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1. Main Activities

The use of ICT in schools all over Europe is on the increase. From an initial focus on IT as a subject and basic management support in the early '90's, there are now few schools anywhere that do not have an explicit and comprehensive IT policy. Educational authorities have dedicated IT units and support networks to foster the responsible and integrated take-up of ICT in schools.

In-service and pre-service training and support programmes help teachers find innovative and pedagogically sound ways to enhance their teaching through the use of ICT. Dedicated government grant schemes support the installation of equipment and networks in schools and alongside all of this, there is a growing body of knowledge into how best to use the many ICT tools at the disposal of teachers and students.



All over Europe, school networks have been set up by ministries of education that are generally based on a regional or national organisational framework. Many operate schools portals offering recommendations for content, advice and support to school staff and teacher training.



While the list of portal sites offering educational content is impressive, many portal managers report difficulties in actually encouraging teachers to actively use the material which is either produced or recommended on such sites. In research carried out by the SchoolCast team, this was largely found to be for the following reasons:

- Teachers were not aware of available and suitable content
- Poor access and inability to download multimedia rich material in schools
- Lack of opportunity to use educational content due to, for example, poor access to computer facilities, lack of relevance to the curriculum, over-

emphasis on examinations in the curriculum and lack of IT skills on the part of the teacher.

While many of these reasons are linked to broader issues to do with IT in education, poor access and a lack of awareness were of most interest to the SchoolCast team. What if a sophisticated and tailored system could be developed that allowed managers of school portal sites to multicast specific multimedia-rich material to groups and sub-groups of schools? could this not help? ... it is against this background that the idea for SchoolCast was born.

The SchoolCast consortium comprises 4 commercial companies and 2 public institutions who, as a public private partnership, have brought together all the necessary skills to deliver an integrated service fully cognisant of the educational, commercial and technical challenges to create and pilot test a schools content delivery system.

The Prime Contractor with responsibility for management, monitoring and reporting is **ATiT Ireland, Global Communication and Services (GCS)** GmbH in Austria provide the multicasting service SIMPLE and are responsible for the further development and provision of multicasting software, **Web-Sat** in Ireland provide the two-way Internet via satellite network used to connect up the participating schools and **Intel(r) IT Innovation Center** in Ireland are responsible for the provision of the skool.ie site and for providing support with regard to the take-up of the service in non-satellite supported networks. The **National Centre for Technology in Education (NCTE)** is the main stakeholder representative in Ireland which also has responsibility for evaluation of the service and for the provision of content through scoilnet.ie and **HEAnet** who are responsible for the management of the new schools broadband access network in Ireland are a key test user from a network management point of view.



1.1. SchoolCast

The objective of the SchoolCast partners was to develop, implement and bring to pilot utilisation a content delivery system aimed at the compulsory schools environment and to pilot test it with a view to its eventual take-up as a sustainable commercial service.

It is important to understand that SchoolCast is a combination of technologies and human procedures that support the management and the process of selection, validation, aggregation, scheduling and booking of the transmission of content, and furthermore the verification of the reception and access to the content on the client side.

Based on a client-server model where users have access to a common online management system, 4 types of users are foreseen:

- The system manager who is responsible for the final selection of content to be multicast and the overall management of the system, this role is normally foreseen for the school access network manager, usually an agency of the Ministry of Education (in Ireland this is NCTE for example).
- Content publishers who can prepare and clear their own content for multicasting as well as log the use of their content in participating schools.
- Network managers who can schedule multicasting for the most suitable time, satellite providers, for example, usually like to use overnight when there is little traffic on the network.
- Schools who can check for recent multicasts and request certain content to be pushed.

The SchoolCast team made a short animation to help get across the way SchoolCast works and the different people involved which is available from this site:
<http://schoolcast.atit.ie/>



1.2. Development

The SchoolCast system went through various development phases from the initial system as foreseen in June 2004. During the initial 7 months of development, the various elements were created based on two software building blocks on the server side:

- The SchoolCast Management System
- The Archive Creation And Distribution Service or ACADS

SchoolCast was lab-tested throughout this time and by January 2005, a first version of the system was ready for trials.



From February till June 2005, this version of the system was tested with the schools network comprising 10 schools, 3 primary and 7 secondary and all connected to the Internet via a two-way satellite link using the Web-Sat system.

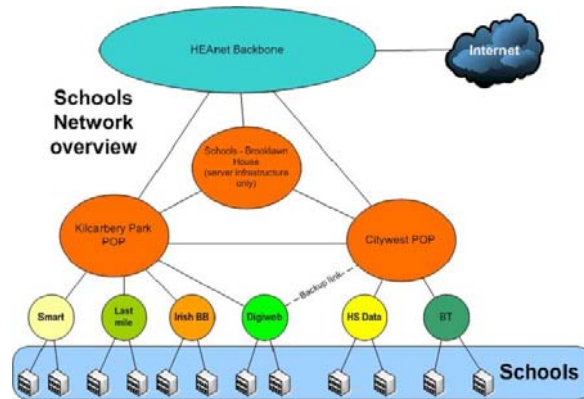
This phase revealed several operational issues in terms of how the system was performing and in June and July, a re-appraisal of SchoolCast took place in terms of both the system itself and the potential take-up of the eventual SchoolCast offer within the target community.

