Coleg Harlech – extranet for distributed records management and e-learning services

Paul Richardson, Coleg Harlech WEA

Geoff Constable, UW Aberystwyth

Acknowledgements

The authors wish to thank Oggie East and his staff at Symantise Ltd. for their prompt and helpful contributions to this paper. Thanks are also due to colleagues Dylan Evans (Coleg Harlech WEA) and Hefin James (University of Wales, Aberystwyth) for their contributions and prompt answering of questions regarding the network set-up at Harlech.

Executive Summary

- Merging Coleg Harlech residential adult higher education college with the Workers Education Association (North Wales) to form CHWEA resulted in the need for a new central database and improved inter-site communications.
- The main business driver for the project was the data records requirements of the funding body.
- A unified application-based solution proved to be the best answer to the needs of the organisation.
- The chosen solution involved the upgrade of Internet-based network links and the main site JANET connection to provide appropriately improved network connectivity.
- This was coupled with database design and development, together with selection of the versatile FirstClass front end client interface and backend FirstClass server.
- There have been widespread benefits of the solution, including more efficient collection of data, integrity of data provided to third parties, and new and improved working practices. Future developments are planned to meet challenges.

Overview

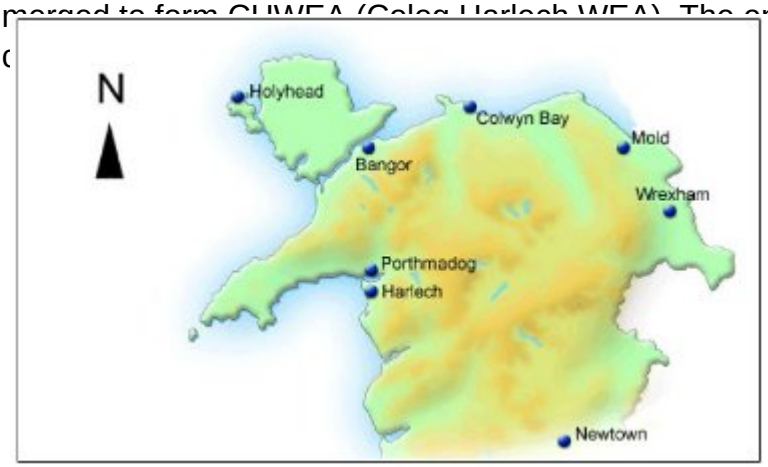
This case study describes the solution to the need for data connectivity to access an MIS (Management Information System) database and an e-learning collaboration environment for the widely geographically dispersed offices and teaching locations of Coleg Harlech WEA. The solution comprises enhancement of network links between the remote locations and the deployment of an off-site groupware server providing the FirstClass collaborative groupware system. FirstClass also provides an integrated user interface to the MIS database. The motivation and requirements for the project are described, as well as the development process and components of the solution. The performance and reliability as experienced in practice over the period since deployment are discussed, and a description of the current use, perceived benefits and potential future developments is provided. The case study also

highlights how the solution has managed to address various distinct sets of requirements in a unified fashion, without adopting the traditional — but expensive — high bandwidth star topology network. Finally, the benefits which the project has brought to the organisation are demonstrated.

Introduction

The merger of Coleg Harlech and the WEA (Workers Education Association) in August 2001 resulted in a number of challenges in the area of IT infrastructure and systems. Further demands were placed on the organisation in 2003 when the Welsh funding body ELWa (Education and Learning Wales) made significant changes to the information reporting required. In addition there has been major interest in developing an e-learning/virtual learning environment for which an improved infrastructure and an underlying system solution have been required. It is likely that a continuing number of organisations will face similar challenges as the result of future mergers and changing demands. This case study, therefore, has widespread relevance to many organisations in the education sector.

Based in Bangor, the WEA in North Wales is part of the national WEA charity and has a long and proud history of delivering education to local communities throughout the UK. Coleg Harlech was well established as the leading residential Further Education organisation with an equally proud tradition of delivering education to the community, mainly through residential courses. The two organisations shared a common mission to enhance the opportunities of socially and educationally disadvantaged adults, and on 1 August 2001 these organisations merged to form CHWEA (Coleg Harlech WEA). The enlarged organisation has administrative c ıre 1.



[1]

Figure 1: Map of North Wales showing principal offices of CHWEA

A key challenge was the provision of a single MIS system, since prior to the merger the two organisations had separate and different records-keeping and management processes.

