Exploiting Web based Electronic Publishing in the service of regional development: lessons from experience

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Abstract

Government institutions, businesses and individual members of society - at least in the developed world - are increasingly required to become computer literate and knowledgeable about Web based electronic publishing. A key issue is what strategies can be employed to ensure that such skill development is achieved within a community and that the opportunities presented to a community by Web based electronic publishing are exploited to advantage? This paper addresses this question. Three case studies involving three distinct user groups - SMEs, Local Government and members of the community - are examined. Each applied the A.K.T.E.S framework: - awareness raising, know-how transfer, trial and evaluation and support through software development and trained personnel. This framework is critically evaluated and lessons learned from our experience reported.

Introduction

We are all aware of the impact that the current convergence of communications and information technology (ICTs) is having on business and on society as a whole. During the last five years we have witnessed an unprecedented growth in the number of computers connected to the Internet. The invention of the World Wide Web (Berners-Lee et al, 1994) has transformed public interest in the use of the computers for communication and information acquisition. Government bodies world-wide have become concerned about the level of computer literacy within businesses and the community as a whole as ecommerce takes root. Economic growth is increasingly argued to be dependant on knowledge workers and exploitation of digital technology. Use of ICTs to support and enable economic regeneration has become a key issue in many regional policy documents[1].

The potential of digital technologies to enhance cultural activities and learning opportunities within communities has also received much attention (Dyson, 1997). As a knowledge driven economy needs a flexible workforce that is constantly updating its skills, the role of technology in supporting life-long learning and just-in-time learning within the workplace through distance education has been emphasised. On-line shopping and other ecommerce activities also require a computer literate population, as does exploitation of the opportunities for digital publication of cultural artefacts. Indeed as electronic publishing of information becomes increasingly commonplace, there is a pressing need for public institutions to provide access and training in the use of the technology to avoid sectors of the community becoming marginalised and excluded from its benefits (Information Society Forum, 1996).

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[1] For example, the Bangemann report (1994), The European Report on Growth, Competitiveness and Employment (1994) and the European Initiative in Electronic Commerce (1997) all emphasise the importance of ICTs to the economic regeneration of deprived regions of the EU. ICT's are viewed as both providing new trading opportunities -through ecommerce activities- and new job opportunities. New media industries - digital content creation in particular - have been identified as a key area for job growth. Greenspan (1998) attributes the present growth in the US economy to the impact of digital technologies.

This rapid pace of change is introducing new pressures. Government institutions, businesses and individual members of society - at least in the developed world - are expected to be computer literate and, in particular, knowledgeable about Web based electronic publishing. Local Government bodies are expected to create multi-faceted WWW sites through which to disseminate information. Small businesses as well as large are expected to engage in Electronic Commerce and everyone, at a personal level, is expected to become competent in electronic information retrieval if not in electronic publishing per se. A key issue facing many policy makers at both a national and more local level is: - *What strategies can be employed to ensure that an appropriate level of computer literacy is achieved within a community? How can the opportunities presented by Web based electronic publishing be best exploited?*

This paper addresses both these questions. Our organisation, CONNECT at the University of Liverpool, UK, http://www.connect.org.uk/, has sought to exploit the potential of the WWW in the service of regional development since 1995. In this paper, we describe, discuss and critically evaluate the strategies we have adopted. We offer a framework- the A.K.T.E.S framework[2]- for use by others facing similar issues. A.K.T.E.S. emphasises the need for *awareness* raising, promotion of *know-how* skills, opportunity for *trial and evaluation* and community-oriented *support* including support for software development in any technology dissemination programme. Use of this framework is illustrated by three case studies of Web publishing projects, each involving a different user group.

Background

Initially CONNECT was established within the Department of Computer Science as an Internet Centre for Merseyside Businesses which would help the latter exploit the opportunities offered by Electronic Commerce and contribute towards the economic regeneration of the region. As Merseyside is one of the poorest regions[3] in the European Community, funding was obtained from the European Regional Development Fund and the European Social Fund as well support in kind from the University of Liverpool for this purpose. This funding was backed by some private funding from Hewlett Packard and subsequently also backed by Telewest and IBM. Local government bodies then became interested in the potential of the Internet and a large electronic publishing project was undertaken with Knowsley Local Government Authority. Finally the need for local consumers for such information and services subsequently led to a variety of community education programmes. The three projects we report on in this paper thus involve three distinct user groups:-

