

**Learning Lessons from
MLE Development projects**
A review of the 7/99 JISC-funded projects

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Introduction

This study reviews progress in Managed Learning Environment development across the 7/99 JCIEL-funded *Building MLEs in HE* projects, so as to begin to summarise what lessons can be learnt. It aims to identify and evaluate generic themes, in support of the programme's aims and objectives, and to propose appropriate additional studies, models, resources and support. The projects reviewed and their respective time-scales are outlined in Appendix 1 (also <http://www.jisc.ac.uk/mle/>.)

The first stage of this process was to attempt a comprehensive mapping of the MLE development process from pre-initiation to insitutionalisation¹ into which projects could be 'located'. A draft MLE development generic model was constructed, using a range of sources from both within and outside the 7/99 projects; from interviews, reports and other publications such as JISC briefing papers (fig.1). This was then customised into an MLE development grid which tried to take into account the different objectives and scales of operation - for projects, institutions, the JISC programme and HE/FE community as a whole. This grid (fig.2) puts a basic sequence of 'ideal' activities in the MLE process against its different levels of operation. In each case these simultaneously concern pedagogic, technical and organisational issues.

The grid also aimed to incorporate the over-riding objectives of *Building MLEs in HE* programme (Appendix 2: EYSYS itemisation of issues in 7/99 call), which are summarised below: it was also therefore concerned to provide a model of best practice:

Pedagogic student-centred
 improve learning and teaching processes

Technical: improve integration of technologies across different functions
 improve data accuracy, robustness and management
 support technical innovation
 support single student record model
 assess resource-effectiveness

Organisational: improve organisation and management of institutional processes
 enable the effective management of change

provide tools such as cost-benefit analysis to assess impact
enable embedding in institutions

Transferability: demonstrate value to HE/FE community

draw out generic applicability
provide transferable tools
support collaboration
create technical and organisational guidelines
evaluate and disseminate lessons learnt

The second stage was to test ‘filling in’ the grid using material from project reports. This was therefore not necessarily a comprehensive description of project activities. More work will need to be undertaken to evaluate individual projects effectively using other techniques such as, interviews with key stakeholders. However, it enabled the generation of a broad picture of where 07/99 project activities had been concentrated, where there were gaps, generic issues raised and about lessons that were being learnt. This outline review of projects using the grid framework is given in Appendix 3. In addition, the validity of this grid as a way of describing MLE development and of structuring project information was discussed with project teams at the 7/99 July 2002 Programme Meeting: their responses are included as Appendix 4.

Finally, the outline review of the 7/99 projects was evaluated and key themes drawn out so as to propose potential areas for further work in support of MLE developments in HE and FE and of JISC aims and objectives. This has been divided into four sections;

successes and failures: an overview of the 7/99 call framework in relation to project approaches and outcomes

learning lessons; where more detailed studies of aspects of 7/99 project work could very usefully provide guidance for other projects and institutions engaged in MLE development

generic difficulties: where further research is needed to support the effective development of MLEs

identified gaps: where future projects and studies need to be undertaken to better help improve MLE development processes

Summary of 7/99 MLE projects review: successes and failures

Many of the intended objectives of the JISC 7/99 have been met, particularly in terms of technical developments, that is:

- improving integration of technologies across functions
- improving data accuracy, robustness and management
- supporting technical innovation
- draw out generic applicability
- providing transferable tools

As noted below, valuable lessons from technological prototyping have been learnt here, and can be collated and disseminated relatively straightforwardly – even where ‘solutions’ raise as many questions as they solve. However, 7/99 projects seemed less able to meet JISC objectives where these related to the interface between project and institution; and institution and wider FE/HE community.

It may be that the intention to move towards examining generic issues, transferability, embedding and dissemination around MLE development was in fact “too early” for the institutions involved who have mainly used the funding as a ‘seed-bedding’ initiative rather than for large-scale implementation or institution-wide embedding. In addition, whilst project teams contained considerable technical expertise, they had less experience, on the whole, of explicit project management models and methods; and were specific solution-focussed rather than reflective on, or analytical of, MLE development processes more generally. This was exacerbated by the tendency of their institutions to locate work as a ‘technical’ project, leaving sensitive organisational and pedagogic issues unresolved and the projects authority in these areas often ambiguous and complex. Finally, the time-scales required to fully embed an MLE were far beyond what could be achieved by a two year project.

It is therefore recommended that future funding of projects takes into account the relatively early stages of development across the UK HE and FE sectors; for example, by supporting smaller

scale feasibility studies and by exploring mechanisms for enhancing institutional commitment to the whole (technical/pedagogic/organisational) process rather than just ‘technical’ solutions.

Summary of 7/99 MLE projects review: learning lessons

The 7/99 projects have generated a considerable amount of constructive work which provides both useful resources and the potential for more detailed comparison between and across the approaches that project teams developed. This report suggests that a number of additional short studies could be commissioned for more in-depth reviews of specific activities from the 7/99 round. The main areas where additional comparative analysis of materials already produced and work undertaken could draw out useful lessons are:

MLE conceptual models

Project teams developed and tested a variety of systems and integrative tools, mainly based on portals. In addition there was a mix of bought in, open source and in-house approaches. A comparative analysis of MLE diagrams and their educational/organisational/technical implications would be very informative to the HE/FE community as a whole: as would guidance on the variety of ways in which an MLE could be conceptualised (for example, including consideration of interactivity, e-commerce and intelligent systems.) Such a review would need to test MLE models in terms of their student-centredness, resource-effectiveness and effects on organisational structures and roles.

User analyses/data flow mapping approaches and methods

One of the key findings from the 7/99 projects was how little institutions know about what already happens in terms of either data flows or organisational relationships. Project teams did a considerable amount of work in this area. A comparative study of the successes and failures of their different approaches and techniques would be very informative to future projects and for MLE development in the sector generally. This could offer guidance on best practice, provide a framework for feasibility study funding (where institutions first evaluate what they already do before going on to improve the process), and support further research on the current ‘shape’ of UK HE/FE in terms of similarities and differences in data and organisational structures.

Data ownership and gate-keeping in institutions

While, overall, sensitivities about potentially changing roles and responsibilities across institutions made it difficult for projects to engage effectively with organisational and educational change at the university/college level, their initial mapping processes interacted very immediately with existing patterns of data ownership and gate-keeping functions. A review of 7/99 project difficulties in attempting to integrate data and alter accessibility across previously separate areas could very practically inform this aspect of MLE development

Approaches to systems architectures, tools and standards

The 7/99 projects concentrated on key issues of technical compatibility across systems, tools and standards; and were generally successful in linking up aspects of VLEs and MIS, in designing and testing generic cross-platform tools, in implementing security and authentication procedures and in applying standards (particularly IMS) to enable integration. An in-depth review of these technical developments, the lessons learnt and their more general applicability to other HE/FE institutions, in consultation with project teams, would be a very relevant outcome from the 7/99 round.

Content and delivery strategies, design and implementation

The review suggests that 7/99 MLE content and delivery was most commonly developed as a reactive and incremental response to existing technical/organisational/pedagogic structures. However, a comparative evaluation of the different resulting patterns of in-house/ bought in resources, content design, data access procedures, delivery strategies, student support services, staff development mechanisms, assessment processes, media mix and updating processes – preferably in relation to all ready existing best practice guidelines on on-line learning materials development – could draw out important conclusions about strategic versus incremental approaches.

Disseminating information and resources

Whilst project time-scales and solution-focussed approaches meant that efforts around dissemination were relatively uneven, all projects attempted dissemination and provided resources at three levels (within an institution, between project teams and towards the wider HE/FE community.) Useful lessons could be learnt here from summarising and evaluating their experiences of these processes – that is, of what seemed to work and what didn't. This would, however, also need to be put in the context of best practice approaches to dissemination, some of

which have been developed, for example, by TLTP and FTDL projects which looked at problems in embedding ICT into educational institutions.

Project evaluations: approaches and methods

Projects planned a variety of internal and external evaluations of their work (see appendix 5: *EYSYS summary of 7/99 project evaluation methods*). In addition, the 7/99 round was used as an opportunity to explore cross-project modes of evaluation, which examined process models, evaluation methods and reporting frameworks. A comparative review of these various evaluations would be very helpful in moving towards guidance on best practice and for unifying evaluation processes.

Summary of 7/99 MLE projects: generic difficulties

Some of most interesting conclusions from the 7/99 projects has been about common difficulties, that is, aspects of MLE development which were hardest to implement and/or where information and guidance was sparse. Attempting comprehensive MLE development - something still in its infancy – is highlighting the complexities (and incompatibilities) of many existing pedagogic, organisational and technical structures and processes in HE and FE.

Lack of precedents: what is happening across the sector?

One key difficulty for all projects was the lack of available and well-tested precedents for any aspect of MLE development. In many ways, the projects themselves were really feasibility/precedent studies. JISC is now funding a “state of the sector” survey of MLE development across the FE/HE sectors, which will be very informative to future project and institutional processes; as would a summary of the (generally more advanced) American experience. It is also suggested that some future studies could explicitly explore what type of precedent and feasibility studies would be useful to the sector. This needs to take into account on-going institutional flux and shifting educational contexts.

Problems in selecting/ customising/building integrated systems

Many of the 7/99 projects began to undertake interesting work (and to generate potentially valuable resources) related to systems procurement and/or in-house design. Most found themselves attempting to resolve incompatibilities even within systems from the same supplier and having to deal with uncooperative vendors and time delays in procuring appropriate systems and tools. This is exacerbated by the relatively newness of MLE development and by the speed of

change of standards and applications versions; although it now seems that some generic open source tools such as Uportal may offer flexible and robust possibilities. More detailed guidance in how to select systems and choose between in-house and commercial variants would thus be welcome.

Scaling up and integrative processes within institutions and across UK HE/FE sectors

The framing and time-scale of the 7/99 funding round, together with current levels of expertise within UK HE/FE, tended to result in product rather than process oriented approaches. There was a lack of clarity about relationships between projects and their institutional contexts: and between joining-up parts of administrative/educational/learning support services and its scaling-up to the whole institution. This was clearest in the sense that most project continuation strategies are relatively fragile. MLE development inherently demands a level of cross-institution collaboration and commitment far beyond other ICT projects. It is thus essential that the HE/FE sector both has guidance on the implications of MLE development in terms of organisational, pedagogic and technical re-structuring, and that any future projects are more firmly embedded in their institutions from the start. This latter requires recommendations on how to confirm institutional commitment before supplying funding, what sorts of pre-initiation processes should be in place, and best practice decision-making structures.

