50 Split

The diagram shows an alternative approach, based on the assumption that streaming sites would need local servers. In such instances, the “Resilient Virtualisation” architecture is proposed, although in reality a mixture of resilient/non-resilient infrastructures could be used.

Although Scenario C has more sites retaining servers than Scenario B (74 vs. 37), it still represents a reduction in sites compared to the original scenario (74 vs. 90). Since each existing site already has (on average) three servers, this also represents a net decrease in the number of servers deployed.

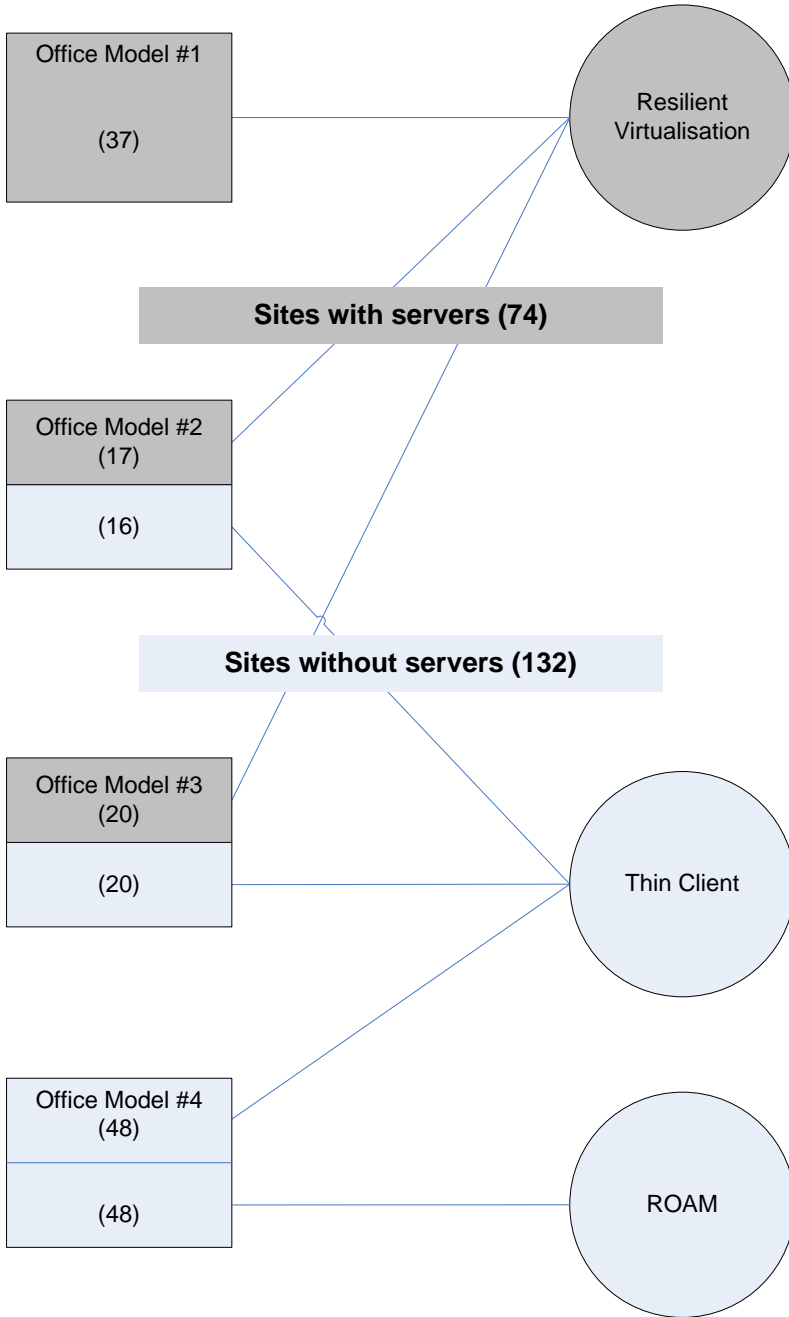


Figure 10 - Scenario C (simplistic 50:50 split)

5.1.4 Scenario D - Back Offices use Thin Client, Front Offices use Standard Virtualisation

Since it is only the Front Office desktops in the larger teaching centres that *might* not be amenable to being simplified, a more realistic split might be as shown in “Scenario D”, Figure 11 below. Note that Scenario D reintroduces “Standard Virtualisation” as a technical option, and that this only requires one virtual host server, compared to the two required for Resilient Virtualisation.