- Small to medium sized local enterprises (SMEs) who wish to use electronic publishing to *market themselves both locally and globally* through an on-line WWW site and sometimes through an on-line store offering a complete *catalogue* and *secure order processing* system. Businesses on MerseyWorld are illustrative of this group, see http://www.merseyworld.com/

- A local Government Authority (LGA), Knowsley at http://www.knowsley.gov.uk/ This user group is illustrate of organisations who wish to engage in electronic publishing on the WWW *primarily to facilitate the dissemination of information* to members of the general public but who are also concerned to *promote a democratic consultative process by electronic means* through forums, feedback forms, contact lists, email, chatroom discussions. Such organisations invariably wish to publish *on-line community newsletters* and *calendars of community events.* To succeed with the latter projects they have to involve others. This requires that *their target customers are also IT literate* and have *ready access* to the technology. Unlike the SME, the local authority has in-house computing support. Developing skills within the organisation thus often involves *training the trainers and software developers*.

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[2] Originally derived from the work of Rogers on the processes underlying the successful diffusion of an innovation within a community (Rogers, 1983).

[3] Objective 1 region (European Community, 1994)

- Members of the general public who are anxious to make use of the Internet and the WWW for *information acquisition* but who also frequently want to *acquire Web publishing skills* as part of a more general computer skills training package. Primarily this is to enhance their future or current job prospects. Recently, however, retired adults in particular have become involved. They are primarily motivated by a wish to make more effective use of their leisure time by educating themselves/researching topics on-line and/or an involvement in their grandchildren's education. Such users were involved in the recently completed Internet Express project, see http://www.connect.org.uk/iexpress/

The A.K.T.E.S. framework

For each of these groups the A.K.T.E.S. framework was adopted. Interest in the opportunities offered by Web based publishing for a particular group was created through special seminars, talks and hands-on demonstrations (*awareness raising*). Each group was then trained in use of the relevant technology (*know-how transfer*) through a modular programme and given the opportunity to try out the technology in the service of business, consumer, educational or community objectives *(testing and evaluation*). Each project required trained demonstrators, presenters and often also required the development of in-house specialist software (*support*).

The Projects

Project 1: Web based Electronic Publishing for SMEs

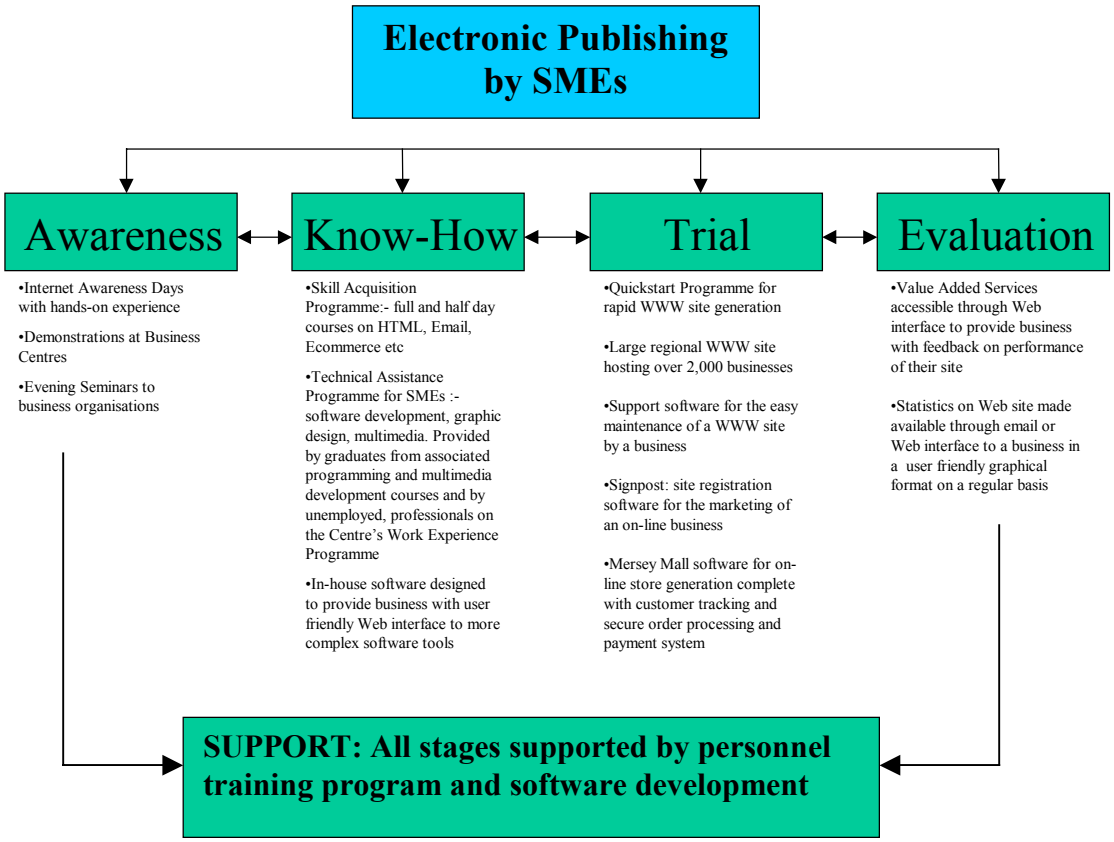
It is relatively straightforward and inexpensive for a small business to take out an account with an ISP, set up a basic WWW site for the promotion of that business and engage in communication with clients through email. The potential benefits of so doing are well recognised in the literature. Our initial contact with SMEs focused on *awareness raising* as to this potential through "Internet Days" during which the principles of ecommerce were discussed and basic tools such as email and HTML editors were demonstrated. Businesses could then gain the appropriate *technical know-how* skills themselves by attending a series of short courses within the Centre. MerseyWorld, http://www.merseyworld.com/ was created in order that businesses could readily *test and evaluate* the technology. MerseyWorld has evolved into a *portal site* for the region. In addition to referencing nearly 2000 sites hosted by our own server, MerseyWorld acts as a gateway to other businesses, services hosted on other servers in the region. The integration of many different types of information on MerseyWorld -travel, tourism, local council, sport etc- attracts many users and in doing so enhances the marketing value of the portal to local SMEs.