Managing change

Universities and colleges in the UK do not commonly have in place explicit management of change models or processes. They have tended to build up systems piecemeal, resulting in continuing incompatibilities, repetitions and gaps in both organisational and technical frameworks. In addition, they have traditional divisions between academic, administrative and learning support staff. Almost all the 7/99 projects have had to recognise the complexities and sensitivities of their contexts and the inevitable inter-relationships between data and organisational interoperability. A comparative analysis of management of change models and techniques, with recommendations for best practice relevant to HE and FE education could usefully inform both institutions and projects.

Staff development and consultation processes

Whilst all the 7/99 projects undertook some staff development and/or consultation, this was often at the level of information and training, rather than, for example, debate and consultation. Again,

the experience of previous ICT-related FTDL and TLTP projects around staff development might be usefully applied and extended to MLE initiation and implementation.

Developing content-centred MLEs

It is suggested that the 7/99 MLE projects were successful in improving interoperabilities between systems, particularly between different MIS components and between VLEs and MIS: but that the demands of system integration sometimes took precedence over consideration of content design and delivery. The mapping, comparison and evaluation of different 7/99 project MLE content and delivery frameworks – put into the context of best practice pedagogic models – would provide useful base data against which to propose guidelines on MLE content and delivery design.

The single student lifelong learning record

7/99 projects also made some useful steps towards enabling a single student identifier across parts of systems within institutions. However, the difficulties in even achieving this at a local level indicate some of the complexities of developing a single student record across their entire learning experience. A review of the problems projects faced (and the various solutions) put in the context of a lifelong learning agenda would inform policy and practices in this area.

Cost – benefit models and performance criteria

On the whole, UK HE and FE lacks effective cost-benefit models or performance analyses for evaluating the effectiveness of conventional educational processes, let alone on-line and MLE supported ones. The 7/99 projects found this a common difficulty and in response began a useful gathering together and testing of aspects of various evaluation models and methods. These could provide the basis of a more thorough review of what techniques are available and their applicability to HE and FE sectors.

Linking initiatives

The 7/99 projects were uneven in their ability to collaborate across projects or with other groups. It was also difficult to link to, or make comparative assessments of parallel initiatives such as DNER. Reviewing or networking with relevant associated initiatives can be time-consuming and ineffective at the level of the individual project. It is therefore suggested that on-going review and linking of initiatives is best located as a JISC provided service. Whilst this already happens at a

generic level, it may be worth exploring how it could be customised to specific areas such as MLE development. This may mean re-considering, for example, the categorisation of information and services on JISC web-sites.

Summary of 7/99 MLE projects: identified gaps

Within this previous list, there were a few clear gaps in supporting materials and research; that is, areas where key aspects of MLE development still remain to be explicitly articulated.

Lack of models of MLE development process

Most important of these is the lack of generally agreed models of the MLE development process itself. Unlike on-line learning materials development, where clear and education-centred process diagrams already exist (for example, in the work of Laurillard and Rowntree), the MLE development process tends still to be very much based on a kind of ‘suck-it-and-see’ approach. One of the most important outcomes of the 7/99 projects has been the opportunity their range of development processes offer (both successes and failures) as groundwork towards an ‘preferred’ MLE development process model.

Defining intended outcomes and evaluation criteria

One of the clearest gaps caused by this lack of an MLE development process model was in institutions or projects having well defined objectives. Whilst the general assumption was that an MLE needed to provide ‘seamless’ online access to educational and administrative information and services all students (and staff), this was not necessarily broken down into explicit or evidence-based outcomes. Again, there is a useful analogy with best practice in on-line learning, with intended outcomes linked to evaluation criteria. Managers in HE/FE institutions need to be involved in developing a range of relevant outcomes/evaluation statements for MLE development, so as to inform the sector in general and individual initiatives in particular.

Supporting a student centred approach

A related gap – which urgently needs to be dealt with – was the lack of an explicit concern with making the student experience central. Of course, technical and organisational requirements are also relevant, and academic, learning support and administrative sensitivities have to be managed. Nonetheless, institutions and projects failed, on the whole, to examine how a student-centred approach could and should inform their activities. Best practice guidance here is essential to improving the quality of MLE development.

Relationships between MLE development and educational/organisational change

It has been noted that most 7/99 projects and institutions treated MLE development as piecemeal and incremental, rather than something which implies wider institutional re-thinking and re-structuring. Research into the impact of different MLE conceptualisations and development processes on organisational and pedagogic relationships would help inform the sector about using MLE development to improve organisational and pedagogic performance.

Conclusion: towards an MLE development guide

This review has aimed to propose methods of consolidating 7/99 outcomes by mining the rich data they can provide: by drawing out common difficulties, and by highlighting some key gaps which need to be filled. It is suggested, in conclusion, that MLE development in the UK is now at a stage where it is possible to provide guidance on best practice, not just for aspects of its initiation, implementation and embedding, but comprehensively for the whole process.

An outline of how the MLE development process might be articulated has already been described. This begins to provide a framework linking the various recommendations for additional studies and guidance given above. Such an MLE development guide (which parallels many of the excellent resources on on-line learning development and VLEs) could offer a very valuable resource for HE and FE institutions as they become increasingly aware of the importance of MLEs and of the need to implement them effectively.

Fig 1: An outline map of the MLE Development process

1: pre-initiation

Visualising your MLE

What does an MLE look like - pedagogically, technically, organisationally?

Portals and their alternatives

Buying-in versus in-house developments

Learning from precedents

Assessing developments across the sector

Making the student experience central

Considering changing educational contexts

Defining outcomes, monitoring processes and evaluation criteria

How can 'seamless access to relevant information and services for students (and staff) everywhere and at all times' be articulated in terms of specific outcomes and evaluation criteria customised to a particular institution?

Guidance on 'typical' outcomes and issues to be addressed

Guidelines on evaluation and performance measures; cost-benefit, impact assessment etc.

Analysing what already happens

Mapping existing data flows/organisational relationships/student experiences within the institution; examples of good practice

Analysing internal gaps/overlaps/repetitions/inconsistencies

Re-designing to support student experience, data robustness and efficiencies improved organisational procedures and in response to external contexts and changes

Scoping the project

Agreeing and validating the MLE

Funding

Feasibility

Defining an action plan

Allocating tasks and responsibilities

Planning for the management of change

Guidelines on planning the process

Student and staff consultation procedures

The importance of institutional commitment

Overcoming difficulties in managing change in HE/FE context

2: implementation

Content and delivery

Content design and/or purchase

Planning and supporting content design and delivery processes

Making content and delivery to student central to process

Review of e-learning models to include MLE issues

Good pedagogic practices in MLE development

Managing the student record

single student identifier (life-long learning)

authentication and authorisation

IMS and other interoperability issues

Student accessibility to data

Selecting systems

Characteristics of existing commercial systems and likely changes

Evaluation and procurement processes

Commercial versus 'home-grown' systems

Legal issues (copyright, IPR etc)

Systems architecture, tools and standards: design and re-purposing

Architectures, tools and standards

development models and processes

accessibility - guidelines

Systems operationalisation

enabling interoperability

demonstrators, pilots and 'big bangs'

Piloting and testing procedures

Managing implementation

organisational 'interoperability'

how to implement institutional restructuring

testing re-designed processes and systems with users

performance monitoring

involving students

staff development

re-organising data ownership and management

3: institutionalisation

Scaling-up and integration of systems

Scaling up implementation to whole institution/between institutions

Continuation strategies

Embedding processes

Systems administration and up-dating

Evaluation and process improvement

Assess MLE development against outcomes and evaluation criteria

Embed process improvement

Learning lessons

Sharing experiences with wider HE/FE community
Collaboration and enhancing interoperability

1. Pre-initiation: key activities and issues

Visualising the MLE		
Project	Institution	Programme + Community
Precedents MLE conceptual models Student centred approaches	L+T , ICT and information strategies Quality enhancement Student centred policies Investment planning Changing educational contexts	Generic issues Dissemination of best practice Collaboration Transferability
Defining outcomes, monitoring processes and evaluation criteria		
Project	Institution	Programme + Community
Project outcomes Project monitoring Project evaluation processes	Institutional outcomes Cost-benefit analyses Performance targets	Costing models Evaluation models
Analysing what already happens		
Project	Institution	Programme + Community
Map data and organisational structures and processes <i>Evaluating/re-purposing available systems/ functionalities/ compatibilities/costs</i>	Evaluating/re-purposing institutional structures and culture	Best practice mapping Similarities and differences across HE/FE sectors
Scoping the project		
Project	Institution	Programme + Community
Define scope Feasibility studies Clarify terminologies Project staffing and management <i>Project programming</i>	Institutional commitment	Guidance on pre-initiation work

Planning for the management of change		
Project <i>Management of change processes</i>	Institution Project champions Management of change models Consultation processes Collaboration procedures, eg Roundtables	Programme + Community MLE champions Effective change models Guidelines and tools on consultation and collaboration

2. Implementation: key activities and issues

Selecting systems		
Project	Institution	Programme + Community
<i>Compare commercial systems/alternatives</i>	VLE and MLE good practice models	
<i>Consultation and selection procedures</i>	Procurement and investment decisions	
Content and delivery		
Project	Institution	Programme + Community
Learning objects	Specify content	Generic issues
<i>Interface and navigation structuring and design</i>	Specify data access	Disseminate good practice
<i>Meet interface accessibility guidelines</i>	Specify delivery strategies	
<i>Design data transfer and storage mechanisms</i>	Specify student support	
<i>Evaluate content and delivery</i>	Specify assessment processes	
	Specify media mix	
	Updating processes	
	Develop/purchase resources	
	Legal issues - data protection/Copyright/IPR	
	Plagiarism detection	
Managing the student record		
Project	Institution	Programme + Community
<i>Authentication, authorisation and security procedures</i>	Single student identifier	Lifelong learning single student record
<i>Student accessibility to data</i>	Re-structure data ownership and management	
	Incorporate and evaluate student experience	
Systems architecture, tools and standards: design and re-purposing		