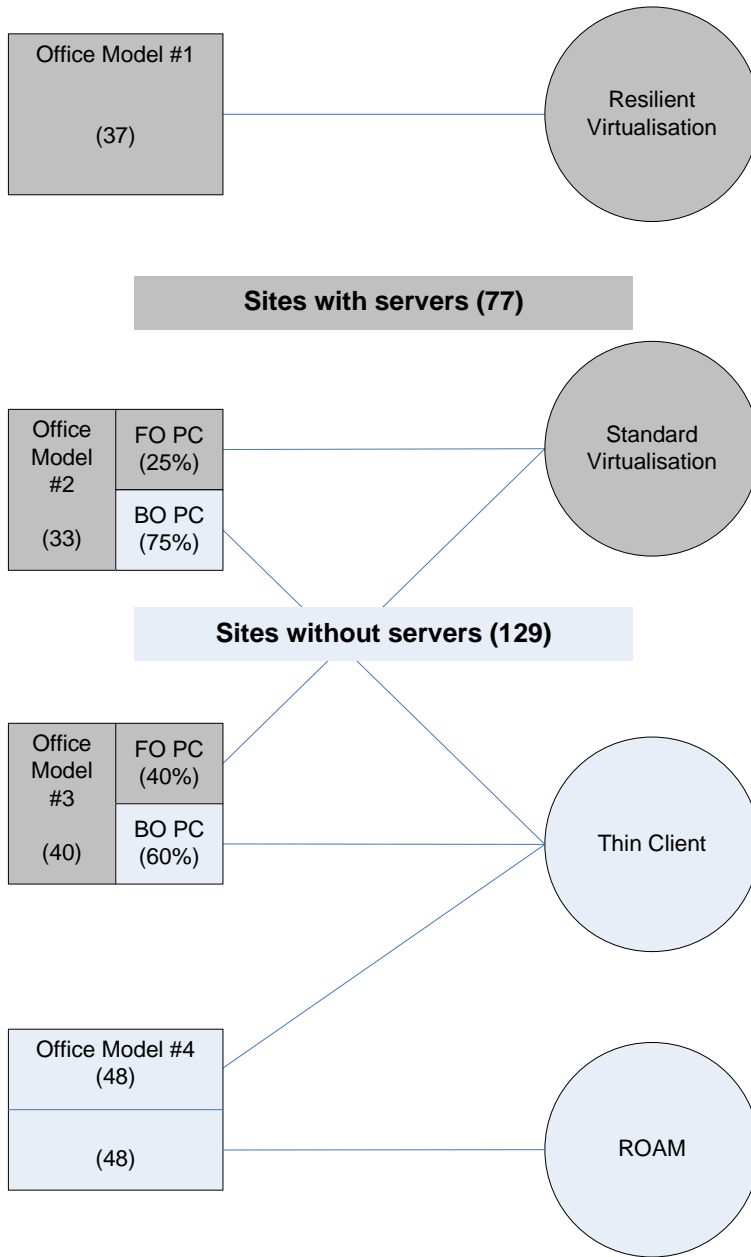


Figure 11 - Scenario D, Back Offices use Thin Client, Front Offices use Standard Virtualisation

Given more information, the architecture shown in Scenario D above could be refined such that the only desktops that are *not* replaced by thin client systems are those Teaching Centre systems that require high-bandwidth streaming media. Again, this is all predicated on the assumption that Teaching Centre PCs cannot be replaced by thin client desktops. For instance, interactive whiteboards probably cannot be operated from a thin client desktop, thus teaching staff might need a thick client PC.

5.1.5 Cost Assumptions

The indicative costs from [Ref 2] together with the revised office categorisation and FO/BO PC counts from [Ref 8] were used to model the cost distribution of each Scenario. The results are shown in the following two diagrams. However, one key variable, the cost per seat of a CITRIX-based thin client service, was not clear, and so models using costs of £200, £400 and £600 are shown.

A summary of the different scenarios is shown below.

- Scenario A All Model 1 offices to use resilient virtualisation
 All Model 2 + 50% Model 3 offices to use standard virtualisation
 50% Model 3 + 50% Model 4 offices to use thin client
 50% Model 4 offices to use ROAM
- Scenario B All Model 1 offices to use resilient virtualisation
 All Model 2 + all Model 3 + 50% Model 4 offices to use thin client
 50% Model 4 offices to use ROAM
- Scenario C All Model 1 + 50% Model 2 + 50% Model 3 offices to use resilient virtualisation
 50% Model 2 + 50% Model 3 + 50% Model 4 offices to use thin client
 50% Model 4 offices to ROAM
- Scenario D All Model 1 offices to use resilient virtualisation
 Model 2 FO (25%) + Model 3 FO (40%) to use standard virtualisation
 Model 2 BO (75%) + Model 3 BO (60%) + 50% Model 4 to use thin client
 50% Model 4 offices to ROAM