As the Internet changes however, effective exploitation of its ecommerce potential requires a more functionally sophisticated WWW site (Steiger et al 1997). Where a business is selling a product line, characterised traditionally by a printed catalogue of goods, the electronic presence of the business is expected to offer an equivalent on-line service: - vis-à-vis creative advertising; a detailed catalogue of the product; an efficient and secure order placement & processing system and a variety of methods (e.g. phone, fax, email) for communication about and confirmation of orders. However, including such functionality in a WWW site and maintaining the site effectively demands a degree of technical skill, which is beyond the competence of most small businesses. There are several possible solutions to this problem. The first is for the business to completely outsource responsibility for the construction, maintenance and development of their WWW site. This can result in the incurrence of an unacceptable cost and also involves a loss of control over a key marketing element by the business. The second is for the business to learn the skills necessary to do the task themselves. This has time implications, which can be severe and can involve the learning of very different sets of technical skills ranging from simple HTML authoring to complex CGI or Java programming. A third option is for service providers to provide the business with an appropriate interface to their technical expertise. The latter option is the option we favoured. We used our technical expertise to provide local SMEs with WWW sites hosted on our servers with a Web based interface to an integrated suite of underlying tools for site validation and maintenance of their site. This system is known as ConnectSupport. A catalogue generation and on-line order processing system, MerseyMall, was also created.

The key services provided by ConnectSupport are: - Web Authoring Advice; Search engine registration and marketing tools; Site Validation; Site Design Advice; Web Traffic Analysis (in-house software utilising the output from Analog[4] software running on the Web server); Contact Management (email redirection etc) and Domain Name Registration and access to a Tools Archive containing functionally useful Java applets and cgi-scripts. Courses that SMEs can attend to develop their Web based publishing skills are also referenced. This service is password protected and only applies to sites hosted on our own WWW servers. Screen dumps illustrating the service can be found at http://www.merseyworld.com/support/hfes/

MerseyMall is a *generic* system, based on the use of CGI scripts, for the *dynamic*, automatic generation of on-line stores for clients complete with catalogues, customer-tracking, order processing capabilities and order confirmation by fax, phone or email from a database of client details. Functional stores may be generated using this software and populated by the client, using a WWW interface to the underlying database in less than one hour, for examples see http://www.merseyworld.com/mall/ Some stores such as LR Supermarket receive orders worth thousands of pounds per month from around the world. Figure 1 below summarises our application of the A.K.T.E.S. framework with SMEs.