The existing Coleg Harlech system, which was considered adequately to meet the needs of the organisation as it was then, was a Microsoft® Access database located on a dedicated server in Bangor. The first step was to merge this with the WEA system into one student records database.

Remote access to the system for data input and access to student records was required by administrative staff at each of the locations indicated in Table 1. This had previously been

achieved via dial-up modem connections over commercial Internet Service Providers to the database at Bangor via the Bangor office's routed ISDN Internet connection. The performance of this system was poor and resulted in high call costs.

In 2003 Paul Richardson joined the organisation as ILT Champion, at which time the new reporting demands of the funding body arose. This, together with the need for developing a virtual learning environment, prompted the search for a comprehensive infrastructure and systems solution.

				Network Con	
Location	**PCs on LAN**	**Staff (approx)**	**Students (approx)**	**Before**	
Harlech	90	-	120 Full Time	2Mbit/s RN1	8 I
Bangor2	25	15	10 at a time	128kbit/s ISDN3	51
Porthmadog	3	3		56kbit/s dial-up4	56
Colwyn Bay(1)	2	2		56kbit/s dial-up4	51
Colwyn Bay(2)	3	3		56kbit/s dial-up4	51
Newtown	3	3		56kbit/s dial-up4	51
Mold	1	1		56kbit/s dial-up4	56
Wrexham	2	2		56kbit/s dial-up4	51
Holyhead	1	1		56kbit/s dial-up4	51

1Regional Network (JANET)

2Location of old Access database server

3ISDN routed connection to Internet ISP

4Dial-up Internet ISP connection

Table 1: Coleg Harlech WEA – Locations and connections

Service Requirements and Constraints

Project Requirements

ELWa was the former Welsh Assembly sponsored public body responsible for funding post-16 education in Wales. It established a requirement accurately to monitor student participation, registration and other records in order to correctly and fairly fund the different organisations throughout Wales responsible for the front-line delivery of education. During 2003 ELWa introduced the LLWR (Lifelong Learning Wales Record) system in order to keep their records and monitoring accurate and up-to-date (see http://www.elwa.ac.uk/elwaweb/elwa.aspx?pageid=2061 [2]). Information gathered at the delivery organisations needed to be full, accurate and timely and it also needed to be presented in a uniform manner. LLWR set out the records and fields that ELWa required for electronic management of the data. Funding was made available to the colleges in order to update or expand their databases and, if necessary, purchase software or hardware systems in order to gather the information securely and accurately.

To underpin the required data gathering system, a key necessity was an adequate and appropriate inter-site data communication mechanism. The existing modem-based system was clearly in need of a comprehensive update.

At the same time as the above requirement, there was a lot of interest in (and some funding available for) the implementation of e-learning portals, or Virtual Learning Environments, to allow managed access to online services and resources for students and staff. These web-based learning environments allow each student to interact in a tailored fashion with their tutors, teachers and fellow students using e-mail and chat rooms, and to access file stores, documents, assignments and online resources. For an organisation like CHWEA an attractive feature of e-learning of this type is that it is suitable for residential or day students as well as students attending classes in remote locations or at home, who can use their dial-up or broadband connections to access the learning materials available online. CHWEA has a higher percentage of non-traditional learners than most organisations, many of whom really do have a requirement for 'anytime, anyplace, anywhere' access to learning.

A further issue was that due to the ad hoc nature of previous growth in Internet use, there were a number of different ISPs providing Internet services at the various CHWEA locations. This meant that many of the organisation’s staff had e-mail addresses that were long and featured the ISP's identity as part of the address (e.g. colwyn-bay@wrexhamwea.virgin.co.uk [3]). Others in the organisation had a username@harlech.ac.uk [4] style e-mail address because Coleg Harlech had been part of the JANET network since 1996.