Table 2 - Summary of scenarios

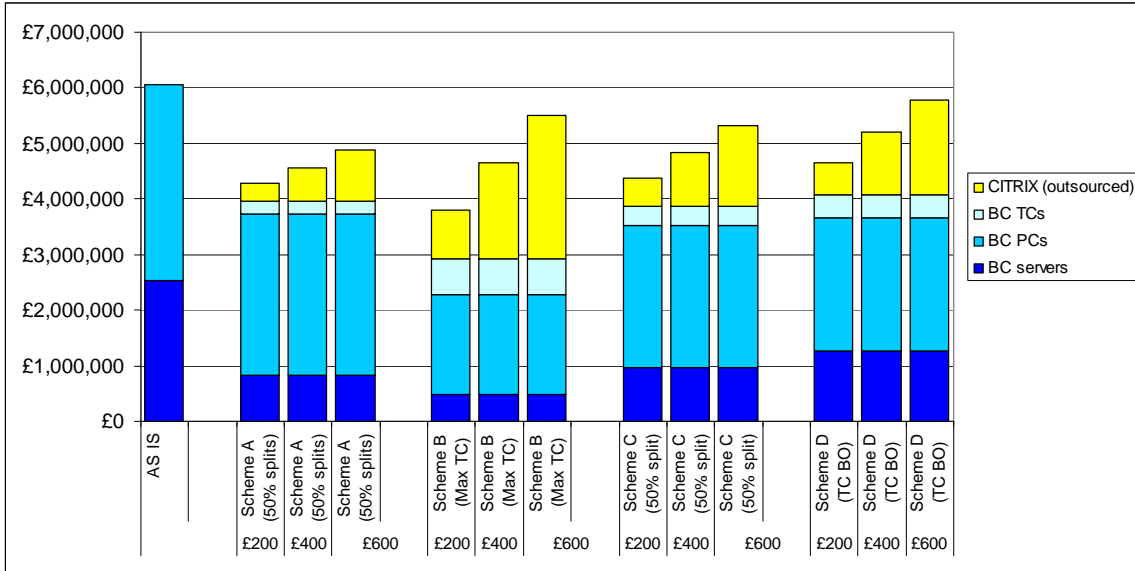


Figure 12 - Comparison of overall cost distributions

Simplifying the above down to internal BC spend vs. outsourcing costs gives:

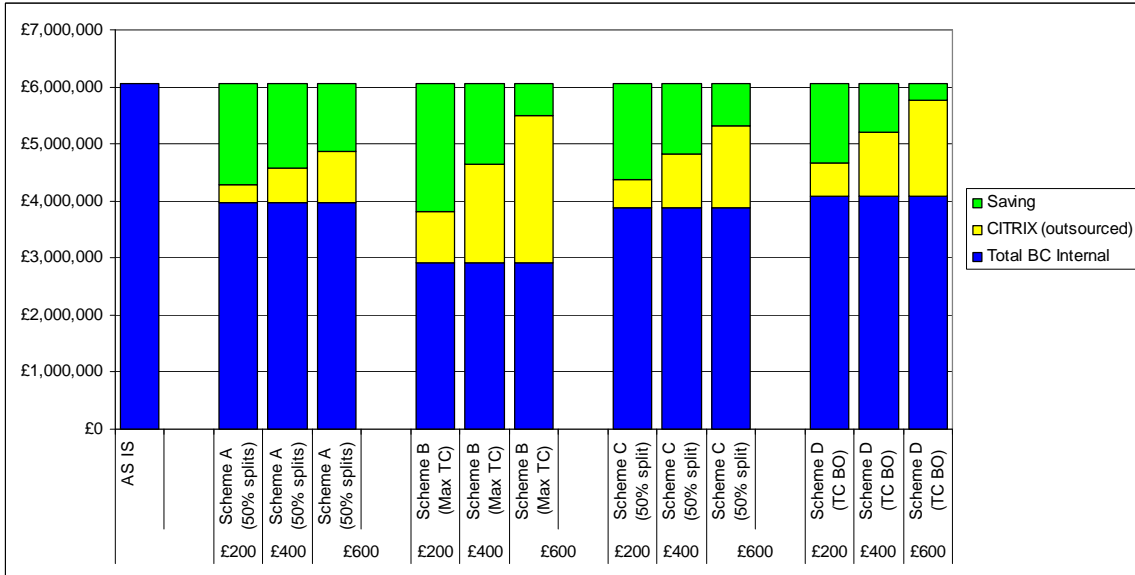


Figure 13 - BC vs. Outsourcing spend

Notes:

1. Using the figures provided, a net saving occurs until the CITRIX cost per seat reaches £700.
2. The calculations do not include any indirect cost savings, e.g. due to reduction in IT support costs.

