

A non-technical guide to technical frameworks

Part Two

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The second part of this guide looks at the relevance of technical frameworks for education, in particular the e-Learning Framework.

In Part One of this guide I explored the development of some new technologies and their significance in the business world; in Part Two I am going to look at their relevance for education, and how they underpin the Frameworks and Tools Strand of the e-Learning Programme.

The common problem faced by all sectors using large IT systems is that of the duplication of functionality. An obvious example is that all IT systems need to check that a person logging on is really who they say they are and has permission to use the system, but this means that if a person has to use several systems they will have to log on several times.

A second problem is that a large system will dictate how work takes place. From a business point of view, this means they are forced to work in the same way as other businesses which purchase the same system, and this may affect how competitive they can be. From a teacher's point of view, a VLE may constrain how s/he is able to teach, and it may standardise how teaching takes place across an institution. This is a 'one-size-fits-all' scenario.

As discussed in Part One [1] of this article, new technologies in the form of Web Services and Service Oriented Approaches have been providing a way forward. However, from a business point of view, the aim is to make a profit and therefore serious levels of investment in new and more efficient approaches can be justified. It is harder to make the case in education as the funding model is completely different

The Frameworks and Tools Strand [2] of the e-Learning Programme is a response to both the work of the previous Managed Learning Environments (MLE) Programme [3] and the development of these new technologies.

Technical frameworks

A number of key documents can be found on the JISC website [4] that explain the thinking behind this strand but this article is an attempt to draw out the main principles and see what they mean for those involved in teaching and learning.

If we consider a VLE, perhaps the one we use, we can think in a general way of the kind of functionality it has – a signing on facility, online discussion tools, content management tools

(lecture notes, book lists etc), tools for managing lists of students and modules, online assessment tools, etc We might also think that whilst these things are fine as far as they go, it would also be nice to have some other functions as well such as shared whiteboard, weblogging and wiki tools and so on. If we look at other systems, for instance a Student Record System (SRS), they will have their own set of functions such as signing on to the system and establishing the identity of the user, storing information and so on.

Some functions will be common to many systems, and some are specific to their own domain. The process of identifying these, along with considering all the things we might want to be able to do, means we should be able to draw up a list of all the functions we would want an ideal system to provide to meet our needs, both personal and organisational.

This exercise is a factoring of functions which can then be put together into a framework. Many of the functions we would have identified can be provided or obtained as web services (see Part One) and if they can be described carefully both in terms of what they should be able to do (at a technical level) and what technical standards they should comply with, then they can be joined up into a composite application. This means that we could make a selection of those functions we want and combine them into a specific system that will suit our particular needs and make our idealised system a reality. How this can actually happen is a technical question, but for the purposes of this article the point is that it is possible.

Importantly, this approach also means that some of those services we selected could, in principle, be combined with systems we may already have in place such as a VLE, so we could increase the flexibility and functionality of our existing systems.

This framework can then, in Scott Wilson's words, provide us with a 'palette of possibilities'.

'Using a combination of (possibly open-source) components that communicate with each other by means of standardised interfaces (such as those provided by Web services) these developments could open up the field to a much wider range of pedagogical tools, which can be flexibly allocated to different contexts within an institution than is currently possible'. [5] and

'By providing a common set of service definitions, we enable communities to have a shared vocabulary for discussing MLE and e-learning activity' [6]

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This development of a shared vocabulary and way of thinking is a key aim of the Frameworks and Tools strand.

The e-Learning Framework - aka the 'ELF'

The ELF is a factoring of all the functions that are required in the context of elearning as discussed above.

These functions are displayed in a set of boxes in three main layers, but they could equally be displayed in a list or in some other way. The bottom layer - Common Services - shows those

functions which are common to many systems, the middle layer - Application Services - show those which are specific to a domain (in this case e-learning, but there are others such as research), and the top layer shows User Agents which provide the interface which allows the user to access these services.

Below is a diagram showing these services and the layers they belong to. This set of boxes comes from an earlier paper 'A Technical Framework to Support e-Learning' [7] but if you look at the ELF site [8] you will see this has grown to include many more!

User Agents

VLE	Portal	SRS	Authoring tool	Library
Timetabling	Space allocation			

Application Services

Sequencing	Learningflow	Collaboration	Activity management	Course management
Group management	Scheduling	Resource management	Resource discovery	Content management
Cataloging	Packaging	Activity author	Resource list	Archiving
Rating/annotation	Terminology	Assessment	Grading	Learner profile management
Competency	e-Portfolio	User preferences		

Common Services

Messaging	Authentication	Authorisation	Resolver	DRM
Matadata registry	Logging	Identifier	Filing	Workflow
Search	Service registry			

Institutional Infrastructure

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Whilst some of the terms used for these services may seem rather technical or arcane, a more careful look should make them clearer - I've picked out a sample of descriptions of these services from the e-Learning Framework Summary [9]. It is likely that these services will match some of those you would have identified as functions performed by your VLE, and other tools you want to use, if you had conducted the exercise described earlier.

A sample of Application Service descriptions -

Activity Management

Supports the management of learning activities.

Course Management

Supports management of courses, modules and other units of learning

Resource List

Supports the creation, access and management of reading lists and other lists of resources.