In summary, the solution described in this case study was driven by the following set of

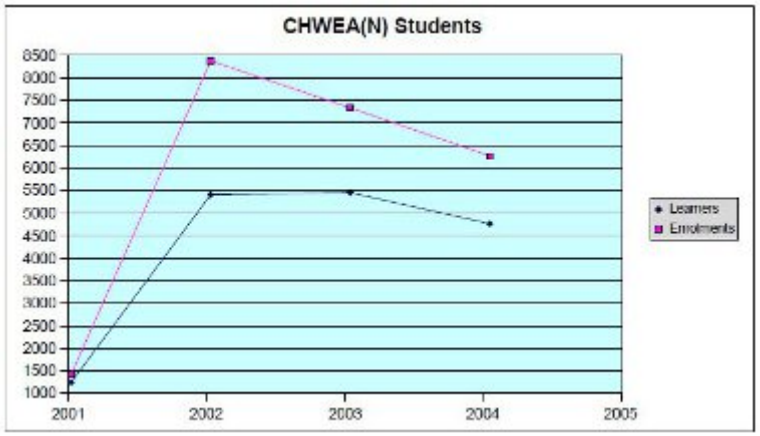
requirements:

- Creation of a modern, live-access, distributed access and expanded student records database which met the requirements of CHWEA and ELWa
- Implementation of a secure e-learning environment suitable for all student types (from those taking a residential degree course to those attending a basic computing class in a remote mountain village hall)
- Uniformity of e-mail and other Internet addresses across the different CHWEA locations
- Upgrading and modernisation of network links to support these services as appropriate.

For some time these were viewed as distinct and separate issues that would each require their own solution.

Student Records Database

The new requirements imposed by LLWR meant a large expansion of the database involving completely new tables, data sets and fields. It also introduced the need to manipulate the data in new ways with new queries, etc. A further consideration was the expansion in the number of students registered with CHWEA that had occurred since 2001. This growth, illustrated in tabase becoming somewhat unwieldy.



[5]

Figure 2: Growth and levelling off of student numbers following merger of the two organisations.

These factors indicated that a serious upgrade to the existing Access system or possibly investment in a new solution was needed. This introduced the consideration that any new solution could be purchased as an off-the-shelf product or possibly as a development tailored to the individual needs of CHWEA. Each potential solution had its own cost, suitability and maintenance implications.

Limitations of Existing Access Database

The situation at the start of the project was that duplicate copies of the Microsoft® Access database were held at each of the CHWEA locations with a master version held at Bangor. These copies of the database were being synchronised regularly, but not frequently enough to satisfy the increasing demands resulting from the growing number of students and the new reporting requirements for LLWR. Updates and synchronisation were carried out in most

cases over dial-up modems. Moreover, synchronisation often had to be initiated manually. All this resulted in large files having to be copied between locations at low bandwidths and the master database only being accessible by one dial-up connection at a time. This state of affairs meant that the system was rarely completely up to date and this was causing considerable frustration.

Database Requirements

The requirements for the Student Records Management database system to match the evolving needs of the organisation can be summarised as:

- Larger capacity, so that it could hold all of the data required by ELWa, and could be extended further to meet future needs
- Automatic synchronisation, with as near-live access as possible
- Non-duplicated, with only one live version at any one time
- Accessible securely from the organisation’s remote sites – with appropriate bandwidth available as necessary to support 'live' access to the database across the network.

Virtual Learning Environment

Another parallel development was the need for the introduction of a VLE (Virtual Learning Environment) at CHWEA. Like LLWR, this was in response to a mandatory requirement from ELWa for all FE Colleges in Wales to develop an e-learning portal. ELWa had also made £10,000 available initially, to cover the VLE/MLE server software and computer hardware to support it. In some cases, organisations had purchased off-the-shelf solutions, with both Teknical Virtual Campus and Granada Learnwise proving popular amongst FE colleges as 'ready-made' VLE solutions.

Site Network Communications

The key requirement for inter-site communications was that it should support both the demands of the Student Records database and those of the VLE for users at the various locations. Both requirements called for the provision of significantly more bandwidth for both the remote sites and the central Bangor site. Furthermore, any new or upgraded network connection needed for any site would have to support both inter-site traffic and Internet traffic. This situation was not new, since historically, due to the costs of installing leased line communications — as would be the case for a traditional WAN (Wide Area Network) — both organisations had implemented a solution of using the Internet for site-to-site communications.

Thus for the remote sites, which in general comprised only staff requiring database communication and Internet access, significantly more Internet bandwidth was required than could be provided via the existing 56kbit/s modems.

In the case of the Harlech site, where no staff were based, there was a very large population of students requiring increasing access to the Internet. Prior to the upgrade project there was a 2Mbit/s JANET link via University of Wales, Aberystwyth which was considered insufficient for growing needs.