Taking into account the increasing outsourcing support for servers to a third party and the simplification of the desktop estate though increased used of thin-client technologies, all scenarios represent an overall saving compared to the British Council's current infrastructure arrangements. However, a final recommendation cannot be given without more detailed costing analysis and investigation of any streaming media requirements.

Accounting for non-Teaching Centres

It is noted that Front Office systems in offices that are not Teaching Centres *may* be removed. This would be 1431 out of 3170 FO PCs, and would alter the figures shown above. The "as is" spend on thick client PCs would drop from £3,516,000 to £2,995,200, an upfront saving of £520,800.

The overall saving for each scenario obtained by eliminating non-TC FO PCs would be:

CITRIX (£/seat)	Scenario	Additional saving by dropping non- TC FO PCs
	AS IS	£520,800
£200	Scenario A (50% splits)	£480,147
£400	Scenario A (50% splits)	£592,752
£600	Scenario A (50% splits)	£714,752
£200	Scenario B (Max TC)	£479,677
£400	Scenario B (Max TC)	£672,018
£600	Scenario B (Max TC)	£891,018
£200	Scenario C (50% split)	£483,808
£400	Scenario C (50% split)	£598,377
£600	Scenario C (50% split)	£727,877
£200	Scenario D (TC BO)	£525,032
£400	Scenario D (TC BO)	£495,660
£600	Scenario D (TC BO)	£483,860

5.2 Physical Domain Models

Detailed physical model for the Platform Domain can be found on the British Council's enterprise architecture SharePoint site.

6.0 Making it Happen

6.1 Technology Choices

The virtualisation mechanism chosen by the Council is from Microsoft. This is a low-cost option compared to the main virtualisation vendor, VMWare, but at the expense of reduced operational and support capabilities. However, should the Council later determine that the more robust VMWare mechanism is required; it should prove simple to migrate the actual virtual machine images into a VMWare ESX environment.

The thin-client/server-based computing element of the revised architecture could be met by any of three key technologies. These are Microsoft's Terminal Services, CITRIX and VMWare's VDI. GIS has already concluded a comparison of these three options [Ref 1]. CITRIX is recommended as the way forward, as it would provide a flexible infrastructure that would support the Business Priorities and Principles described in 4.1 above.

Remote access capabilities already exist within the British Council, in the form of the ROAM service.

6.2 Key Organisation Processes

The following processes are required to ensure successful implementation of this roadmap:

- Enterprise architecture governance
- ITIL processes:
 - Supplier management
 - Capacity management

6.3 Resources and Skills

In the longer term, the actual resource required depends on the sourcing strategy adopted. Currently sufficient skills exist within GIS to support the platform domain.

6.4 Provision Assumptions

Ultimately, this will depend on any decision to outsource the overseas platform. Assuming that an outsourcing model is applied:

- Outsource "business as usual" operational activities
- Keep senior architects in-house for designing and developing new services

Alternatives:

- In-house development of new systems/services
- Out-source development of new systems/services, under guidance of in-house experts

6.5 Milestones and Deadlines

The Council has stated that it will decide on an outsourcing strategy by 2010, and that should outsourcing be adopted as the way forward the Council aims to have contracts signed by the start of 2012.

For the purpose of deriving a high-level roadmap, Scenario D (See section 5.1.4) is assumed to be the desired target architecture. As Scenario D is the most complex of those presented, this roadmap can be viewed as “worst case”. Should Scenario B prove to be functionally acceptable, the roadmap would simplify accordingly.

Even at the highest level of abstraction, there are a number of stages required to evolve from the current architecture to that depicted in Scenario D. However, these can be grouped into two distinct projects, one for the introduction of virtualisation (both standard and resilient) and one for the replacement of the desktops with thin clients. There are thus two ways in which the roadmap could be prioritised.

- a) Introducing virtualisation first would result in the number of deployed servers being reduced from $\sim 327^2$ servers across 110 sites to $\sim 99^3$ servers across those same sites, a saving of 226 servers. Model 4 office types would remain unaffected by this change. The implementation could be phased in a number of ways, for instance by geography or by office classification.
- b) Introducing thin clients *before* virtualisation would result in the number of deployed servers being reduced from $\sim 275^4$ servers in 169^5 sites to 57^6 servers in 25^7 sites, a saving of ~ 218 servers. This assumes that the sites not able to utilise thin clients will retain all their existing servers.
- c) Introducing thin clients *after* virtualisation would result in a further reduction in deployed servers from $\sim 48^8$ servers across 48 offices to zero servers across those same offices. This is because only the Model #4 offices would be affected. A model #1 office would not use thin clients, and the servers used by the thick clients in Models #2 and #3 would have already been replaced by virtual servers. The change from desktop PCs to thin client devices would, of course, affect all offices in Models 2-4.