Figure 1: A.K.T.E.S. framework applied to Web Publishing by SMEs



Evaluation

User reaction to the ConnectSupport toolkit for maintaining and developing an on-line business presence has been evaluated primarily through use of qualitative (interviews, observational analysis) methods[5].

[4] http://www.statslab.cam.ac.uk/~sret1/analog

[5] The attempt to use an on-line questionnaire to evaluate user reaction to the system met with a very poor response rate though those businesses, which did respond, rated the system positively.

Users are enthusiastic about the system which they find easy to use/ learn. However, this positive evaluation is dependent on the fact that the system is *embedded into a more general framework for site support*. A conventional half day class based seminar is used to introduce clients to the system and support staff are readily available by email or phone to deal with any issues raised by the on-line material. For technically naïve clients, comparable systems such as NetMechanic, which are physically remote and lack human support, http://www.netmechanic.com/, are not nearly so attractive.

Lessons from experience

In our experience, there are still a very large number of businesses that although now aware of the Internet, still have no real sense of the potential impact on their business. Businesses who have little or no marketing budget historically, are not ready to create one just because there is a new media. SMEs who do have some sort of marketing/advertising budget are still reluctant to modify their marketing mix and in many cases, the Internet requires an expansion of their budget. Many SMEs are still attempting to engage in Web marketing out of petty cash!!

Secondly, if a business is a start-up or particularly if it is a new business operating solely using Internet technologies and they do not have a 12 month trading record, getting credit card facilities for on-line ordering and payment is extremely difficult.

The biggest technical issue we have faced in supporting SMEs in their Web publishing activities is probably the differing standards between the various browsers. How does one decide to what extent a site has to be backwards compatible? There are also still connection problems in the UK. Connection and network speeds are still very low, limiting the technology that can be applied to a site.

There are also more detailed technical problems we discuss in other papers. Invariably Web publishing systems, such as the on-line store generation system used at CONNECT, involve trade-offs. Dynamically generated HTML pages ensure currency of information. However speed of response to the customer can be an issue and service provision may be abruptly terminated if, for example, the database underlying MerseyMall falls over. MerseyMall is essentially a templating system for store generation and, as with any template, there are limits in the extent to which one can provide for individual customer need while maintaining the efficiency of the store generation process.

Project 2: Knowsley Local Government Authority

In describing the A.K.T.E.S. framework as applied to the development of the Web Site for a local government authority, Knowsley, we would like to focus on the software development effort (*support*) that occurred in order to provide Knowsley with the tools necessary to encourage *community involvement* with the WWW site, see http://www.knowsley.org.uk/. The training of LGA. personnel involved the same type of activities in respect of awareness raising, transfer of know-how etc that we have described for the SMEs. Examples of software tools developed to promote *involvement and interactivity* are as follows: -

A templating system was built to allow members of the council to create community newsletters for subsequent publication on the site without having to have detailed knowledge of HTML. Various such newsletters are displayed on the Knowsley WWW site. This system is currently html/cgi-based but is being redesigned using XML for data representation. Use of XML will allow the targeting of specific subsections of information during the editing process and will also allow the newsletter to be readily published in a variety of different presentational formats, HTML, Postscript, WAP etc and styles using XSL.

A variety of software tools have been created to allow the ready recording and publishing of community events on the WWW site. For example, there is a Datebook applet that displays community events in an easy to navigate calendar like format. A scrollable list of events is presented to the viewer against a particular date. Clicking on an event line will either bring up a popup message panel containing more information for the user to read or direct the user's web browser to a different web page. With some events such as Board Meetings there is an associated design feature -a small line- which, when clicked, allows the

user to jump between related events e.g. information about the next Board Meeting. Users can page through the calendar on a day by date basis or jump to specific dates.

A variety of communication routes with LGA employees are offered: - a Java applet is used to provide a diary like display of the email addresses of council employees, a chat applet is used for on-line consultation with council officials at specified times, a feedback form and guest book allow users to make comments about the site etc.

Where possible additional services are added to the site to enhance its value to the user. The Job Watch section on the Knowsley site thus interfaces to MerseyWorkPlace, a web interface to a wide variety of databases holding information about jobs in the region. A housing repairs system[6] allowing tenants to submit repairs requests over the WWW by pointing to a graphical exemplar of the fault they are experiencing with a household item. Cultural information is integrated into the site, as for example through the popular Local History section http://history.knowsley.gov.uk/.