<p>Project</p> <p><i>Customise/integrate commercial systems</i></p> <p><i>Systems design</i></p> <p><i>IMS</i></p>	<p>Institution</p> <p>Monitor, support and improve systems integration</p>	<p>Programme + Community</p> <p>Integrate with parallel initiatives (e.g. DNER)</p>
<p>Systems operationalisation</p>		
<p>Project</p> <p><i>Define operationalisation procedures - Demonstrators, pilots and ‘big bangs’</i></p> <p><i>Interoperability</i></p>	<p>Institution</p> <p>Interoperability</p>	<p>Programme + Community</p> <p>Guidelines on approaches and best practice</p>
<p>Managing implementation</p>		
<p>Project</p> <p><i>Managing change structures and processes</i></p>	<p>Institution</p> <p>Staff development and ‘buy-in’</p> <p>Involve students</p>	<p>Programme + Community</p> <p>Best practice on managing implementation</p>

3. Institutionalisation

<p>Scaling-up and integration of systems within and across institutions</p>
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<p>Project <i>Implement maintenance, technical support and updating procedures</i> <i>Continuation strategies</i> <i>Collaboration</i></p>	<p>Institution Transferability Embedding</p>	<p>Programme + Community Extend standards Provide guidelines, tools and resources Support integration</p>
<p>Evaluation and process improvement</p>		
<p>Project <i>Project self-assessment</i> <i>Student experience</i> <i>Staff evaluations</i> <i>Disseminate evaluation results</i></p>	<p>Institution Process improvement</p>	<p>Programme + Community Cross project evaluations Good practice examples</p>
<p>Sharing lessons</p>		
<p>Project <i>Dissemination</i></p>	<p>Institution Process improvement</p>	<p>Programme + Community Contribution to MLE models Access costs and benefits Evaluate programme effectiveness Impact assessments</p>

Appendix 1: 7/99 Projects and programmes

To be added

Appendix 2: EYSYS itemisation of issues in 7/99 call

To be added

Appendix 3: Using the MLE development grid framework to review 7/99 projects

The original aims of the MLE development grid were to:

- Provide a framework for recording, ordering and evaluating the key themes and issues generated by MLE development
- Enable the 'location' of different 7/99 project and programme objectives and impacts so as to map out both areas of activities and potential gaps across MLE development as a whole
- Provide a mechanism through which projects can locate themselves and their priorities, so as to group and review progress around validated issues²
- Act as a repository of linked information and evaluation related to relevant themes and issues
- Use identification of the successes, failures and the gaps across the grid to provide a framework for outlining potential future actions in supporting and evaluating MLE development in UK HE and FE

In this first iteration, the grid is broken into its sequential elements and then some relevant 7/99 project activities and lessons learnt listed in each category. This is followed by suggestions for future action. Where actions are already going ahead within JISC, these are asterisked. It is these action items that have formed the background to the review recommendations.

Whilst no framework for something as complex as MLE development can offer a completely coherent and non-redundant set of themes, it is hoped that such an approach begins to offer a valuable 'thick' description of the processes involved. It should be noted that the concentrated work in response to the 7/99 call has been mainly in technical areas of systems architecture, tools, standards (particularly IMS) and interoperability issues. 7/99 projects were also divided into separate areas. This means that some cover several issues across the grid, whilst others are concentrated in one 'box'. In addition, most projects did not achieve their original aims and objectives in full, due to a variety of reasons which are dealt with in the body of the report; activities are therefore towards pre-initiation and initiation phases of MLE development rather than implementation and embedding.

At this stage, programme and HE/FE level themes are included in the diagram for completeness, but are only expanded in the main body of the report.

Pre-initiation: key activities and issues

Visualising the MLE		
Project	Institution	Programme + Community
Precedents	L+T , ICT and information	Generic issues
MLE conceptual models	strategies	Dissemination of best practice
Student centred approaches	Quality enhancement	Collaboration
	Student centred policies	Transferability
	Investment planning	
	Educational contexts	

- *Precedents*

Whilst many project teams had knowledge of, and expertise in relation to, previous MLE projects, (and many studies are already available), the 7/99 projects could not refer easily to relevant precedent studies in an appropriate format. Part of the call's aim was to inform understandings of the MLE development process. 7/99 projects were therefore required to disseminate reports of their activities. Projects were also asked to self-assess their contribution to the future development of MLE models, in order to facilitate the development of shared resources. The collation and dissemination of these resources generated by projects is currently being undertaken by JISC staff.

ACTIONS:

- Commission research on state of the sector in MLE development*
- Collate and disseminate resources from 7/99*
- Produce and disseminate relevant precedent studies

- *MLE conceptual models*

The short study *MLEs, joined up systems and the problems of organisational change* reports that within the 7/99 projects and institutions there has been a tendency “to conceptualise the problem as the integration of *existing* systems.” The student portal model, supported by JISC in this call, has been a key mechanism in enabling scaling-up and integration of systems through a connecting layer, without requiring re-design of underlying processes or relationships. The majority of the JUSL and JUSI projects have developed web-based portals using open source

software and IMS specifications to join together previously separate components of student data systems, on-line learning delivery, library and other learning support services, linking and customising commercial systems. Three custom-built VLEs have been extended and tested in relation to interoperability. These have all been intended as multi-functional and transferable. In addition, four projects have produced software tools to assist future developers (and explored issues of common standards, particularly IMS specifications and compliance.)

Whilst this has enabled considerable technical and organisational lessons to be learnt (see *systems architecture, tools and standards*), other alternatives (particularly those with clear student-centred and pedagogic objectives) still need to be conceptualised and tested. The projects themselves have become increasingly aware of this issue, with ComanTLE organising a workshop to discuss MLE visualisations. However, at the level of the institution there appears less recognition that MLE development is not merely a piecemeal addition to existing academic, information, administrative and technical processes but demands their re-thinking and re-structuring.

ACTION: Guidance on the different conceptual models for MLEs

Student centred approaches

Analysing project progress reports seems to suggest that teams tended to look at how to give students access to what their institutions hold, rather than analysing the students' experience and requirements. Students were involved in some initial user studies: for example MARTINI had Students Union support in student user needs analysis, SMILE had a student support officer on their advisory committee and Loughborough students were involved in a CAA interface review. Students have also been involved in testing pilots, for example at DMU and at Student Focus, Bangor, which is consulting widely with the student body about the functionality and content that they would like to see in the new system.

Other projects used placement and post-graduate research students to support aspects of project development. These, however, were not necessarily supported by any coherent institutional or project overview of how make the student experience central to the design and implementation of an MLE from a pre-initiation stage (see *involving students*).

ACTION: Guidelines on a student-centred approach to MLE development

- *L+T, ICT and information strategies, Quality Enhancement and student-centred policies*

The extent to which MLE development come out of, or was integrated with, institutional strategies and other policy initiatives was very varied. In part this was because MLE Development was not articulated via a set of intended outcomes, which could be linked back to these strategies and tested through explicit evaluation criteria. In addition, it was not always clear what processes and mechanisms were put in place for translating policy into practice and how effective these were. As already noted, this was because MLE development was often treated institutionally as additive and non-problematic rather than integral to, and forceful elements on, pedagogic, cultural, organisational and infrastructural change.

ACTION: Guidelines on defining MLE intended outcomes and evaluation criteria

- *Investment planning*

There is also little evidence on MLE development, the 7/99 bid cycle and university investment plans. It is difficult to assess if the projects would have gone ahead within JCIEL support.

ACTION Consideration of MLE development support based on matching funding and similar mechanisms for clarifying institutional commitment

- *Changing educational contexts*

MLE Development is inherently connected to shifts in educational contexts. The shape of an MLE and its implementation also frame relationships between learners, academics, learning support and administrative staff; and between the institution and the outside world. MLE development is most appropriate where it aims to respond effectively to current changes to the FE/HE sectors, institutions such as expansion of access, diversification of the curriculum, flexible modes of delivery (including at a distance) and concerns with lifelong learning.

ACTION: Commission research on state of the sector in MLE development*

Defining outcomes, monitoring processes and evaluation criteria		
Project	Institution	Programme + Community
Project outcomes	Institutional outcomes	Costing models
Project monitoring	Cost-benefit analyses	Evaluation models
Project evaluation processes	Performance targets	

- *Project and institutional outcomes*

The intended outcome for MLE development can be summarised as ‘seamless’ on-line access for students (and staff) to relevant university information and services, available anywhere, anytime. Whilst all projects were developing or testing all or part of such an outcome, there was little recognition of the need for evidence based evaluation criteria explicitly linked to more precisely articulated outcomes. It may be that the learning outcomes model could be extended to project planning.

In the CoManTLE study of academic and administrative staff, they report that there was no apparent clear consensus on the reasons and benefits of e-Learning. As with SMILE at Sunderland, the project itself became a means to enable debate about what the outcomes of MLE development should be, as well acting as a mechanism to achieve increasing commitment from senior management (see also *management of change, staff development*).

ACTION: Guidelines on MLE development, outcomes statements and evaluation criteria

- *Project monitoring and evaluation, cost-benefit models/performance targets*

Projects found it difficult to self-assess benefits and costs from MLE development, particularly at early stages. It should be noted that this is partly because FE and HE institutions do not have consistent procedures and measures for evaluating conventional teaching modes and methods, let alone ways of assessing what constitute pedagogic and resource effective changes.

Another commonly raised issue in the CoManTLE interviews related to estimating the true cost of implementing e-Learning across the institution and resourcing developments. Estimating the costs of the different strategies and solutions is part of the on-going work of the LMT working group at Bangor. The Virtual Desk project, DMU, undertook a literature search into the costs and/or benefits of MLEs and related developments. They also worked with existing DMU staff

who had used learning technologies and gathered information on their costs, usage and impact.