One factor that might sway the decision over which is done first is that of outsourcing. If outsourcing is desired and an outsourcing partner is found that can help the Council migrate from its distributed thick client architecture to a centralised thin client architecture then that might be an attractive first step, as it would benefit more sites in total than the move to virtualisation would, with almost the same reduction in server counts (218 vs. 226).

The decision tree in Figure 14 shows that two of the three paths require the British Council to first build its own server based computing server farm. For this reason and that in (b) above, it is suggested that the thin-client project be prioritised above that of the virtualisation project. The resulting high-level roadmap is shown in Figure 15.

² (37 Model 1 offices @ ~ 4 /office) + (33 Model 2 @ ~ 3 /office) + (40 model 3 @ ~ 2 /office)

³ (37 * 2) + (33 * 1 * 25%) + (40 * 1 * 40%)

⁴ (33*3 + 40*2 + 96*1)

⁵ (33 + 40 + 96)

⁶ (33*25%*3 + 40*40%*2)

⁷ (33*25% + 40*40%)

⁸ (48 Model 4 offices @ ~ 1 /office)

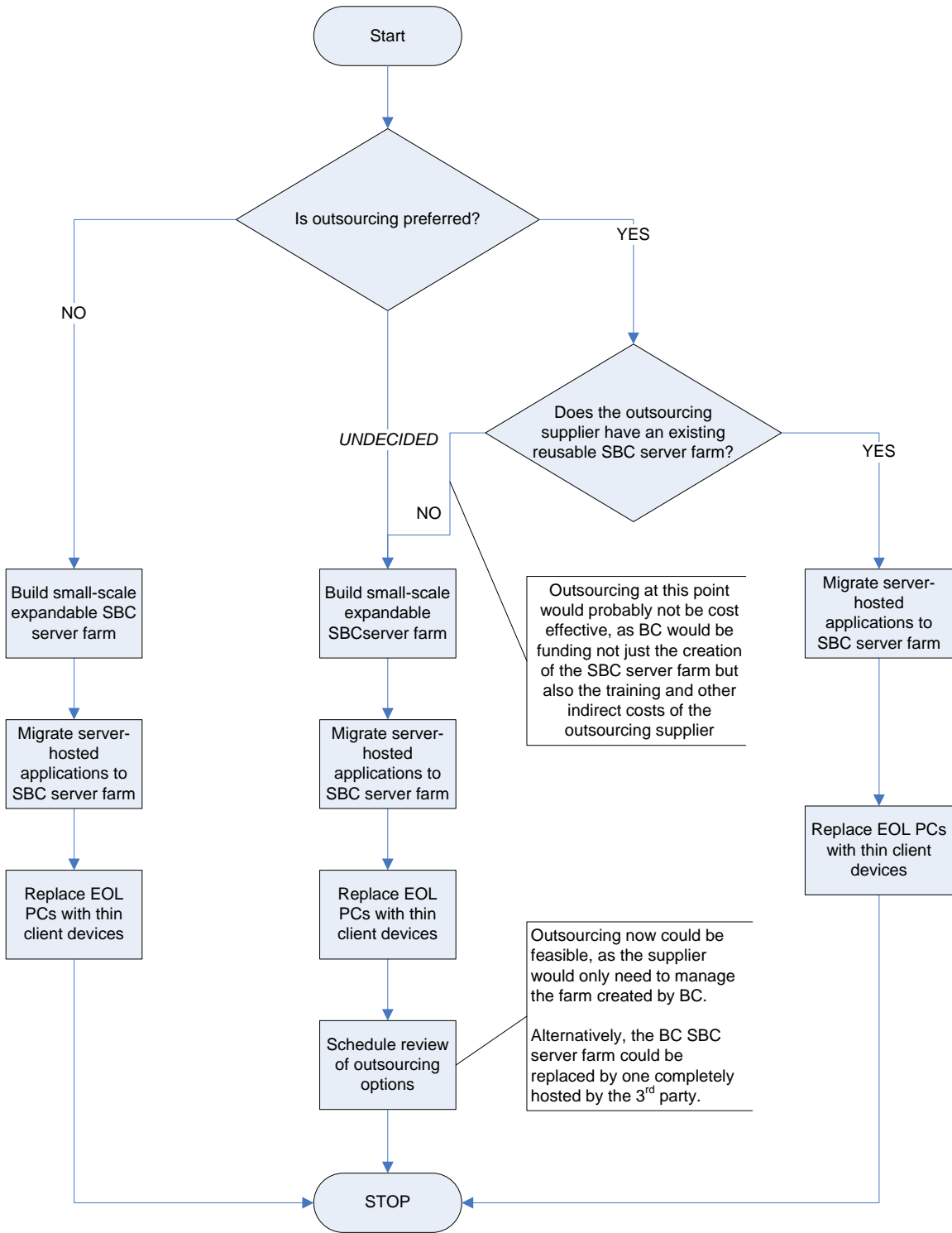


Figure 14 - Outsourcing decision tree

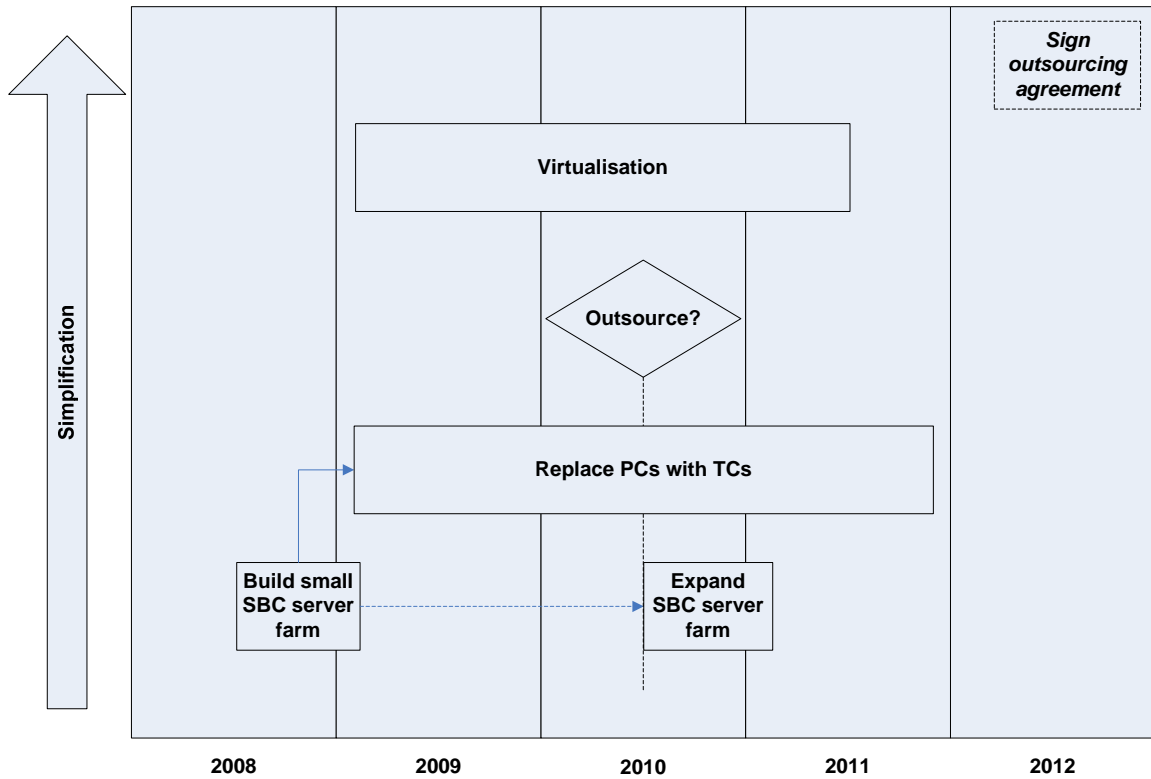


Figure 15 - Platform Domain High-Level Architectural Roadmap

Additional factors for the current Platform Domain roadmap are the vendor-driven obsolescence of the deployed Microsoft operating systems and the Council's 5-year server and desktop refresh cycles. Any plans based on the architectural changes shown above could be aligned or prioritised to coincide with these refresh periods. However, a more detailed financial analysis of the overall cost of ownership of the existing platforms might suggest accelerating the refresh.