Lessons from experience

When the Knowsley project was first started in 1996/7 there were few local government sites. Much of the initial development effort went into producing information on the WWW for dissemination and only more recently has the focused changed to the design of interactive elements and the production of tools that enable the council themselves to increasingly take over the running and maintenance of the site themselves. The Template system, even though the current version is somewhat clunky to use, has proved invaluable in helping LGA employees to take control of the site as it can used to generate a wide variety of document types for different purposes. Many of the applets used on the Knowsley site are also made available to SMEs. The key points we would emphasise to anyone proposing a similar project would be minimise the effort required by council employees to publish material on the WWW and kickstart the project by making use of existing structures and programmes in the community. Knowsley had several community programmes in place, which gives us access to community groups without having to approach each in turn. Making contact with *umbrella* organisations rather than *individual* organisations is also important when trying to develop a critical mass of information on the site.

Project 3: Information retrieval and publishing in the community

Our strategy here has been to promote community access to the technology through partnership with bodies such as *libraries* (through the appropriate local government departments such as Leisure and Recreation services) which provide convenient, secure locations for computer resources and *companies* such as Telewest, HP and IBM who are able to provide sponsorship for the necessary ISDN lines and computer hardware. The first project created through such a partnership was The Internet Express, http://www.connect.org.uk/iexpress/. The Internet Express took the form of a roving Internet café, which toured libraries in the region applying the A.K.T.E.S. framework i.e. raising awareness about and providing training in the use of Web and the Internet both for information retrieval and electronic publishing, to members of the general public and library staff. Occasionally visits were also made to Shopping Malls, Garden Centres etc for one-off special events and in support of other initiatives[7]. The Express provided training at each library in the programme for approximately a three-week period on a rotational basis. A specialist Internet Skills Training course, specifically targeted at unemployed people, was also made available. This was a six-week course, which in addition to the normal Internet and WWW publishing modules included modules on Employment Resources on the Internet (job search skills, electronic, and HTML based CV construction) and Home Page design for advertising job related skills. In poorer areas funding was made available for a PC to be donated to the participating library. The intention was that this

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[6] This facility won a Local Government Award: - http://www.lga.gov.uk/lga/webawards/winners.htm

[7] For example, the UK government initiative, IT for All: http://www.itforall.org.uk/

would act as a seed for locally based initiatives requiring use of the Internet. The Internet Express has recently been superseded (February 1999) by the creation of five permanent community based centres for training, see http://www.connect.org.uk/ctl/liverpool/home.html. Each centre provides a suite of 10 up-to-date PCs with full Internet access and software including stand-alone packages for CV construction and desk-top publishing. Fully trained staff, supported by work experience personnel, provide group or one to one tutoring or advice at each of the Centres. Many of our courses have now been converted to on-line modules for use at these centres.

Support: Creating resources for the region

There is a wide range of employment resources available on the WWW. However, many people who are seeking employment cannot or do not wish to change their location. In a region like Merseyside, with high unemployment, there is a need to provide a more local focus to the employment information available over the WWW. Not only do employment opportunities need to be advertised so too do training and grant opportunities in order that those with skills that have become obsolete can create new opportunities for themselves. Such considerations led us to create MerseyWorkplace, http://www.merseyworkplace.com/ Various stand-alone databases that were only accessible at specific locations in the region have been WWW enabled and integrated. A user is thus not only able to query a database of local jobs on-line, s/he is also able, from within the same site, to check-out training opportunities which would enable her/him to become qualified for a particular job. The user can also readily check whether any form of support, monetary or in the form of child-care, is available while training is being undertaken. The latter information is often of critical importance to women for whom lack of child-care is often a major barrier to retraining. A WWW based email service, MerseyMail, has also been developed to further service the needs of the local community (http://www.merseymail.com/).

Evaluation

Overall the project has been extremely well received by members of the public and library staff. Thousands of people across the Merseyside area have participated. This clearly indicates that socio-economic factors such as an income and education are not barriers to use of the Internet but rather to access to it. When access barriers are removed we found, as have Kraut et al 1996, that social demographic factors, such as gender and generation, were only the prime determiners of *early adoption/interest* in the technology.

The project had considerable *political* impact. It made local government officials aware of the WWW and the Internet. This helped secure the necessary funding for the establishment of more permanent centres. Individual libraries also became motivated to campaign and seek funding for maintaining Internet Access points as a community service.