Assessment

Supports the use of automated assessments.

Grading

Supports submitting grades against courses, modules, and other units of learning.

ePortfolio

Supports the management of artefacts created by learners, such as essays and projects.

Learning Flow

Supports the management and use of complex learning scenarios.

Activity Author

Supports the process of creating learning activities.

A sample of Common Service descriptions

Messaging

Allows broadcast of messages to users and groups using appropriate communication technology.

Authentication

Allows the identity of agents to be established.

Authorisation

Supports the management of access to resources by agents.

the following appear in a later version of the ELF -

E-mail management

Support for email management (as provided by IMAP, POP and SMTP)

Scheduling

Supports the management of allocation of resources against time, such as rooms, people and equipment.

Content Management

Supports the publishing, retrieval, description, and organisation of information resources, including their lifecycle management.

The work of the Frameworks and Tools Strand

The idea of the strand is to think of all the services that could possibly be needed, to define these carefully so that people can create them, or make them available from existing sources, then to develop the materials that would enable these services to be joined up. It should be possible for these services to be combined in all sorts of ways which means that systems can be developed that will adapt to lots of different contexts.

or - using the appropriate technical terms to say the same thing -

A framework of services will be defined, then reference models will be produced with libraries of software and toolkits, and guidelines, to enable their integration into a wide variety of composite applications.

It is very likely that some functions that are necessary may not be covered by the list and 'gap analysis' is an important part of the process. This is where working closely with those involved in the e-Learning and Pedagogy Strand [10] of the Programme becomes so important. Technology developers need to be able to respond to what teachers and learners actually do, and want to be able to do; but equally importantly, practitioners need to engage with what is possible, and not possible, with technology.

The Frameworks and Tools strand is producing these materials through the Technical Development and Demonstrator Projects [11], which involves cycles of short projects, the timescale of which should enable these to be responsive to work taking place both within the strand and in the other strands of the e-Learning Programme.

Using the ELF

At the moment we are at the factoring stage, and whilst there are projects which will be looking at the assembly stage, there is nothing yet available in the way of fully functioning systems for anyone to see, but we can begin to have ideas about the kinds of systems that can be assembled.

'It should be noted that the toolkits are not intended to be complete desktop applications and as such may not be immediately useful to

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teachers – rather they provide some of the foundations for a new generation of teaching and learning tools’.[12]

The outcomes of this work will include descriptions of a set of services, and the tools needed to join them up with each other and with other applications, and guidelines to support this process. But this is still a set of functions with no recipe for putting them together in any ideal way, the strand is not developing the interface which the user will see or interact with. It is a bit like the engine of a car being put together, but it still has no steering wheel or pedals.

The vision of a ‘pick n’ mix VLE’ [13] will be enabled by the work of this strand, but it doesn’t mean the next stage of assembling systems will be easy. The work of the strand will mean that there will be few technical barriers in the way of putting things together you the way you want to, but a number of questions will need to be addressed to take things into the next phase of assembly and sustainability. Questions such as what is the model for sustainability? Who will provide the tools that educators use? The Distributed e-Learning Strand [14] has some projects doing this, but what will the role of vendors be? What relevant developments are taking place internationally?

A sobering ‘reality check’ is provided by Derek Morrison [15] -

‘Some institutions have been doing more than gathering experience and have made a full-blown strategic commitment to products which represent only one way of offering e-learning. How many will now be willing to allow ‘different e-learning tools’ that don’t fit into the licensed, and therefore supported, vendor’s product? Is it possible to think beyond the monolithic VLE model?’

The ELF is part of an international process, and there is an increasingly solid agreement about the services that belong in the domain of e-learning [16]. The focus is now beginning to move in the direction of solving the question of the user layer, or what the user will actually interact with, and systems such as LAMS (Learning Activity Management System) [17] are making great strides in this area.

The much more difficult challenge...

As discussed in Part One [18], in many ways it is easier to purchase an application that does everything in an integrated way so you just have to learn how it does things then comply with that, or find ‘work arounds’ if you wish. However this can also be frustrating if it just isn’t possible to do things the way you really want to, which can be very important when practitioners wish to take a pedagogical approach which is not supported, and may even be hindered, by a system.

If you wish to construct a system to suit your needs, you will have to think very carefully about all the different possible things you might want to do; and if the system is for a college or university, there will be a wide range of ways in which people may wish to work.

This therefore requires careful thought and analysis, not necessarily of the technical underpinnings to this approach, but of the functions you might wish to have available to you - a pedagogical problem! The e-Learning and Pedagogy Strand [19] is exploring this

area and it is intended that there will be some projects which will begin to overlap between the strands of the Programme. The question of whether a service oriented approach could lead to pedagogical diversity has been explored by Scott Wilson [20].

The gap between developers and users is a familiar one in the worlds of IT and Business and there is much to learn from those who have engaged in developing a more participative approach to the adoption of technology. [21] There are also many resources and agencies who can offer help [22].

One of the important aims of the ELF is that it can provide tools to help people in the difficult task of analysis and planning, at both a strategic and practitioner level, and perhaps provide a bridge between the two very different communities of developers and practitioners. It will also enable us to move into a more mature and thoughtful approach to developing technical infrastructures for e-learning.

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