6.6 Domain Strategic Roadmap

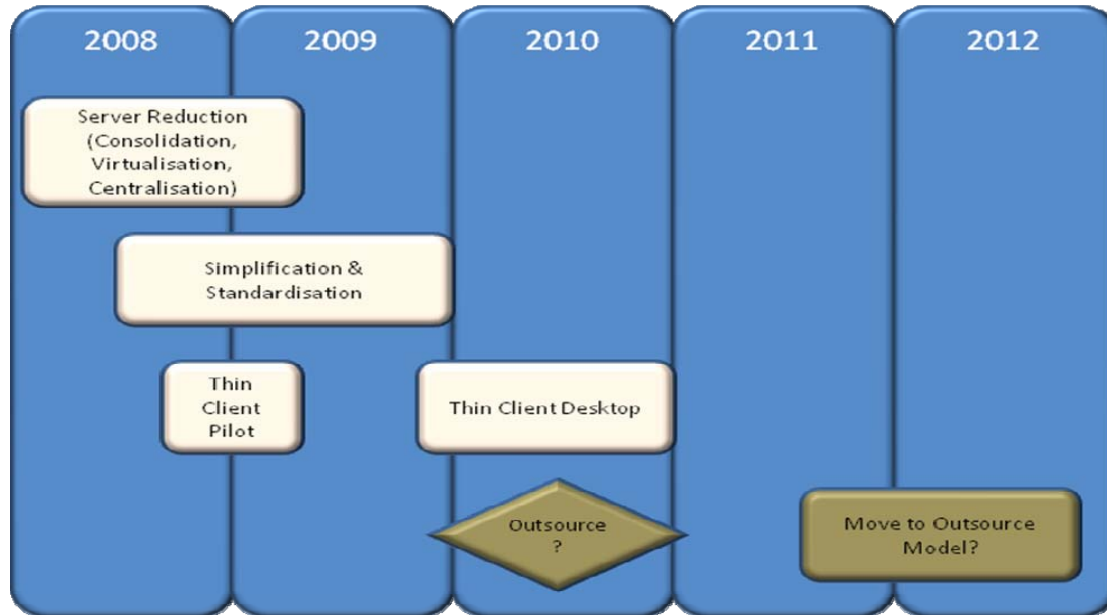


Figure 16- Platform Domain High-Level Strategic Roadmap

6.6.1 Step 1 – Server Reduction

The first step is to complete the current program of server reduction. See section 4.3.1

6.6.2 Step 2 – Platform Simplification & Standardisation

Continue, and accelerate the process of standardising the hardware and software platform. See section 4.3.2

Ensure that the exceptions process is carefully managed.

6.6.3 Step 3 – Thin Client Desktop

Move some desktops to thin client - See section 4.3.3

In summary:

- Select approach – see section 5.1
- Select thin client technology
- Implement PoC and initial Pilot
- Full rollout

6.6.4 Step 4 – Full Outsource

Further investigation of the potential for full outsourcing needs to take place. In particular, it needs to be established if there are significant cost benefits.

In any case, the three steps outlined above should still take place, as this will ensure that the platform environment is in an optimum state for outsourcing (working on the principle of transform before transition is most cost effective).

6.7 Domain Technical Roadmap

The platform domain technical roadmap may need to be further developed once the platform sourcing strategy and approaches have been agreed.