The result of this was two-fold, first a refinement of the system was proposed as an extension of the development work foreseen by the project developers and secondly further effort was put into the potential take-up of the system by network operators other than satellite operators in line with market reality.

The development work continued until November 2005 alongside trials with the schools network which increased in intensity during the months September–November. During this second phase of trials, a far more proactive approach was taken with schools, whereby weekly emails were sent notifying them of the material which had been multicast overnight and inviting and receiving teachers direct input and suggestions about sites and materials that should be multicast.

At the same time as the trial with schools connected via satellite was taking place, the SchoolCast team also set up a trial to test SchoolCast via the HEAnet network. HEAnet, which is a partner in the SchoolCast project, is managing the new Schools Broadband Access Network in Ireland and it has always been an objective of the project to ensure that SchoolCast could operate not only via satellite, but also via terrestrial networks, given the reality of schools network provision in most European countries which is practically always a mix of network technologies. This required there to be a link providing a transparent transfer of multicast traffic between Web-Sat and HEAnet. This link was connected via a multicast router with the fully IP multicast enabled backbone network of HEAnet. An own multicast router at Web-Sat's premises connects this link with the VLAN which is used by the SchoolCast server. For cost reasons, this link was realised as a radio link with a capacity of 2 Mbit/s which is enough bandwidth for the transmission of the web site snapshots as well as for collecting the client log files.

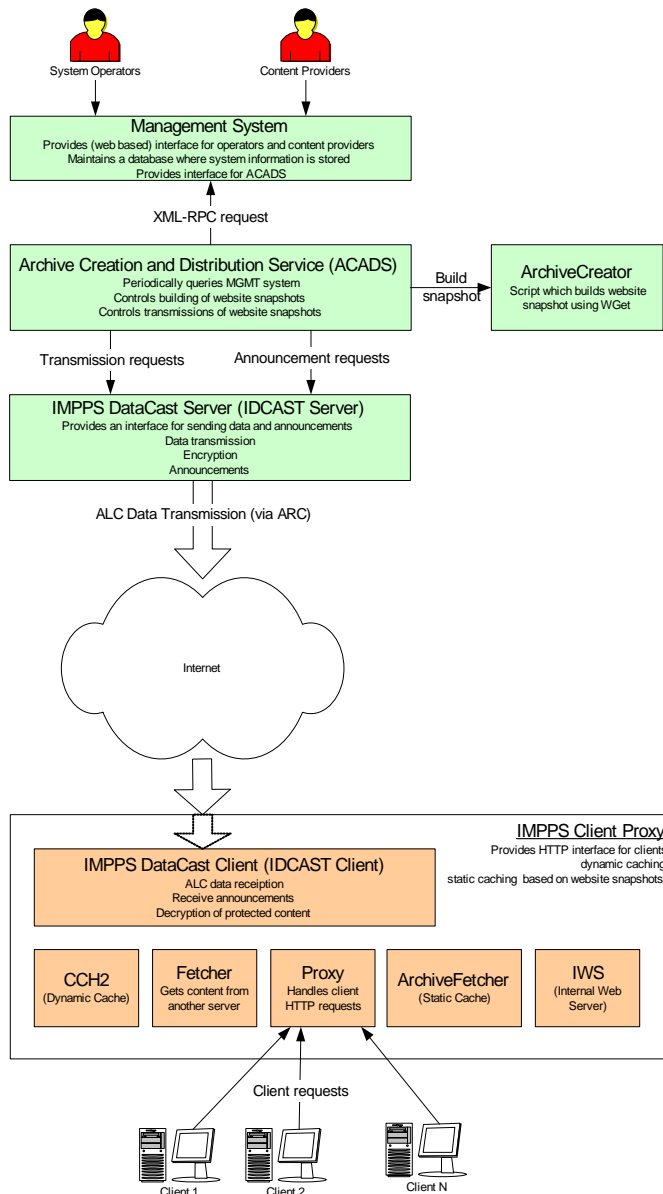
As part of this effort to establish the reality of operating SchoolCast in a mixed network, typical of school provision everywhere, a study was launched in July 2005 entitled "Multicasting Research Paper - The Challenges, Risks, Returns on Investment and Benefits for Internet Service Providers and Schools" aimed at the companies supplying broadband services under the Schools Broadband Access Programme in Ireland.



A range of activities have been undertaken in the project to realise the market potential of SchoolCast. While these have focused to a large extent on the Irish market, this does not mean they are confined to Ireland and workshops and meetings have been held in several countries including a very successful workshop in Greece in October 2004 which has resulted in a number of important opportunities for the SchoolCast team.