From these published and unpublished sources, lists were compiled of:

- The cost elements associate with building an MLE
- Methodologies for calculating or estimating these elements
- Sources and examples of cost data
- Methodologies for evaluating the impact of MLEs
- Sources and examples of evaluation data

ACTION Continue review, development and dissemination of performance assessment methods

Analysing what already happens		
Project	Institution	Programme + Community
Map data and organisational structures and processes <i>Evaluating/re-purposing available systems/ functionalities/ compatibilities/costs</i>	Evaluating/re-purposing institutional structures and culture	Best practice mapping Similarities and differences across HE/FE sectors

Mapping data and organisational structures and processes; evaluating/re-purposing available systems/functionality/compatibilities/costs

University data systems tend to have been built up piecemeal and through time to meet the needs of separate functions areas within the organisation. This means that project teams initially needed to build up accurate and complex data and organisational maps in order to record what was already happening, because such information did not already exist. They then needed mechanisms for reviewing, re-designing and evaluating systems, assessing user requirements and negotiating these changes with relevant stakeholders.

The enormity of these tasks alone should not be under-estimated. The complexity of current systems and processes and the proliferation of alternative/replicated student records at departmental, faculty and institutional level was noted by many project teams. This was both in the inability of computing systems to talk to each other and in gaps, repetitions and inconsistencies between how processes were defined organisationally. There was also a lack of

integration of different ICT related initiatives from various departments or at different levels. In addition, both mapping what already happens and proposing improvements are organisationally very sensitive issues because of the inter-relationships between control over data and existing roles and responsibilities (see management of change).

Different projects used a variety of approaches to this problem. SMILE developed data flow diagrams and process maps: and then undertook user surveys and user scenarios (based on focus groups) linked to the their SAS procurement process. Their mapping was thus a means not only to describe the existing situation, but as a method of consultation and dissemination. The short study *MLEs, joined-up systems and the problems of organisational change* proposed that most common motivations for bidding in the 7/99 round was because of the need to replace existing and out-dated MIS, or to enable components to talk to each other. Thus the pre-initiation phase was often reactive and particular to an institution. Only SMILE articulated re-purposing systems as related to institutional restructuring and used VLE/MIS selection as an integral part of consultation processes. One of INSIDE's aims was the development of a sustainable model of the university's information flows and processes based on analyses and formal modelling techniques

The CoMantLE project used two different techniques, both systems-oriented, to analyse the structure of their institution, to explore the structures and processes that needed to be in place to support a VLE. These were the Viable Systems Model (Beer) and Soft Systems (Checkland). The process of mapping the functional structure of the organisation begun with the procurement of organisational information including strategy documents, organisational charts and committee structures (*Reports from visits to 7/99 projects, spring 2001*). An important part of the organisational modelling work of CoManTLE was thus to provide a way of estimating the nature and extent of organisational change involved and a model of the perspectives amongst different stakeholder groups of the reasons for engaging in e-Learning.

ACTIONS: Review 7/99 mapping methodologies and provide (student –centred) guidelines
 Map institutional similarities and differences in data and organisational structures

Evaluating/re-purposing Institutional structures and culture

At the time of the August 01 Progress report, many projects were reporting difficulties with the time consuming nature of setting up processes for engaging with staff across the institution. The short study MLEs, joined-up systems and the problems of organisational change proposed that

organisations needed to be modelled as to different kinds of key stakeholder commitment: comprehensive, additive, parallel and autonomous – each with implications for effective implementation processes.

The Roundtable methodology being tested by two projects also indicates some issues about the importance of existing insitutional structures and cultures

ACTION: Review methods for analysing FE/HE organisational structures and cultures

Scoping the project		
Project	Institution	Programme + Community
Define scope	Institutional commitment	Guidance on pre-initiation work
Feasibility studies		
Clarify terminologies		
Project staffing and management		
<i>Project programming</i>		

- *Define scope*

The work reviewed here is all project based, with the scope of that project defined in the original applications. However, in some cases it is clear that the scoping process tended to be opportunistic and reactive, rather than integrated with the requirements and intentions of the university or college. In some cases it came from a single department. This left some project teams with a complex and unresolved relationship between project and institution, between MLE project and other initiatives, and between collaborating projects and/or parent bodies.

ACTIONS Guidelines on how to scope projects
 Support for initial feasibility studies in support of institution-wide developments

- *Feasibility studies*

A conclusion of *MLEs, joined-up systems and the problems of organisational change* is that the 7/99 projects tended to have a solutions driven rather than problem-seeking approach. It is suggested that pre-initiation feasibility studies might be undertaken for MLE development before

the implementation cycle begins in order to better prepare institutions for implementation and embedding.

ACTION Guidelines on feasibility studies

- *Clarify terminologies*

The ways processes and systems are described and divided up is not coherent either within particular institutions, or between them. In addition the emerging terminologies around MLE development are not necessarily shared or agreed (see *MLE conceptualisation models*). This was at both the level of systems/data categorisation and organisational divisions and language. The INSIDE project found that for the successful development of a generic model of the student registration process, problems over terminology between St. Andrews and Durham had to be resolved.. Initially a simple dictionary containing the agreed generic terms was created. In this dictionary each generic term had assigned a single definition, and the common term in use at each HE Institution. With the progressing of the generic model there was an increase in knowledge gained from the continued domain analysis. The increased understanding of the domain was applied to the dictionary of generic terms and a thesaurus was developed. The thesaurus centres on the generic terms in the domain. Each generic term has assigned a primary definition, an area for any alternate definitions and the equivalent common term in use at St. Andrews and Durham.

Another project (SMILE) reported that it used the issues of differences in terminology over both existing processes and MLE structure as a key way into debate and consultation about re-structuring their educational and organisational processes. MLE development thus needs to have techniques for defining key processes without reducing the variety and differences in approaches between institutions.

ACTION: Develop glossary of processes and key terms

- *Project staffing and management*

Staffing short-term research projects is inherently problematic. All projects had difficulties in finding and then retaining high quality staff. Several projects (MARTINI, CO3, TISR, TIRCs) reported delayed start-up for this reason. 50% required time extensions. These issues could be time-consuming and problematic to manage. At MARTINI, for example, difficulties in recruiting and replacing staff gave rise to delays. This meant the project had to be completed in less time

than the planned 24 months, requiring a re-planning of project activities. At SMILE the project team was seconded from existing staff. This, however, did not prevent problems. Staff have left before the project has ended, due to short-term contracts. Project staff also had their own positions to satisfy as well as the additional project workload. This caused some delays and problems for SMILE as other departmental and project staff had to juggle the allocation of priorities to develop workable schedules in order to complete tasks.

Projects also often found themselves in an awkward relationship to their institutions, needing to be both independent 'outsiders' and with authority and credibility; and to operate between and across 'grass-roots' and management. Getting to know institutional structures and cultures could also be a steep learning curve.

In addition, projects demanded project management experience as well as technical and programming expertise. Teams varied as to their explicit use of project management tools and techniques. CoMantTLE used a project management tool based on Zope technology to allow the project team to regularly record information about their progress and particular issues that arise during the project, and to share this with the rest of the team.

ACTION: guidelines on project management

- *Project programming*

Most projects kept close to their original project programming; but often did this by concentrating on technical innovations at the expense of supporting cultural and organisational change. Only TIRCs had to shift core objectives after meeting problems in finding IMS compliant software. Common under-estimations in time for activities, in addition to the project staff issues reported above (as summarised by the JCIEL MLE project manager), were;

Changing institutional contexts, priorities, internal politics and power struggles

(see *management of change models, implementing change*)

Collating information on current processes

(see *data and organisational structures and mapping*)

Consulting, liaising, co-ordinating and brokering negotiation between different stakeholders and interest groups

(see *staff development, management of change models*)

Changing standards and applications versions

(see *systems architecture and tools, interoperability issues, IMS*)

Uncooperative vendors and time delays in procuring appropriate systems and tools

(see *procurement*)

Time taken for project self-reflection, evaluation, dissemination and cross-project collaborations

(see *project evaluation, dissemination, collaboration*)

ACTION: Guidelines on project programming

- *Institutional commitment*

By the *August 01 progress report* the most common form of decision-making structure was a high level steering group of key stakeholders and/or a special working group. However, teams were also reporting some problems with institutional commitment. In particular, it was often unclear the extent to which such groupings were for information-sharing and advice rather than making decisions: and the extent to which they were integrated (if at all) with other institutional decision-making processes.

In addition, all projects experienced considerable changes in institutional context and staffing, with new line managers or organisational re-structuring within the 2 year period. At DMU, the Virtual Desk Internal Steering Group (ISG) has 16 members (including 2 student reps). However, a senior manager is re-constituting the MLE management structure, so as to separate requirements for the JISC project from corporate implementation for DMU—the latter needing a high-powered Steering Group of its own explicitly linked to corporate decision making. Whilst this process is likely to result in a “take-up” plan for future development and maintenance of the MLE Virtual Desk at DMU it also indicates how institutional commitment ‘followed behind’ the original project, rather than being integral to it.

ACTION: explore means of improving institutional commitment such as matching funding mechanisms

Planning for the management of change		
Project	Institution	Programme + Community
<i>Management of change processes</i>	Project champions Management of change models Consultation processes Collaboration procedures, eg Roundtables	MLE champions Effective change models Guidelines and tools on consultation and collaboration

Management of change processes and models

One of the findings of the short study *MLEs, joined up systems and the problems of organisational change* was that, on the whole, projects (and institutions) did not have explicit models for the management of change. A more recent study by EYSYS (*Initial Findings for change Management Model for MLE*) reviewed examples of some current change management models, based on web research. Ravensbourne (TISR) noted that they knew of no model specifically for small institutions (and criticised the ‘over-ready’ assumption that small institutions must be facing the same problems and work well together.) There is also an issue of similarities and differences between the FE and HE sector.

The wider project in which SMILE is located, PLUS2 at Sunderland University, is implementing a business process review which integrates MLE development with wider institutional change. This has demonstrated that many of the University’s processes were being unnecessarily duplicated and allowed the project to make suggestions as to how these processes can be streamlined. The project reported that this review showed how much thinking within the University remained ‘in silos’ and regretted that such daily working procedures were difficult to break down. They propose that co-operation from ‘within silos’ has to be established prior to any project activity, in order to move in a direction beneficial to the University as a whole.