At Bangor, the central site network communications had to support the increased Internet-

based traffic demands of database access from the remote sites and also the new traffic from remote learners accessing the VLE over the Internet, together with general rising Internet access demand from the students at Bangor.

Identification of Possible Solutions

Database

The various problems raised by the growth in student numbers, the expansion of data required by ELWa, the diversity of Internet access within the organisation, the non-standard nature of e-mail addresses and the desirability of implementing an e-learning environment for students and staff all pointed towards a need for major change. As an initial step, the Senior Management Team recognised and prioritised the need to update the database and Paul Richardson, ILT Champion, and Mena Ifans, manager of the MIS (Management Information Systems), were appointed to manage the LLWR Development Project.

The project team initially explored the possibility of purchasing off-the-shelf software, but this was dismissed due to lack of sufficient funding. It was then decided to invite solutions from three different local companies based on a specification of requirements produced by CHWEA.

Network Communications

Harlech was the only site with a significant student population and so was the only one with a JANET connection. Prior to the project this was a 2Mbit/s connection via University of Wales, Aberystwyth on the South Wales MAN. At the time, the North Wales MAN was being rolled out and Harlech's connection was due to be increased to an 8Mbit/s link by the end of 2004.

For the seven smaller remote sites, data communications to Bangor via the Internet had been the preferred WAN solution for CHWEA for some time. To meet the needs of increasing data communication, greater bandwidth than was available through the 56kbit/s dial-up system could only be provided by ISDN (Integrated Services Digital Network) or by ADSL (Asynchronous Digital Subscriber Line). For most of the locations, the arrival of commercially available 'broadband' access was very timely indeed, although it was not immediately universally available.

Both ISDN and ADSL technologies have the feel of 'always-on' network access to the user, once connection has been established, and so would provide an immediate improvement compared to the previous modem-based system.

ISDN-2 provides 2 x 64kbit/s channels (i.e. a possible 128kbit/s), and can be used either to inter-connect offices in a private WAN for short duration remote network access and data transfer, or for Internet access via an ISP that offers such a service. Although ISDN has been widely available at most BT exchanges and installation costs are low since all calls incur charges for both connection and call duration, the ongoing costs of ISDN for both WAN and Internet access are relatively high. Regarding the use of ISDN for WAN use, one of the particular problems with WANs built using ISDN is that of minimising inter-LAN call-ups associated with the network operating system protocols. For these reasons, it was decided that if ISDN had to employed it would be in the form of ISDN Internet through ISPs.

ADSL as provided by commercial ISPs has the benefit of being charged at fixed monthly

pricing rate instead of per-minute pricing. The base package provides 512kbit/s download data rate and 256kbit/s upstream. This was thought to be able to provide a reasonably fast connection for general users and to be able to support live manipulation and use of the proposed database over the Internet.

The only technical issues with ADSL are firstly that it is a contended service – typically 20:1 for business users, i.e. the potential total bandwidth of all subscribers connected to a DSLAM at the BT exchange can exceed the bandwidth of the data pipe from the DSLAM to the core of the ISP's network by a factor of 20; and secondly that the total path length for packets over the ADSL network and through the Internet to the home network (in this case Bangor) can be considerable, resulting in higher latency and jitter. However, ISPs rarely provide a service with the worst case contention ration, particularly in the early days of ADSL provision when take up was low and the applications planned for use over ADSL Internet were not sensitive to jitter/delay.

ADSL was thus selected as the preferred network means, but unfortunately as ADSL was being rolled out on an exchange-by-exchange, demand-led basis at the time, it would have been necessary to purchase ISDN-2 to replace the dial-up modem systems for all of the offices at which ADSL was not then available, at least as a holding measure until ADSL was available at the relevant exchanges.

Costs/Technical Comparisons

Quotations and proposals from the three selected companies in response to the CHWEA specification of requirements for the database system were sought and received.

Although three companies were approached, the project team was impressed by the fact that Semantise, the solutions developer, was the only company which had stepped back from the isolated issue of the database and had taken a wider view. They had considered the other issues previously described, in particular the need for a VLE, adequate network access and standardised e-mail addresses.

After due consideration it was felt that the proposal submitted by Semantise most closely matched the needs of CHWEA. Their proposal was based on the use of the messaging and communications product **FirstClass®** as an interface to the student records database. For product information see http://www.firstclass.com/ [6].