Lessons from experience

It was our intention that those trained in the community would go on to create local community WWW sites which would act as an information resource in the library, ‘a virtual yellow book’ of a particular area of the region. We had reserved Web space on our servers for this to happen. It did not happen. We appeared to need a locally based ‘community champion’ for this to happen. We did not have the resources to devote a person to this role. Thus while individual course attendees went on to use their newly acquired electronic publishing skills to their personal benefit -as in creating a WWW site to publicise a War Memoirs’ book- few individuals became involved in helping to create a local WWW based community resource (e.g. putting all local voluntary organisations on-line).

Secondly, despite advertising, the initial week at the library tended to have a much lower attendance than later weeks, first time round. Our questionnaires indicated that people predominantly heard about our presence through *‘word of mouth’*. A few advance talks to local community organisations just prior to our visits to the libraries might have ensured an even higher initial attendance in the first week of the Internet Express. Our questionnaires also indicated that projects of this type involve librarians in considerable

additional work. This they willingly undertook as it was felt that the presence of the Internet Express radically altered many young people's perception of and interest in the library.

Organisational infrastructure

Our efforts to exploit WWW based electronic publishing in the service of regional development involve a wide range of projects. These projects were and continue to be dependant on a large number of trained personnel. The technical expertise required to service these projects as well as the personnel required to lecture/demonstrate on the training courses etc was not available at the start of any of the projects. It also had to be created. This was achieved by the establishment of various courses within our own University and *partnerships* with other educational bodies, for example, the creation of a post-graduate Software Technology Retraining course to retrain unemployed programmers in Internet related technologies such as Perl, Java, Javascript and, more recently, a post-graduate Multimedia Technology course to retrain unemployed Arts/Design graduates in multi-media technologies. A Work Experience Programme was also established to allow graduates from these programmes who remained unemployed to gain work experience at CONNECT as demonstrators/software developers/web site designers in the aforementioned projects. Figure 2 illustrates the complex interweaving of all the organisational elements we found necessary to achieve our goals in the projects we have described. The key elements of all our projects were awareness raising, know-how transfer, opportunity for trial and evaluation and support, both by software development and by the provision of appropriately trained personnel (the A.K.T.E.S. framework).

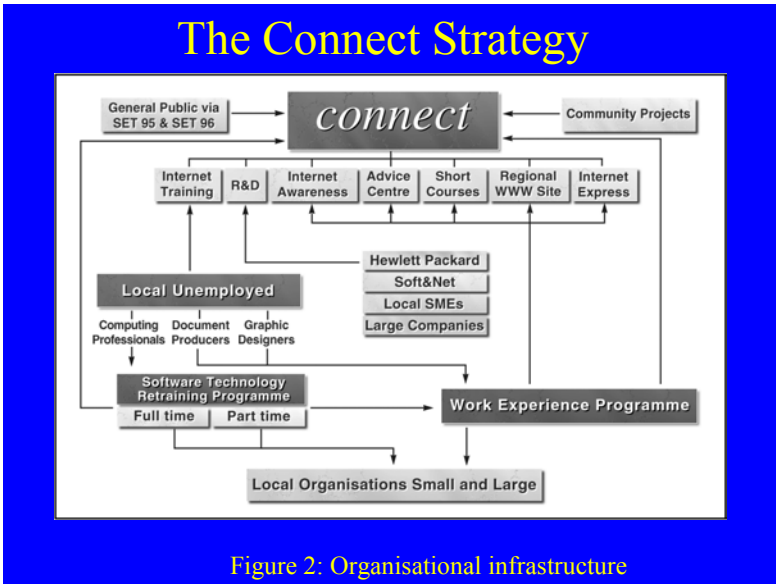

Figure 2: Organisational infrastructure

Conclusion

Each of the projects we have described has not undergone any formal evaluation as to its impact at a regional level. SMEs have however succeeded in generating revenue, in some cases substantial amounts, through their on-line Web presence. The Knowsley Local Government Site is frequently used by local residents and won the 1999 Bangemann Challenge Award while MerseyWorld is one of the Year 2000 finalists in the latter competition. Many individuals in Merseyside have written to us to express appreciation of the WWW publishing skills they acquired on the Internet Express and the impact these have had on their employment prospects. This suggests that the A.K.T.E.S framework has indeed proven valuable in guiding the process of technology transfer to the community.

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