There is an opportunity here to monitor the change management process as it specifically relates to MLEs. In addition other models could be piloted - perhaps in collaboration with HE/FE business schools (although it should be noted that 7/99 project teams were generally wary of involving their own business schools). Future action needs to take into account work in this area already undertaken by the JCALT Information Strategies Initiative; and which recognises the recent introduction of the EFQM Excellence Model into HE and FE management by HEFCE.

These models need to:

- *Negotiate differences between stakeholder objectives/motivations at different levels*
- *Overcome gaps between review, implementation and institutionalisation processes*
- *Build cross-functional and collaborative working in cultures based on autonomy and independence*
- *Enable long-term constructive development and embedding within reactive, adaptive and 'just-in-time' approaches*
- *Provide mechanisms for prioritising student-centred approaches within management and technical processes*
- *Generate credibility and authority for projects*
- *Be flexible enough to deal with changing external contexts*

CoManTLE has also been undertaking an analysis of organisational issues and challenges associated with attempting to produce an MLE to serve within a traditional university context. In this respect the project is using the tools of qualitative social research: primarily, focus groups and semi-structured interviews with some degree of participant-observation. The aim of this strand of work is to understand how staff and students currently work and how the university as an organisation is currently structured. This is with a view to building a picture of what changed will be required to make the shift to using an MLE to support e-Learning within the University.

CoManTLE ran focus groups with students and staff, conducted most of the interviews with key personnel in the organisation and participated in internal working groups associated with e-Learning and VLEs. There have been a number of outcomes from the social research strand in this period and there is an emerging picture of the situation at UWB regarding the nature of the uptake of e-Learning predicted over the next 12-24 months and the anticipated role of an MLE. An important part of the organisational modelling work of CoManTLE was to provide a way of estimating the nature and extent of organisational change involved and a model of the perspectives amongst different stakeholder groups of the reasons for engaging in e-Learning.

ACTION guidelines for institutions and projects on the management of organisational change

- *Project champions*

Whilst most of the literature on introducing ICT into education emphasises the importance of project champions, particularly at senior level, the MLE projects had a relatively high level of *lack* of commitment outside of the project team; and in many cases key stakeholders exploited the funding as a means to *begin* integration of technical and organisational systems and structures; and to influence institutional policy and direction. This has had an impact on their ability to meet some of the objectives set by JCIEL, which focussed on transferability, dissemination, embedding and benefits analysis. At the same time it has the potential to offer valuable data on the problems of change implementation in higher and further education and on the role and importance of project champions (see also *management of change models*).

It should be noted that the Roundtable methodology has the concept of project champion firmly at its core, but that evidence of its value to the institutions involved was not clear from the 7/99 projects .

ACTION: review literature and projects on role and relevance of project champions

- Consultation processes

At the level of the project, consultation processes have been most commonly articulated as a process of gathering user requirements and mapping current process flows. Consultation is thus primarily focused on information sharing and persuasion around uptake rather than on collaborative decision-making and re-structuring.

At the same time, projects and other key stakeholders have used consultation as a powerful means of influencing policy decisions and of generating senior management ‘buy-in’. Only one (SMILE) used the MLE/VLE selection process as a means of instigating institution-wide discussion as a deliberate means of improving awareness and supporting ‘buy-in’. There was relatively little information from the 7/99 projects on how MLE development potentially changes the roles of academic, administrative staff and of students, and its impact on consultation processes,

ACTION guidelines for institutions and projects on best practice consultation processes
Research into impact of different MLE models on organisational/pedagogic relationships

- *Collaboration procedures*

Funding was specifically allocated to evaluate the transfer of the American Association for HE Teaching Learning Technologies models for improving the use of ICT in learning and teaching. At the August 01 progress reporting point it was clear that the two projects FLRT and QMUC were developing differently– with QMUC adapting Roundtable guidance whilst Sheffield Hallam had found them less easy to apply. However this did not lead to a comparative review of how and why techniques work differently in various institutions, because there was inadequate evaluation and lack of clarity over deliverables. Since Roundtable goals were inadequately defined in either project, it was difficult to assess their impact or performance on supporting ICT and MLE development within institutions.

Implementation: key activities and issues

Selecting systems		
Project	Institution	Programme + Community
<i>Compare commercial systems/alternatives</i>	VLE and MLE good practice models	
<i>Consultation and selection procedures</i>	Procurement and investment decisions	

- *Comparison, consultation and selection of commercial systems/alternatives*

Easily accessible comparative data on different commercial (eg WebCT, Blackboard, SCT Banner and in-house (Collaquia, Co-mentor, COSE) VLES and/or MIS is not yet available. These systems are themselves undergoing constant upgrading and change, as they attempt to move from a module-by-module VLE model to institution-wide integrated VLE-MIS approaches. SMILE incorporated both MIS and VLE selection and procurement into their project (choosing WebCT), but is providing the framework for integrating these systems via a portal. They recommend that other projects could be assisted in taking up lessons from the project by referring to the Plus 2 Toolkit for procuring systems, supported by dissemination events. This includes invitation to tender documentation aimed at commercial providers. The MARTINI project explored the relative ease or difficulty of creating a generic interface to student data so as to help inform the wider FE/HE community on the issue of whether a MLE should be ‘home built’ on open standards or whether it should be purchased commercially.

Others had already made these decisions. Bangor has recently bought SCT Banner as a student record system, with CoManTLE exploring how to join up at least two different VLE products to it (WebCT and Colloquia). DMU are currently using WebCT but senior management are planning a move to Blackboard.: their portal is therefore concerned to be independent of any connecting systems. They report that at the inception of the project there were no appropriate tools that even came close to providing MLE type of functionality, but that several groups had also started to develop things. By the time they had created a demonstrator system at DMU, other tools also started to appear. As they became more familiar with the software and what works best, alternate ways of structuring the MLE system, centred on modularity and customisation.

Other tools being tested as to applicability, interoperability and customisation include QM Perception for computer-aided assessment (Loughborough) and Flashlight for evaluating e-learning developments (QMUC and Sheffield Hallam).

All projects note problems with incompatibilities, even between systems bought from the same vendor. Whilst many of the vendors are saying they support IMS specifications, there is not yet a “standard” ways to implement these specifications (see *interoperability issues, IMS*). DMU argue that the next required stage is to develop agreed transactional models that indicate real usage and allow for interoperable communications between vendors and project developers. DMU are helping to progress this work, with CETIS and the IMS SIGs, but need to test against other projects that support IMS to provide input into this process.

The shifting patterns of costing associated with these systems is also an issue. Student Focus report that since the inception of the project, the portal market, Campus Pipeline functionality and the web advertising funding model for Campus Pipeline and other web based services/ products has changed significantly. The longerterm implication on Bangor and other institutions are being considered. Similarly, the Campus version of Blackboard software costs around \$1200. However, they have recently launched a “Building Blocks” program for developers, allowing them to get support in using their tools to create a plug-in services for Blackboard. DMU has negotiated the setting up a server for the JISC project community and is pursuing similar interactions with WebCT.

The in-house VLE developers of the CO3 project are also concerned that the enhancements enabled through JISC funding need continuing resources and support which may not be affordable by individual institutions.

ACTION Build up bank of comparative data on commercial and in-house VLE and MIS systems and tools
 Provide guidelines on choosing between commercial and in-house systems

- *Procurement and investment decisions*

All projects suffered delays in making selections from commercial products and in ironing out software bugs. In addition they spent a considerable amount of time in negotiation with vendors and often found some resistance from them to supporting integration of systems.

Measures of success (especially in financial terms) are not yet in place across HE/FE to estimate the costs and benefits of ICT related changes; nor even of existing conventional methods and modes of delivery. Some work is being undertaken on investment appraisal and on ROI (returns on investment). Again, these need to be linked to clearly defined outcomes, performance measures and evaluation criteria.

ACTION: Continue developing appropriate costing and performance measures for MLE development*

Content and delivery		
Project	Institution	Programme + Community
Learning objects	Specify content	Generic issues
<i>Interface and navigation structuring and design</i>	Specify data access	Disseminate good practice
<i>Meet interface accessibility guidelines</i>	Specify delivery strategies	
<i>Design data transfer and storage mechanisms</i>	Specify student support	
<i>Evaluate content and delivery</i>	Provide staff development	
	Updating processes	
	Develop/purchase resources	
	Legal issues - data protection/Copyright/IPR	
	Programme on-going content provision and updating	
	Plagiarism detection	

- *Learning Objects*

There has been a considerable amount of work on what constitutes a learning object within education. The move from conceptualisation of on-line resources for students as a VLE to an MLE has considerable implications for the concept of learning object.

ACTION Review the concept of learning object, its relationship to MLEs and its value to developers

- *Interface and navigation structuring and design*

Projects were involved in the design of the web-based portal's interface and navigation structure. Some had access to Educational Technologists and graphic/web designers; whilst others are working with the limitations as well as benefits of commercial systems. All projects have done some sort of user testing.

DMU noted that developing web interfaces that are visually interesting and interactive is very difficult when you need to support all the major web browsers with no use of specific plug-ins or scripting. This was even more difficult when considering accessibility issues for tools like screen

reading software. At Bangor (Student Focus) a significant amount of time has been spent in the student records project to help assure the quality of information provided through the portal.

However, overall, quality of interface/navigation design and quality of content sometimes lags behind systems architecture and compatibility for consideration by projects or institutions.

ACTION Incorporate learning technologists as well as programmers and web-designers in MLE development processes
 Provide guidelines on best practice design for education*

- *Meet interface accessibility guidelines*

Only one project explicitly considered disability access in interface design at the outset. Emerging guidelines need to be integrated into MLE development and tested in this context. The OU also offered to have their accessibility specialists look at DMU's current MLE project and demo systems and do a written assessment. GIMIS worked with RNIB Technology in Learning and Employment (TiLE) to ensure provisions made for any students who have impaired vision comply with appropriate standards and includes any appropriate RNIB initiatives.

ACTION: Integrate accessibility standards into MLE development*
 Incorporate accessibility issues into user requirements analysis

- *Design data transfer and storage mechanisms*

Most projects developed XML and Java based server-side interactions between different data stores, based on re-usable tools and open standards. Joining up different data stores (even when these were supplied by the same vendor) was identified as one of the key technical difficulties. In addition, projects tended to focus on being able to view data, rather than be able to interact with it, or for the data itself to operate intelligently.