Semantise had studied the LLWR specification in detail and were confident that their enterprise-level database management skills could be applied to CHWEA's requirements. They were able to present a prototype example of a data entry interface which would be available to users within the FirstClass environment. They also demonstrated the use of FC RAD (FirstClass Rapid Application Developer) technology to write to and read from an SQL database.

FirstClass is also a VLE-style environment, so staff would have a single unified way of accessing their e-mail, updating and accessing the database and communicating with their students and peers.

An additional benefit of this approach was that all users would now have a single address style, e.g. a.person@fc.harlech.ac.uk [7], as FirstClass also has an e-mail server.

The total cost of the project was arrived at from a number of elements:

- FirstClass server software, licence and server hardware
- User and student licences (based on the number of concurrent users)
- Development work by Semantise to develop a new SQL server database and the FirstClass user interface to the database
- Ongoing support and maintenance and refinement of the database as needed

Procurement

In July 2003 it was decided to go ahead with the project and to appoint a suitable solutions provider.

Semantise were the only supplier offering a comprehensive solution and proposing to use the FirstClass product. They had previous experience of both developing FC RAD / database applications for large (>20,000 users) organisations and deploying educational FirstClass intranets - both of which were required by CHWEA.

Semantise was therefore contracted to do the work for a fixed term, with an option for increased functionality to be added following the completion of the initial agreed work. The work was seen as a long haul and the focus of the first year (July 2003-July 2004) was the need to introduce a system to capture and store additional data for LLWR and ELWa and to provide the required reports.

Project Planning

Staff from Semantise interviewed staff at CHWEA in order to perform a thorough systems analysis of information flows and processes within the organisation. They spent time with staff, particularly with learning managers and administration staff to develop an appreciation of the whole organisation's processes, functions and structure, as well as information flows and the ways that gathered information was recorded, accessed and used.

Once the decision had been taken to implement the Semantise/FirstClass solution, personnel from that company joined the CHWEA staff on the project team and at this point more formal project plans were made.

Once the development had commenced there were weekly team meetings with a rolling standing agenda. These meetings were minuted and were deliberately kept quite formal and explicit in nature. The face-to-face discussions were supplemented by a system of folders and conferences on FirstClass, in which items such as job requests and invoices were stored. This allowed project planning to continue seamlessly between meetings. This method of working facilitated rapid decision-making where necessary, and provided a scaleable framework for ongoing user support.

Implementation

Infrastructure

Semantise specified what hardware and/or other equipment would need to be purchased. This mainly consisted of new hardware to run the FirstClass server (there is no need for any client hardware), DAT backup tapes and VERITAS ‘Backup Exec’ software. This server was installed and hosted at the Semantise office at Bangor for initial development, deployment and data entry.

The components of the solution were:

- Server hardware and operating system

- FirstClass server software (including RAD-environment)
- Semantise’s own development tool, ‘Wizard’, a generic RAD application, which consists of a database structure model, with associated metadata and pre-built procedures
- ODBC (Open DataBase Connectivity) middleware, a standards-based 'bridge' between the database and the database management system (used here by the FirstClass RAD server to connect to the database)
- MSDE (Microsoft® Desktop Engine) database software, a free downloadable SQL database available from the Microsoft web site
- The database structure.

Database Development

The final component in the list above, the database structure, consists of:

- Tables combining fields for the LLWR (and other CHWEA-specific fields)
- Stored procedures for handling ELWa returns that ensure the data is in the required format
- Functions for verifying and validating LLWR-specific data to ensure the data is entered correctly.

Alongside each database table every field has associated metadata which itself has tables, stored procedures and functions. These are used by the generic RAD application, to ensure the appropriate data entry components are presented to the user.

Data Migration / Loading

When the new solution had been tested sufficiently, the 'real' data could be entered into the system. This job was handled by Semantise at their premises. The migration of Access data proved time consuming, taking from July to September 2003. To facilitate this process, data was broken down into appropriate data sets, for example, those associated with learners or courses. Each data set was migrated in turn to allow the process to be manageable. Even then, data migration from the old MIS system to the new application was a non-trivial process.