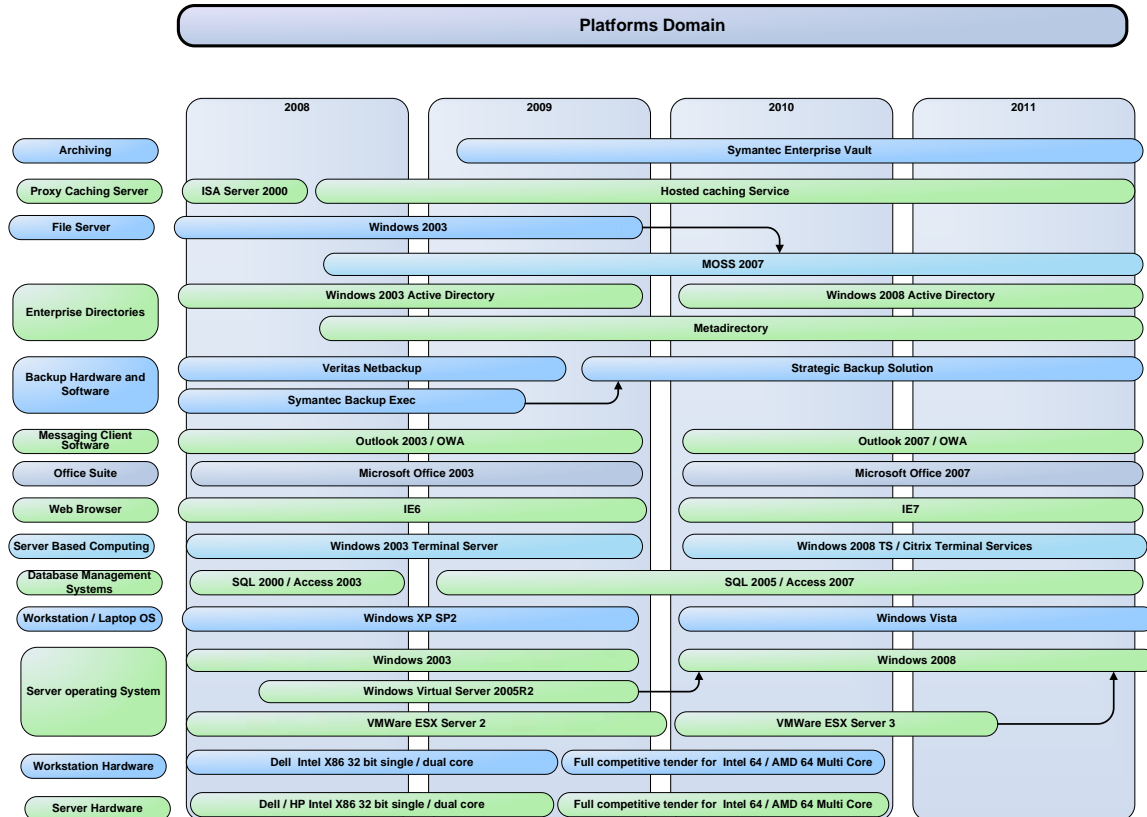


Figure 17- Platform Domain Low-Level Technology Roadmap

Figure 17 is copied directly from [Ref 9].

7.0 Appendix 1 – Principles Guiding the Platform Domain

7.1 Business Principles

Business Principle 1 - Climate Change and Environmental Policy
Business Principle 2 - Business Agility
Business Principle 3 - Maximising Efficiency
Business Principle 5 – Security Strategy

7.2 Functional Principles

Functional Principle 3 - Scalability and performance
Functional Principle 4- Legal and Regulatory Requirements
Functional Principle 5 – Confidentiality, Integrity and Availability of Data and Systems
Functional Principle 6 – Security Policy
Functional Principle 8 – Business Continuity

7.3 Technical Principles

Technical Principle 2 – Maximising Microsoft Infrastructure Benefits
Technical Principle 3 - Industry Standards
Technical Principle 4 - Buy not build
Technical Principle 5 - Flexibility
Technical Principle 6 - Non-vendor specific solutions
Technical Principle 7 – Security Standards

7.4 Implementation Principles

Implementation Principle 1 – Health & Safety
Implementation Principle 2 - Strategic Suppliers and the British Council
Implementation Principle 3 - Provision of Services

7.5 Governance Principles

Governance Principle 1 - Enterprise architecture is business driven
Governance Principle 2 - Architectural values are to be publicised
Governance Principle 3 - Architecture efforts must be unified across the Enterprise

8.0 Appendix 2 – Platform Domain Standards

For future use: This section will contain a list of platform specific architecture standards.

9.0 Appendix 3 – Key figures extracted from [Ref 8]

		BO	FO	Servers (%)	Sites (%)	BO%	FO%
#Model 1 offices	38				18.4%		
#Model 1 desktops	4059	2550	1509			62.8%	37.2%
#Model 1 desktops per site	107	67	40				
#Model 1 servers	144			32.1%			
#Model 1 servers per site	4						
#Model 2 offices	34				16.5%		
#Model 2 desktops	1839	1398	441			76.0%	24.0%
#Model 2 desktops per site	54	41	13				
#Model 2 servers	94			21.0%			
#Model 2 servers per site	3						
#Model 3 offices	40				19.4%		
#Model 3 desktops	1991	1171	820			58.8%	41.2%
#Model 3 desktops per site	50	29	21				
#Model 3 servers	75			16.7%			
#Model 3 servers per site	2						
#Model 4 offices	94				45.6%		
#Model 4 desktops	1030	630	400			61.2%	38.8%
#Model 4 desktops per site	11	7	4				
#Model 4 servers	135			30.1%			
#Model 4 servers per site	1						
TOTAL #desktops	8919	5749	3170	100.0%	100.0%	64.7%	35.3%
TOTAL #offices	206						
TOTAL #servers (excluding 1 exchange per site)	448						

10.0 Appendix 4 – References

This following are referenced within this document:

Ref	Title
Ref 1	“Change Request 4741” Phil Burnham
Ref 2	“Technical Options Paper - Regional Consolidation” Phil Burnham V2007-May-25
Ref 3	“Software as a service - Google Apps study paper” Rev 4, April 12th 2007 Kapila Munaweera
Ref 4	“GIS Enterprise Architecture Strategy” March 2008 Tony Bright
Ref 5	“Overseas IT Models” Rev 5, November 1st 2007 Ann Bailes
Ref 6	“British Council EA Benefits Matrix” V0.1 Nick Morgalla
Ref 7	“Enterprise Architecture Principles” V2.0, 26/02/2008 Tony Bright
Ref 8	“Site Profiles” spreadsheet
Ref 9	Platform Domain Brick Kapila Munaweera