In addition, issues of data transfer and compatibility are inseparable from structures of data ownership and of gate-keeping roles and responsibilities (see *data ownership and management*).

ACTION: Explore MLE conceptual models incorporating interactivity and intelligent systems

Content, data access, delivery strategies, student support, assessment processes, media mix updating processes, developing and/or purchasing resources

The development of an MLE adds additional complexity to the structure of an VLE, especially since many institutions have not even got to the stage of an embedded VLE but tend to have a variety of piecemeal web and other media-based resources. Most projects concentrated on joining up bits of systems rather than attempting a fully integrated MLE. This raises issues of how MLE content and delivery modes are decided across administrative, informational, support and educational materials. Where projects lacked a strategic overview or project champions they needed to be opportunistic and/or act as demonstrators, that is, persuade through results. This tended towards 'quick wins' such as the on-line canteen menus at Writtle and the electronic previous exam papers at DMU, rather than a coherent and student centred approach to content structure and development

Where projects have concentrated on system compatibility and transferability, decision-making over content and delivery is not always explicit or based on clear and shared pedagogic, or organisational goals. Decision-making may also not always take place in the 'best' location or consistently. There is an urgent need for development models that centre on structure and quality of *content and delivery* rather than technical compatibilities as a way of designing systems integration.

Similarly, delivery must be informed by a pedagogic and resource strategy about where, how, how often and through what means students and staff will access materials and/or on-line conferencing facilities.

Some common areas of content developed by the 7/99 projects were basic student data, module databases, time-tabling and diary facilities, news and events and on-line learning resources and modules.

At DMU the Module database is currently being redefined and a new system being written. The current format is being used to experiment with displaying additional module data with the SRS module summary. They can also find the module leaders name and contact details. All this information is presented on a single course screen. The project team have been working with example timetable data in order to work out how this information should be presented. The Diary

system can present various levels of data including the course timetable and personal events. The user can add and edit their own events. This feature is currently working on a separate installation and will be incorporated onto the main system in Jan/Feb next year. The Home/News page presents information about progress on the MLE system, messages about the university, and personalised message (once the user logs in). In order to allow staff to feed-in this kind of data, they have created a news entry form which takes the message, its valid start and end dates and its target audience (individual, module, course etc). At present, associating students with these type of groupings is not easy. It will either take time consuming real-time queries, or some batch pre-processing. Messages presented in this way can be managed like a normal news list. They are removed once read and a full list can be revisited later. On-line learning is accessed via Web-CT, and the project is exploring how to link to other systems (Blackboard) and to other academic websites and resources within the university.

At INSIDE Durham has been developing ongoing incremental component-based development providing web access for staff and students to value added services including:

- Data entry and viewing of student continual assessment marks;
- Tracking student attendance; and
- On-line submission of assessed work.

SMILE now has a working portal prototype with over 400 registered users, comprising a module catalogue consisting of a web display of data for students and a set of forms for data entry. It is intended that this can be linked into SITS systems. It can be accessed via the web portal at my.sunderland.ac.uk but requires user registration. The site also includes web-based data based of all student job vacancies, both graduate and part time temporary positions.

They are also researching into electronic student support, including e-counselling and debt counselling.

The MIS system at Bangor was rolled out to support registration processes in September 2001. There is already a module database available (QAA standards). Eventually, students will be able to have an electronic portfolio (as per HEFCE requirements). From January 2001 students will be able to access their own SR on line, and also access data about Hall fees.

One project based at Loughborough was explicitly concerned with assessment issues – examining the implications of scaling up Perception CAA software to the whole institution.

Another project (Content Packaging and Management, Edinburgh) was explicitly concerned with supporting content provision; here a tool for helping academics to provide on-line delivery. There may be other tools and best practice guidelines for enabling high quality, pedagogically sound and student-centred content provision and its maintenance; some reviews already exist, and could be re-purposed to the MLE development context. The two major activities of this project have been the production of an on-line tutorial (incorporating guidelines and exemplars of good and bad practise) and the production of an IMS package editor. Both of these “products” were created through a prototype-evaluation-final product cycle to allow the evaluation to have a major impact. The tutorial on content packing is aimed at academic staff who are relatively new to producing on-line course material.

It allows them to exchange IMS packages with others and use the editor to change parts of imported packages.

Since the package editor is capable of editing packages produced by any IMS compliant system, it is a useful tool when combining IMS packages produced by several different commercial vendors with part of a course already existing in a specific learning environment to produce a new packaged course which can be delivered in another learning environment. The package editor is platform-independent, relatively easy to use with some technical expertise, and is independent of any specific learning environment.

ACTION: Review tools for support in learning content design, delivery and up-dating
Map, compare and evaluate different project MLE content and delivery frameworks

- *Legal issues - data protection/Copyright/IPR and Plagiarism Detection*

No project was specifically involved with these issues, although the 7/99 call did offer funding for projects related to plagiarism detection.

ACTION: Continue examination of data protection/copyright/IPR and Plagiarism detection issues*

Managing the student record		
Project	Institution	Programme + Community
<i>Authentication, authorisation and security procedures</i> <i>Student accessibility to data</i>	Single student identifier Re-structure data ownership and management Incorporate and evaluate student experience	Lifelong learning single student record

Authentication, authorisation and security procedures

The majority of projects were managing to harmonise usernames across all systems. LDAP was the most popular authentication method. Roles and privileges were mainly held intermally, but some were developing external directories. Most VLEs/ MLEs also seem to enable external authentication methods, again mainly through LDAP but also through a Kerberos interface and using an e-mail (POP3) username.

DMU have authentication to the student email system working. All students have an email account created by the time they enrol. They use this same student ID and password to login to the MLE. The MLE doesn't store or maintain any authentication information. It sends an LDAP request to the email system to validate the user.

Controlled access to GIMIS at Writtle is also now possible, with a security schema, which initially authenticates against Novell NDS. Access to information can be granted to a granular level, all of which is entirely database driven, controlled by specific inclusions and specific exclusions, based on the post, with the individual inheriting rights as a post holder (permanent or temporary). All activity via GIMIS operates within a five minute inactivity timer, after which period the user will be prompted to log onto GIMIS and so re-authenticate before being allowed to use GIMIS. (see also *data ownership and management*). In addition, 'Security compliance blanket' ensuring that all users agree to be bound by the terms and conditions presented by the Data Protection Act (1998) and College Codes of Conduct

Student Focus is aiming for a single sign-on to Banner and library systems, but this integration is not yet specified.(Reports from Visits to 7/99 projects, Spring 2001)

Student accessibility to data/ incorporate and evaluate student experience of MLE

Although all projects were concerned with providing seamless access to students, none had clearly defined or finished testing how and where students engaged with the MLE. Student (and staff) accessibility to hardware software and networks and its potential impact on MLE development also needs to be considered. This means examining the limitations of different computers, browsers, plug-ins and service providers so as to have explicit and detailed evaluation criteria as to what constitutes 'seamless access'.

ACTION: Develop best practice for defining and evaluating student accessibility to data

Student record and single student identifier

There was a lack of existing coherent data identifiers to enable tracking or joining-up of data across sub-systems. Projects also found it problematic to reconcile single identifiers with multiple data sources and vendor authentication methods. This is an issue that reaches beyond single project and institutions; and has more than technical implications (for example around issues of life-long learning records, credit transfer and learning objects.)

ACTION: Policy development on relationship between lifelong learning student record and single student identifiers

Re-structure data ownership and management

Provision of, and control over, different kinds of data (educational, informational, administrative) is the most immediate interface where existing functions must negotiate how systems should be re-structured. Some projects and institutions see data-owners as key decision-makers, particularly because of the centrality of security and data protection issues. This may, however, result in a lack of clarity or coherence in where and how strategic educational and organisational changes should be made. GIMIS noted the lack of departmental appreciation of data ownership, especially when sharing the source data with other departments.

ACTION: review impact of existing patterns of data ownership and gate-keeping functions on MLE development

Systems architecture, tools and standards: design and re-purposing		
Project	Institution	Programme + Community
<i>Customise/integrate commercial systems</i> <i>Systems design</i> <i>IMS</i>	Monitor, support and improve systems integration	Integrate with parallel initiatives (e.g. DNER)

Systems architectures and tools

By the August 01 progress reporting round a number of projects had adapted their intended systems architecture, usually by moving towards a more flexible and decentralised approach. The short study *MLEs, joined-up systems and the problems of organisational change* proposed that this was because such as MLE model (based on joining up separate data systems via a ‘connecting layer’) was itself a key mechanism in enabling the management of change because it enabled sub-systems to be developed relatively autonomously. This has meant considerable technical innovation which has often been successful at dealing with organisational differences at the level of the project, but which has organisational and educational implications. The selected technical specifications for each project is as follows:

Institution wide web-pages:

SMILE – used ZOPE to create an interface to all resources based on student identity They created a working ‘portal’ – a university home page – with appropriate areas of the MLE, VLE and SAS accessed via authenticated logins and with direct links to information services functions . The MLE is conceptualised as a combination of this portal (which can be partially personalised) and as an information warehouse linking to SAS and other university data stores. The portal ‘joins up’ SITS e-vision, providing access to students own records and transfers imodule and programme information to WebCT

DMU also works on a web-based portal, but here accessed following authorisation from a students own page. Portal design is generic and capable of linking multiple sub-systems, using free open source uPortal software. The focus has been on the connection to the Student Record System via a point-to-point link through the firewall. There is a small Visual Basic program that sits listening to a port for requests from the MLE server. This program carries out a fixed set of requests in to the SRS, such as “find all the course data associated with a particular student ID”.

The team have tested this link using secure sockets and encryption certificates, but they are still searching for a version that VB supports without additional costs (noting that there isn't a problem getting good (free) tools for the JAVA MLE server side of the equation.)

Writtle College budget holders are preparing to trial the ability to access the budgets via the GIMIS portal. This is in the form of providing a dynamic Online Staff Telephone directory, which provides the capability to interface with a newly created web based email facility for the college. Staff are also able to view the Colleges refectory menu, which displays the Fare being served each day. In addition there is also a live news feed from "This is Essex" and a departmental/staff structure of the College. The GIMIS query engine has now been written to extract the data from disparate databases. The query engine is entirely database driven, which conforms to a set of "Data Description Rules" which means that even major changes to underlying data sources cause minimal disruption to the GIMIS system. Using a SQL relational database, MYSQL and WINSQL, a general purpose tool for managing and developing SQL based databases.