Each migration involved the following 13 steps:

1. Extraction of the appropriate data set from the existing Access database
2. Analysis of lookup data (by following through all data references to ensure their integrity)

3. Auditing the data's quality (involving removing duplicate data, normalising the data, and verifying the quality of the data)
4. Uploading the data into a temporary table in an offline version of the database
5. Analysis of the data to ensure conformity with specification (of data lengths, inconsistencies, etc.) - this part of the process was semi-automated
6. Mapping of fields to LLWR fields, including modifications as necessary (e.g. conversion of date styles, etc.)
7. Analysis of adjustments required to the database table structure (to accommodate any new fields, as necessary)
8. Development and testing of a database update script to make the required structural changes (i.e. those changes dictated by the results of the previous steps)
9. Population of lookup (or reference) tables with lookup data
10. Maintenance and updating of the metadata tables - these inform the GUI of the new fields, where lookup data can be found, and how to navigate it
11. Transfer of the data set to the real database table from the intermediate offline version
12. Testing via the GUI in order to validate the system and the GUI's relationship to it, and to validate the usefulness and working of the GUI itself (a re-iterative process that may involve re-factoring as necessary in the light of testing)
13. Final implementation on the live system and sign off by all parties.

Transition Phase

There was then a six month transitional phase while the server remained in Bangor as the system was further refined, developed and tested. From January 2004 it was ready for use by CHWEA staff in earnest. Real data had been entered into the system as the new solution was developed, so that by the time the server had been hosted and run for six months prior to the physical move, the data was current.

Deployment

When the server was ready to be deployed on site at Harlech, the transition was jointly accomplished by Semantise and CHWEA staff. The server was transported from Bangor to Harlech, given a suitable IP address, and the DNS nameserver records were updated. At that point staff could start to re-use the server with no need to re-configure their FirstClass clients. This meant that the system was out of use for only one day and caused minimum disruption to MIS and other staff.

FirstClass Interface to Database

For CHWEA, Semantise have implemented their generic GUI ('Wizard,' a FirstClass RAD application) to act as the interface to the database. The application examines the database to determine which tables it should present to the user, which fields are in those tables, and how the tables relate to one another. Much of this is controlled purely by the structure of the database, although some additional configuration ('metadata') is required.

This includes:

- changes to the nature of the associations that are required (between learner and programme, for example)

- which data entry controls to use (e.g. calendar drop-downs, pick lists and so on)
- where lookup data is stored
- how to navigate through it (some of the lookup data is hierarchical, allowing the user to 'drill down' through multiple categories).

The key benefit of the generic GUI, as opposed to the traditional approach of having customised forms bound to specific database fields, is that the system can be tailored to meet evolving requirements much more quickly. This enables the database programmer to simply change the metadata rather than having to redesign forms every time a new field is added or removed.

The FirstClass server has been deployed as the intermediary between the user interface (in the form of the FirstClass client) and the Microsoft Desktop Engine MSDE SQL database (running on the same hardware). For this reason the largest part of the development effort for Semantise was the definition and implementation of the database itself, the development of the interface between the database and the FirstClass server, and the user interface.

Virtual Learning Environment

The e-learning aspects of the FirstClass system could be used as they are 'out of the box' and did not offer serious development challenges.

Once the server was in place the FirstClass environment was offered to a limited number of students. The plan was to allow students and staff to get used to the new environment and gain some feedback from their experience. Sufficient student licences were purchased to allow this pilot phase to progress with IT students and staff, as well as a limited number of staff who needed access to the database for their work. This gradual deployment was also the result of limited funding for student licences at this point. However, funding was also won from the ELWa Knowledge Exploitation Fund (http://www.elwa.ac.uk/elwaweb/elwa.aspx?pageid=1829 [8]) to allow expansion of the user base, to the extent that all new students and staff now get a FirstClass logon. FirstClass has now become the default medium for communication and collaboration for all staff and new full-time students.

Operational Performance and Reliability

The system deployed has worked well and reliably since day one. It has proved to be robust, easy to use and low maintenance. Very occasionally short breaks in network connectivity can interrupt downloads or interaction with the FirstClass server, but the system generally recovers from these without mishap. The system is used via a home wireless network and ISDN 'Home Highway' Internet access by one member of staff who reports that it is very rare to lose a session with the server across this connection.

There is not a 'hot-swappable' spare of the FirstClass server, although there is a back-up of data to tape on a daily basis using VERITAS back-up software. There is also a spare copy of the FirstClass Network Store kept on a spare hard disk, which would enable recovery of the entire FirstClass system in case of a complete hard disk failure on the server.