2. Outcomes

The outcomes of this project are a combination of a smart integrated system of content fetching with archival creation and secure multicast transmission technologies that is tested and validated in multiple environments (satellite as well as terrestrial) with a user friendly transparent management system, that allows for a transparent management of content, users and transmissions in a single interface. Although that the service has been tested and validated in an educational environment, it is content independent, so it can be used in virtually any other environment. Here is how the system looks in November 2005:

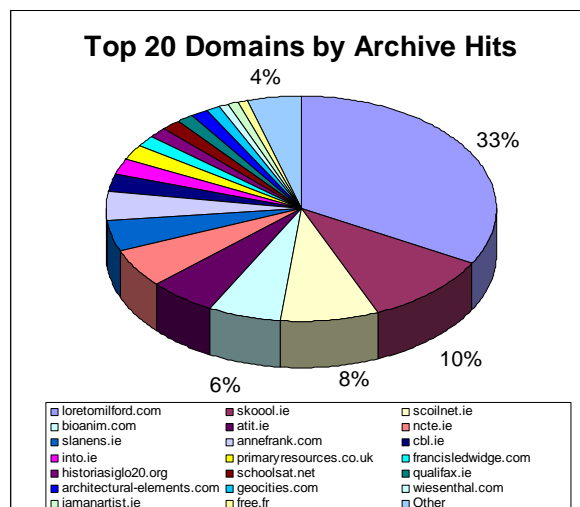


The Management System consists of a management application which is accessible by the end-users by means of a web interface. This interface gives access to all the different aspects required to manage the Content Delivery Service.

ACADS periodically queries the management system for scheduled items, mirrors web sites and creates static snapshots, distributes the web site snapshots via the ARC file distribution server, collects HTTP access log files from SchoolCast clients and processes log files according to the requirements of the content provider.

On the client side the IDCast Client receives web site snapshots via the ARC protocol, corrects transmission errors, stores received web site snapshots to the hard-disk, and instructs the IMPPS Archive Fetcher to load new web site snapshots.

With regard to the initial target user group, the educational community, the system has proven its reliability and appeal to the stakeholders. The service has been put to the test in a real life situation and was evaluated positively overall, this quotation from one of the teachers taking part in the trial is a good example of the feedback received *The quality of access means that I can confidently allow a full class (24) to access the Internet. It has now become a teaching tool rather than an experiment or novelty.*



3. Future Perspectives

Based on the experience of managing SchoolCast it is clear that several opportunities exist for exploitation of the service that has been developed in the educational context.

In the first instance, exploitation has been aimed at stakeholders in Ireland where the project has been piloted. Ireland has been used as a test case, not only in respect to the technical trials but also with regard to the business opportunities that have emerged for the take-up of the system and the exposure this provides to the reality faced by the companies that have developed SchoolCast. The second level of effort has been aimed at potential stakeholders in the educational community outside Ireland, where it is believed considerable interest can be generated now that a fully operational and tested system can be demonstrated.

However several challenges and barriers exist. This is partially due to the nature of SchoolCast itself and partially due to the target market sector. Adapting SchoolCast to the needs of a particular customer is a highly individualised process and much depends on individual requirements. At the same time, the key target for take-up, those agencies with responsibility for the delivery of content to schools and other end-users in the educational sector are quite conservative and require considerable on-going effort in order to appreciate the value of a system like SchoolCast. There is also some evidence that a system like SchoolCast may be a little ahead of its time in that other priorities exist in countries like Ireland where the emphasis is now on ensuring broadband access for all schools and only when this is complete, will the next step of getting good content out to the schools come under consideration. In addition, not all teachers are ready to use web content in their teaching and there is also some evidence that there is a lack of relevant content which clearly meets curriculum requirements.

The consortium remains convinced of the value of continued effort towards the various stakeholders concerned albeit the message for each may be different. We summarise this message as follows:

- For agencies responsible for schools digital content like NCTE in Ireland, the value of SchoolCast lies in its ability to place highly relevant multimedia-rich material directly on the local server and, what is equally important, to see exactly how and when such material is being used
- For Internet service providers regardless of whether the networks employed are based on satellite or not, the value of SchoolCast rests with its ability to increase network efficiency and therefore cut down on bandwidth usage
- For content providers, SchoolCast offers a ready-to-go system for getting their content where it needs to be – on the local hard disk, it enables selection of content and target user and, equally important, feedback on content use
- For schools – and in particular teachers – SchoolCast offers, in the words of one of the teachers taking part in the trial, *Speed and reliability* and the ability to access *a whole site in a very short time*. Teachers benefit from the materials and sites that have been sourced by their peers – often with content that fits perfectly with their local teaching needs.

The SchoolCast partnership continues between the 4 companies involved. ATiT, GCS and Intel are focused on opportunities in Ireland and Greece, while ATiT, Web-Sat and GCS are following opportunities in Sub-Saharan Africa.