Integrating sub-systems:

Student Focus aims for the portal integration of SCT Banner, SRS and the university's new MIS. Work has focussed configuring all the integration tools provided with Campus Pipeline-integration to SRS, both the back-end system, and the 'student web services' component of the student record system, user accounts, and University email accounts. Some detailed programming has been required to link the account creation process between Campus pipeline and system accounts. This integration is nearing completion on the test system and will be ported to the live environment shortly in order to solicit feedback from Administrative/Academic colleagues and Student Union Representatives.

ComanTLE is linking at least 2 commercial VLE products (WebCT and Colloquia SCT Banner) to their MIS and CO3 is looking at the IMS implications of linking up VLES across three institutions.

MARTINI has a systems architecture using UML to model student registration processes. A relatively simple prototype application containing the key features of the planned system has been developed using Apple WebObjects. The application allows students to view their own registration data. The students are authenticated against UEA's LDAP server. UEA's existing

data base is queried via JDBC and ODBC. Data is reformatted as XML by the application. JDOM is used to manipulate and present the data.

INSIDE is generating user-centric portals for staff based on their institutional roles and responsibilities, and piloting value-added services based on the analyses of existing processes. They undertook module enrolment pilots held for several hundred students in the second semester intake in late Jan 2001 using swipe card technology. They now have in place general web access (no swipe card needed) for any student who knows their own ITS username and password. This is the first time that students have had access to parts of their record via the web. Value-added services developed to date have involved innovations in data sharing and information flow between the School of Computer Science and Student Records. Successes include: i) eliminating several paper trails, ii) providing card-based authentication of students enrolling for modules at the school-level, iii) automatically checking modules for pre-requisites, iv) allowing students access to their own record via the web, with the opportunity to submit corrections, v) electronic reconciliation of module lists maintained by Student Records and the School, and vi) elimination of redundant data maintenance and duplicate data entry. They are also experimenting with card-based lecture attendance monitoring. (“Report on the Generic Model of the Process of Undergraduate Registration at Higher Education Institutions Version 2.0”)

TISR was based on the design of a generic API wrapper:, Design of actual data structure drivers and will be supported by the design of reporting and web pages at a later date

It was initially intended to store data in an LDAP directory but have now opted to use XML format. It is easier to edit a text file than it is to extend the LDAP directory schema to accommodate what is needed; it also places more pressure on MIS administration. There is also a proposal for “Project Packs”- an automated way of managing student assessment, units and project briefs.

All these projects are negotiating with emerging (but not finalised) standards as well as inter-operability problems which can make decisions about data and metadata standards (SPARTA, IMS) difficult. As the IMS project noted, IMS standards do not automatically guarantee inter-operability but can provide a framework through which joining up systems can take place.

ACTIONS: In-depth comparative review of 7/99 systems architectures and tools
Link to parallel initiatives (eg DNER, portal services)

- *IMS*

A number of projects explored the implications of IMS specifications in supporting interoperability. The CO3 project examined how well IMS Enterprise copes with different pedagogic models in different institutions. - UWB (Colloquia), Staffordshire University (COSE) and Huddersfield University (CoMentor) IMS An implementation of the IMS Enterprise specification for Colloquia was achieved. IMS Enterprise data has been supplied by the vendors of the UWB SIS system and this has been successfully imported into Colloquia.

Review tool sets which may contribute to the project and summarises the possible use of XSLT in the implementation. However a major part of the job is to come to an agreement between both parties writing to the specification about what particular elements represent.

The work carried out on this project has emphasised that compliance to the specifications is key in maintaining interoperability as limited non-compliance has been found even within the scope of the testing performed to date, and the related issue of maintainability will be critical to practical applications. (not necessarily 'backwards' compatibility).

One of CoManTLE's main project activities have been to examine what is required to achieve interoperability between the student record systems (SCT Banner) and their own VLE (Colloquia) using IMS standards. The advantage of using Colloquia as opposed to a third party VLE is that they can adapt the system at code level to make it IMS compliant. A substantial amount of work has been done to allow basic data exchange between Colloquia and the Student Record System using the IMS enterprise specifications. The basic requirement of interoperability has now been achieved. Data interchange with 'live' data is not currently possible. This is partly due to the fact that the IMS compliant module produced by SCT has not yet been obtained and integrated with Bangor's system and partly because of the sensitivities surrounding using live data in a project context. Colloquia compliance with IMS enterprise specifications has been tested with dummy data. This process has enabled them to understand what is involved with sharing data using the enterprise specification and, in companion with the CO3 project has yielded useful and generalisable results in the form of advice and guidance for others attempting to make use of the specifications.

TIRCs argue that there needs to be institutional strategies in place to implement IMS specifications in the context of MLEs and VLEs (and notes the problem of the lack of IMS compliant VLEs.) This also links to the Information Strategies initiative. DMU also note that at

present, many of the vendors are saying they support the IMS specifications, but that there are no “standard” ways to implement these specifications.

Some very constructive lessons have therefore been learnt: first that IMS is not an instant ‘plug and play’ solution to interoperability because of differences between have the specifications can be implemented; and changes in the standards themselves; second, as MARTINI conclude, participation of stakeholders and data owners is essential. The use and understanding of IMS as a standard for transferring MIS data is not trivial and requires careful consideration. In particular, using IMS may have unwanted consequences for educational content and navigation. Third, Simply using IMS does not overcome issues of data-ownership and control.

ACTION: Summarise results form MIS projects*

Systems operationalisation		
Project	Institution	Programme + Community
<i>Define operationalisation procedures - Demonstrators, pilots and ‘big bangs’ Interoperability</i>	Interoperability	Guidelines on approaches and best practice

Define operationalisation procedures (Demonstrators, pilots and ‘big bangs)

In some cases, systems architecture design has operated as a demonstrator of integrated systems (DMU) so as to gain support for implementation. In others core system components have been selected as part of a wider consultation processes (SMILE). This means that the mechanisms for operationalisation (hardware and software installation, data preparation, system population, testing and upgrading) and for scaling-up have varied across projects.

INSIDE Durham suggest that, in retrospect the project was ‘fighting political barriers with technology’. However, they also propose that this strategy can be successful is useful when guiding new developments at any institution. The alternate “big bang” approach is difficult to manage, has long lead times, and is likely to be very expensive. The use of lower profile pilots of novel services can demonstrate their validity and advance the understanding of what a “good” MLE is for a particular institution.

Interoperability

It is clear from issues raised by attempting to use IMS specifications that interoperability issues are both a matter of data and organisational integration. Even within and across projects interoperability has been difficult to achieve as conflicts on interest and motivation intrude. Tensions also arise between requirements of system specificity and/or transferability and project or institutional competition and collaboration. Thus, for example, Writtle College and Ravensbourne have not found the fact that they are both small colleges enough to achieve collaboration; and St Andrews and Durham have taken very different routes within the INSDIE project. SMILE only improved integration of their VLE and MLE activities after secondment of VLE Manager to MLE team. This permitted an improved flow of communication within the core project team.

At Bangor, Student Focus is working to some extent with the CoManTLE project, in particular on technical issues. CoMantle is interfacing with SCT to discuss whether they could build or supply the necessary IMS extensions to join up the Banner system to the VLEs. However, there is some conflict of views about the structure of the final system. The Student Focus view is that the learner will enter the student portal and the VLE(s) will be just one option for the learner who may choose to use the VLE or may not; it will be at least five years before VLEs are widely and systematically adopted at Bangor. The CoManTLE view contradicts this. This had led to a lack of communication between the two projects and thus raises serious doubts as to the possibility of coherent Institutional approached to the development of a MLE. (*Reports from visits to 7/99 projects, spring 2001*)

This suggests that interoperability remains a complex technical and organisational problem.

ACTION: Continue examining interoperability issues*

Managing implementation		
Project	Institution	Programme + Community
<i>Managing change structures and processes</i>	Staff development and ‘buy-in’ Involve students	Best practice on managing implementation

Managing change structures and processes

The ComanTLE approach to managing change has already been outlined (see *management of change models*). They report that at the start of the project there was very little or no attention paid to these matters but that the fact of implementing change has shifted the shifted attitudes across the whole institution. This ‘back-to-front’ developmental model where projects were bringing not just grass-roots staff but also senior management with them was generally reported. It has produced its own advantages and disadvantages.

ACTION: Best practice on management of change models and implementation techniques

Staff development and buy in

All projects involved academic and administrative staff to some degree (awareness raising, information-sharing, collaboration, consultation, training, career development). Again intended outcomes and evidence-based evaluation criteria would be useful. There was not always clarity as to what type of development and involvement was intended. In addition, MLE development by its very nature is likely to have an impact on working practices and roles within an organisation; this has put project teams in an awkward position where institutional responsibility for these issues is not fully resolved. From the 7/99 projects progress reports, staff ‘buy-in’ seems to have been a particularly intractable problem; particularly where senior management commitment was not fully in place at the initiation stages. The ComanTLE draft study notes some of the different views and difficulties for staff. Interestingly, Collis and Moonen, whilst outlining the merits of ICT integration to universities focus instead on “pay-offs” for individuals as a means of supporting implementation and institutionalisation. It is suggested that more work needs to be done in this area, particularly in terms of student and staff motivations, recognitions and incentives.

SMILE report that they effected ‘buy-in’ through an inclusive communications policy

They also established a Training Room. Training methods for users included input groups, workshops, workplace development with guidance materials, on-line tutorials and a contact person within each school and service. They also held a PLUS 2 panel ‘question time’ event

ACTION: Guidelines on good practice in staff development for MLEs

- *Involve students*

As already noted (see *student-centred approaches*) students were involved to a variety of degrees in 7/99 projects; none however suggests best practice.