At the time of writing the system has been in place for eleven months, and during that time network links have been upgraded (see Table 1), with the exception of the smallest CHWEA

offices which are still-using dial-up access due to the low level of current usage. Performance of the upgraded network links has been highly satisfactory.

Benefits of Project

Currently the users of the system are made up as follows:

- 20 core staff who mainly work in IT and MIS related functions.
- 40 other full-time staff.
- 112 (i.e. all) full-time students, both residential and non-residential.
- 45 part-time tutors. These tutors use the system to access teaching resources which are provided by the Association, and to share resources with each other. This is enabling CHWEA to conduct a long-term pilot in online staff development. Ten of these tutors are also benefiting from an accredited teacher training programme ('Training the Trainers'), which is being provided as a 'blended' learning experience, consisting of a mixture of residential weekends and online tasks and assignments.
- 50 part-time learners. These learners are taking part in a project funded by the Wales Union Learning Fund (WULF) (http://www.tuc.org.uk/learning/tuc-9104-f0.cfm [9]). The project is enabling migrant workers to continue studies (e.g. of languages, and of Information Technology) with the Association, from a range of different locations, and at times which suit them. These studies are fully supported by a tutor.

As mentioned in the previous section, student users of the system have been pleased with this way of working and there has been positive anecdotal and user-evaluation feedback. It is easier for students to submit work securely online, to discuss coursework (and anything else) in a 'closed' environment (using online chat tools or email), to receive assessments and marked work, and to access this from anywhere connected to the Internet.

Teaching staff are seeing increased potential for using FirstClass as a learning environment and it is expected that it will offer a portal to ATHENS and the other JISC e-learning services.

Staff can now handle large data sets live, in a fast, secure, robust and reliable way. Reports and data can be extracted quickly and simply, thus saving staff time and effort.

The introduction of the system has stimulated a new way for staff to work collaboratively, and has made the management process smoother and more efficient. For example, every management committee is supported by an FC conference. This means that all members can see and share the calendar, papers, minutes, agendas, etc. relevant to that committee from whichever college location they are at.

Unexpected benefits have also been experienced:

- FirstClass environment assists staff induction, and new staff members seem to be able to gain knowledge of the organisation, and their role in it, more quickly.
- Mobile working is supported — staff find exactly the same 'desktop' whether they are logged in from home or at work. This makes home-working a lot easier and helps staff have a more flexible approach to work.
- There is no need for staff to carry floppy disks, pen-drives, CDs etc. as they can access their documents and files from anywhere with an Internet connection.

To some extent the introduction of this solution has actually improved working practices and

efficiency across many college functions. The project managers feel that the solution provided has covered all of the original requirements in a unified and integrated solution. It has even covered and made improvements to areas that were not part of the original requirements.

Lessons Learned

The approach which was adopted here of assessing the needs of the whole organisation prior to implementation has been very fruitful. This has enabled CHWEA to seize opportunities to make broader improvements than those which might have been implemented in response to demands simply for more bandwidth to the hub of the network. The result has been that funds were spent on satisfying the needs of the organisation rather than on providing an inappropriate and costly WAN based on leased lines. The potential for synergy between the need for communications, MIS database and an e-learning environment was recognised largely as a result of the organisation's staff being able to operate as a team, and to assess the need of the organisation as a whole. The lessons learned from this process will be applied in new developments across the Association. These will include selecting and implementing new systems for financial control, and in supporting the work of the personnel department.

The use of the Internet as a hub for all activities has been effective and reliable. However, the system relies heavily on two separate connections to the Internet: JANET at Harlech and the commercial ISP at the remote office in question. A failure in either of these would prevent remote offices from functioning. This means that the pathway for trouble-shooting these issues can be long and tortuous. Moreover, these connections often have to be maintained in the absence of local technical support. This has highlighted the need for simple but responsive and cost-effective support which is provided at each area office. This will be achieved by training a designated staff member in each office in setting up and maintaining computers and Internet connections, as part of a broader package of contingency planning.

Future Plans

As ADSL broadband has now become available across North Wales, it is likely that the remaining dial-up connections will be supplanted by broadband ones, and the college is now looking at which additional services and/or applications can be supported by these network links. Videoconferencing is an early contender for development as the college already has PC-based ISDN videoconferencing equipment that can be used across an IP network and there is a Welsh Video Network (IP) videoconferencing studio at Harlech. The ability to replace some physical meetings with videoconferenced ones would obviously save staff time and resources.

The unified architecture that has been deployed for the CHWEA e-learning system and database access is built on IP network links, and like all other IP applications, the route followed by the data is immaterial to the two ends of the IP connection. For this reason, the college can look at alternative network access routes (such as direct connections to the NWMAN) in the future. It is likely that a patchwork of network access will continue, with CHWEA opting for the network access method and technology which makes most sense at each location. Methods are likely to include commercial ISP access, as well as partnerships with other educational organisations in the area, and possibly other public bodies that have backbone network capacity.

The functionality of the FirstClass database can be improved and extended over time to meet the demands of those that input and extract the data. One ongoing development (for example)

is asynchronous interaction with the database, whereby the results of a query can be sent directly to the enquirer's email inbox, rather than being presented live. Results from the query can be presented to the user in a variety of formats (e.g. PDF, CSV, HTML). This is in response to requests and suggestions made by staff that use the database regularly.

Staff at CHWEA are enthusiastic and optimistic about the e-learning solution they are using. One year after initial deployment it is becoming ingrained as a *way of working* at the organisation, as well as a means of enabling networked teaching and learning. Staff can see increased potential for e-learning in the community and have recently won funding for projects to enable community-based e-learning which will utilise the FirstClass server. However, initial analysis of the degree to which the potential learner community is connected to the Internet indicates that a flexible approach to these developments is called for. Tools which enable learners to work predominantly offline, such as FirstClass Personal, could be of major value to learners who do not yet benefit from broadband connections.

Many aspects of the solution and strategy that have been described in this case study will require continued monitoring, including:

- the costs / benefits ratio of this solution
- different licensing models (FirstClass offers many)
- alternatives, including open-source solutions
- developments in FirstClass functionality including future integration with real-time communications
- developments in e-learning and VLEs in general
- the nature and needs of the regional, national and international student body
- gaining extra value from the network connections that are deployed, including videoconferencing, and other voice/video applications
- working with commercial, public and educational partners to continue to develop cost-effective network connections.

However, CHWEA is pleased to have met their complex online needs for the time being and into the future, using a simple and elegant solution which has been built on a trusting and positive relationship between its staff and the solution provider and which has focused on user and application needs, rather than a short-sighted technology-based fix which might have been the obvious first idea.

Summary

The merger of Coleg Harlech and the North Wales WEA to become the new organisation CHWEA led to a number of technical challenges, foremost of which was computer communications. The merger was closely followed by a renewed specification of statistical data to be supplied to the main funding organisation ELWA. There was also a need to develop an online learning environment for their large and disparate student population.

In partnership with a locally based solutions provider, CHWEA took advantage of the developing commercial ADSL networking technologies market and the evolving regional JANET network to implement an Internet-based WAN. The reporting demands imposed by the funding body and the need for an MIS for the merged organisation resulted in the requirement for an enhanced central database and an innovative means of access to it. The solution chosen used the FirstClass collaboration tool to develop a unified user interface to the

centralised database server that was able to provide information that had integrity, was live, and could be formatted to stipulated requirements. The user interface to FirstClass also provided a flexible communication, collaboration and e-learning environment.

Problems experienced during the development of the solution could be dealt with quickly during formal weekly meetings with the developers, and FirstClass could itself be used as an online forum for project management and communications.

The CHWEA has benefitted from bringing in a commercial partner able to take a detached view of the organisation’s needs and systems, and with them has managed to provide a unified solution to a number of issues. This has resulted in a more efficient collection of data, ensured the integrity of data provided to third parties, and has led to new and improved working practices.

Links
[1] http://community.ja.net/system/files/images/coleg-harlech-01.jpg
[2] http://www.elwa.ac.uk/elwaweb/elwa.aspx?pageid=2061
[3] mailto:colwyn-bay@wrexhamwea.virgin.co.uk
[4] mailto:username@harlech.ac.uk
[5] http://community.ja.net/system/files/images/coleg-harlech-02.jpg
[6] http://www.firstclass.com/
[7] mailto:a.person@fc.harlech.ac.uk
[8] http://www.elwa.ac.uk/elwaweb/elwa.aspx?pageid=1829
[9] http://www.tuc.org.uk/learning/tuc-9104-f0.cfm