ACTION: Guidelines on best practice for involving students in MLE implementation

Institutionalisation

Scaling-up and integration of systems within and across institutions		
Project	Institution	Programme + Community
<i>Implement maintenance, technical support and up-dating procedures</i>	Transferability Embedding	Extend standards Provide guidelines, tools and resources Support integration
<i>Continuation strategies</i>		
<i>Collaboration and dissemination processes</i>		

- *Implement maintenance, technical support and up-dating procedures/Continuation strategies*
Projects and institutions need to build in issues of maintenance and support costs into decision-making processes. This has been reported by SMILE and others as a problem. This indicates a larger problem; the difficulties for projects of defining achievable continuation strategies. In many cases it is uncertain if and where funding or other resources might be available within an institution for continued development and integration or scaling-up.

ACTION: Consideration of MLE development support based on matching funding and similar mechanisms for clarifying institutional commitment and intention to implement continuation strategies

- *Collaboration and dissemination processes*

At the MLE 2002 workshop, projects reported on a perceived lack of time for cross or beyond project collaboration, except where this was of immediate value to the project team. MLE development depends on levels of shared interdepartmental work which has been unlikely to have occurred previously. In this context cross-projects and institutional collaborations were often seen as an added burden rather than as a support.

Dissemination for the CoManTLE project is being carried out by a dedicated member of staff who has been brought in especially: the project sees an advantage in the fact that she is a newcomer to the project and so can challenge issues that the project team may be too close to observe. There are also issues, however, of the types of experience most relevant to this type of dissemination.

*ACTION: Recognise and support appropriate time-scales for collaboration
Provide guidelines on effective collaboration processes*

- *Transferability*

Under the heading of transferability, ESYS reported no entries from JUSL (joined up systems for Learners projects) and potential areas for comparative study in 4 JUSI (Joined up systems for institutions) – INSIDE, GIMIS, TISR and CAA. In addition, they noted that the CO3 IMS project collaboration, and differences in Roundtable take-up could also be studied for lessons on transferability. At these early stages it is clear that projects were also not very effective at self-assessing transferability issues. In some cases, project suggested resource limitations to collaboration and transferability lessons. There is also an issue of where transferability happens and of what type.

ACTION: Review transferability issues and appropriate methods for improving transfer

- *Embedding*

In addition, the ESYS document highlights the problem in asking projects to self-assess institutional embedding and ‘buy-in’; where this was claimed there was not clear supporting evidence (for example, by reporting from outside the project team). Where two projects funded within an institution (Student Focus and CoMantle at Bangor) were failing to collaborate,

accurate reporting was affected by the sensitivities of institutional politics. Some projects based in a single department lacked mechanisms or interest to engage with institution wide embedding.

Examples of techniques for embedding include Writtle In future any feasibility, pilot or procurement activities will involve a member of the GIMIS Team being present in any meetings or presentations. The College is considering changing it's financial accounting software (CFACS), brought about by a pending substantive upgrade from the software house. As a result a member of the GIMIS Team has been attending all presentations from prospective replacement companies. This has ensured that any future procurement is congruent and compliant with the process of GIMIS and within the overall College Information Services strategy of integrating the back-end data sources.

Only one JUSL project (SMILE) was able to assess their embedding process; and this was because strategic support and process review models were already in place. Another JUSI project (GIMIS) was able to operate institution-wide more easily because of the small size of the college.

The 7/99 projects thus offer a clear indication that whilst the concept of an MLE is becoming increasingly common, its development and transferability within an institution is still very time-consuming and uneven and that we are still quite a long way from their easy institutionalisation across the UK HE and FE sectors. What the projects were effective at was awareness-raising across a variety of academic, learning support and administrative.

ACTION: Examine more appropriate mechanisms for supporting embedding than project-based technically driven product development

Evaluation and process improvement		
Project	Institution	Programme + Community
<i>Project self-assessment</i>	Process improvement	Cross project evaluations
<i>Student experience</i>		Good practice examples
<i>Staff evaluations</i>		
<i>Disseminate evaluation results</i>		

Project self-assessments

All projects suffered difficulties in effective reporting. Four main reasons are suggested here. There was a lack of an appropriate and validated reporting structure in advance of the 7/99 call; in fact the MLE programme itself is being used as a mechanism to begin to generate and then test such a framework. Whilst this is a valuable development, it can make projects feel like ‘guinea-pigs’. Second, project evaluation is time-consuming. Where projects have attempted to use diaries for example, they have resisted the time required. Third, stakeholder sensitivities can make it difficult to report and assess situations accurately. Funded projects are often caught in an awkward position between two sets of ‘masters’ and are under pressure to appear successful to both. Finally, project team members may lack self-reflective skills or experience of evidence-based models of evaluation.

However, the projects provide an incredibly rich source of knowledge and information which could be more effectively extracted through, for example, external evaluations, reviews of materials, workshops and short studies.

ACTION: Examine alternative mechanisms for enabling and evaluating embedding rather than (or in addition to) self-assessments by projects

Assessing the student experience

Most projects have undertaken some sort of assessment of student responses to MLE portals and tools. SMILE has undertaken an on campus and distance learning student evaluation DMU has carried out a comprehensive assessment of their systems menu and content navigation structure. This took the form of a “card-sort” exercise and was done with 155 users, both staff and students. The results confirm that the way the menus had been designed matched closely with the expectations of the potential users. They also followed up some suggestions by JISC to look at the Bristol Evaluation Learning Toolkit. After spending sometime trying this toolkit, Mark Simpson carried out a more formal review of it and provided Bristol with a written report suggesting improvements.

DMU report that having carried out some extensive user evaluation work on how potential MLE users would locate types of information on an MLE web site, the results have validated the original approach to use the 5 members of the team to look at suggested designs and consider all

aspects in detail and come up with a consensus of results. This produces an almost exact match to that of 155 students and staff.

Again, there remains an opportunity to analyse the student experience from a wider point of view than just their engagement with the university or college via the computer, for example, by taking a process related approach and examining experiences of student entry, learning and information needs (see *student-centred approaches*).

ACTION: Guidelines which embed consideration of the student experience into every aspect of MLE development

Staff evaluations

SMILE has attempted administrative and academic staff evaluations but difficulties have included attempting to gain bi-monthly interview appointments with academics. Although many agreed to participate, it has been almost impossible to gain an interview due to their workloads. This has led to the decision to conduct academic focus groups on a less frequent basis. In addition it was planned that all core project staff should keep an ongoing diary of project results regarding their individual roles. This was abandoned due to time constraints. All communications are conducted informally by face-to-face interview, every 6 months at the Project Away Days. This strategy appears to be more effective and convenient for the project staff.

ACTION: Guidelines which embed staff consultation, development and evaluation into MLE development processes

External project evaluations

The ESYS evaluation progress report of July 2001 summarised project self-evaluation status at that stage, based on a mixture of external and internal assessors (Appendix 5).

ACTION: *Comparative review of 7/99 projects evaluation approaches, methods and results*

Cross project evaluation results

As part of the ESYS formative evaluation procedures, an attempt was made to develop a template for programme level evaluation initially based on an analysis of programme objectives, and then structured around an appropriate change management model. The selected EFQM model was

tested with project teams at a 7/99 programme meeting in January 2002. The results and feedback from this mapping session indicated that project groups felt the model was pitched at a strategic and institutional level and was unable to articulate operational issues. Projects felt that they were often unable to instigate the kinds of institutional change the model and its terminology implied.

ACTION: *Comparative review of evaluation methods relevant to MLE development and guidelines on best practice*

Sharing lessons		
Project	Institution	Programme + Community
<i>Dissemination</i>	Process improvement	Contribution to MLE models Assess costs and benefits Evaluate programme effectiveness Impact assessments

Dissemination

The majority of projects produced and regularly up-dated a web site and participated in conferences such as ALTC 2001. The ESYS document *MLE Programme 7/99 evaluation framework population* reviewed the findings from the initial Co-ordinator's project visits in Spring 2001 in relation to the call's main objectives. They note that all projects are trying to join up across relevant stakeholders and MISs, but not effectively reporting back on emerging issues. An enormous amount of effort (not always successful) has gone into project dissemination (internally, across projects and to the wider HE/FE community).

ACTION: *Critical review of dissemination approaches and guidelines on best practice*

Process Improvement

Besides SMILE, no project integrated MLE development with wider business review or other process improvement techniques.

ACTION: *Consider and test relevant process improvement models and methods*

Appendix 4: Using the MLE development grid

The MLE development grid outlined here was introduced to the 7/99 projects at the “MLEs for Lifelong Learning” Programme Meeting on the 17th July 2002 in Birmingham. Participants were asked first, to compare their own experiences of MLE development with the grid framework, second, to attempt to use it to record some project outcomes, and finally, to comment in general of its appropriateness from their point of view.

The main responses were that the MLE development framework as proposed appeared too rigid to accurately reflect the diversity of 7/99 projects (as one person said there is “more than one way to skin a cat”); that the process should be articulated as non-sequential and iterative; and that many of the 7/99 projects dealt with components of MLE development such as enabling technical compatibilities, necessarily semi-autonomously. Many project members visualised their role as incremental (‘small improvements’), focussed on implementation and relatively limited in terms of integration or scaling up. One participant articulated their approach in three steps, repeated through an iterative process adding new services in each cycle. These were, first, analysis and modelling, second, identifying potential improvements and third, prototyping systems.

Interestingly, this led to a group debate about MLE definitions; that is, about what degree of integration of systems constituted an MLE. There was some disagreement as to whether some versions of this ‘loop’ were at too small a scale to be termed a managed learning environment. This review suggests that, whilst the experience of different levels and types of integration developed through the 7/99 projects has been very useful, for high-quality student-centred MLE development, institutions should be operating from some basic pedagogic as well as technical and efficiency objectives, should have an overall vision of what sort of MLE they want, and implement through processes that involve students and staff from across academic, administrative and student support areas.

It is suggested that whilst the MLE development grid outlined here is too inflexible in its current form to deal with different sizes of projects (from ‘components’ integration to whole institution implementation) and ‘reads’ too much as a single sequence rather than an iterative process, it does offer a framework for beginning to describe the MLE development process comprehensively, so as to better articulate successes, difficulties and gaps. As such it could be a useful tool in its own right in support of MLEs and their initiation, implementation and institutionalisation across the UK HE/FE sector,

Appendix 5: EYSYS summary of 7/99 project evaluation methods
To be added