

Design, implementation and evaluation of a 'generic' ePortfolio: the University of Newcastle Upon Tyne experience

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Abstract

A customisable 'generic' electronic portfolio (*ePortfolio*) has been developed at the University of Newcastle Upon Tyne (U.K) as part of a collaborative project (<http://www.ePortfolios.ac.uk>). This paper describes the design of the *ePortfolio* and its application in a range of contexts where it is being used to support the evidencing of learning outcomes and to facilitate personal development planning. The flexibility of the *ePortfolio* architecture is appraised and preliminary findings from evaluation studies are summarised. Integration with virtual learning environments is also discussed.

Introduction

Requirements for *ePortfolios* vary greatly between different contexts. They may serve different purposes including a range of formative, summative and presentational processes. Even in a single context, an undergraduate course for example, requirements for *ePortfolios* are likely to change over time. It is therefore important to design systems which are flexible and responsive to changes in curriculum and policy requirements (Cotterill, Skelly and McDonald 2004b). This paper describes a 'generic' *ePortfolio* framework, developed at the University of Newcastle Upon Tyne, which has been designed to be highly configurable with the aim of having the flexibility to support diverse and changing requirements. The *ePortfolio* was developed as part of a collaborative project financed by the Higher Education Funding Council for England (FDTL-4 programme). The project is led by the University of Newcastle Upon Tyne and involves The University of Leeds, The University of Sheffield and The University of Dundee.

Educational objectives

i) Personal Development Planning

One of the drivers for this *ePortfolio* project was the requirement for the implementation of personal development planning (PDP) in the Higher Education sector in the UK by 2005 (Quality Assurance Agency 2001). PDP is 'a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development' (Quality Assurance Agency 2001). The *ePortfolio* team at Newcastle has prior experience in developing electronic systems to support PDP. This includes two sequential Internet Personal and Academic Records projects (<http://www.internet-pars.ac.uk>) in collaboration with Nottingham University. The first of these projects was to support PDP in undergraduate students; the second was to apply this in the context of Continuing Professional Development (CPD).

ii) Evidencing Learning Outcomes / Skills Development

Another key aim of the *ePortfolio* is to help support and promote *reflective approaches* for evidencing the attainment of programme outcomes. The focus of the FDTL-4 project is in undergraduate Medicine where there are growing requirements for reflective practitioners who have the skills and attitudes that are needed to meet the demands of professional audit, appraisal and professional revalidation:

Students must receive regular and consistent information about their development and progress. Clinical logbooks and personal portfolios, which allow students to identify strengths and weaknesses and to focus their learning appropriately, can provide such information. Using these will emphasise

the importance of maintaining a portfolio as evidence of achievement which will be necessary once they have become doctors and their licence to practice is regularly revalidated.’ (General Medical Council 2002)

Similar requirements are seen in other vocational courses. Also, there are close parallels with the recording and evidencing of transferable ‘Key Skills’ in other subject areas. In modular courses portfolios may provide a focus on program level as well as module-specific learning outcomes. The portfolio process may help students become better at relating what they have learned to the requirements of employers.

iii) Supporting Life-long Learning

ePortfolios can support life-long learning by supporting the electronic transfer of learning records. This means that prior learning and achievements are taken into account and then after graduating students can take their records with them into employment. More fundamentally, it is also intended that the *process* of completing the portfolio will itself encourage the development of skills necessary for life-long learning. As a student-centred process the portfolio is intended to encourage independent learning. Personal development planning and the ability to evidence learning outcomes are also important life-long learning skills.

***ePortfolio* architecture and design**

The *ePortfolio* has been developed using robust platform-independent Open Source tools (including Apache Web server, the ZOPE publishing environment and MySQL databases). At the design phase some of the potential

‘value-added’ features which an IT approach can bring compared to paper-based portfolios were considered.

The potential ‘value added’ features of *ePortfolios* were:

- highly customisable;
- multiple structures / views;
- sharable - facilitating interaction with supervisors, peers, and others;
- easier cross-referencing;
- searchable;
- integration with VLEs;
- transferable data to support life-long learning;
- reduced / enhanced admin;
- downloading records in a variety of formats; and
- backup and reduced physical storage requirements.

As far as possible these features were ‘designed’ in to the *ePortfolio* (Figure 1). For example, a common contents structure was designed to allow the portfolio owner the facility to share specific parts of their portfolio and to provide cross-referencing capabilities.

Course-level customisation

The *ePortfolio* was designed to be highly configurable. For example component tools for the portfolio can be selected by course and by year group (Figure 2). Context-specific tools can be incorporated into this framework, including structured Web forms generated by course administrators or more sophisticated tools created in-house or by third party developers.

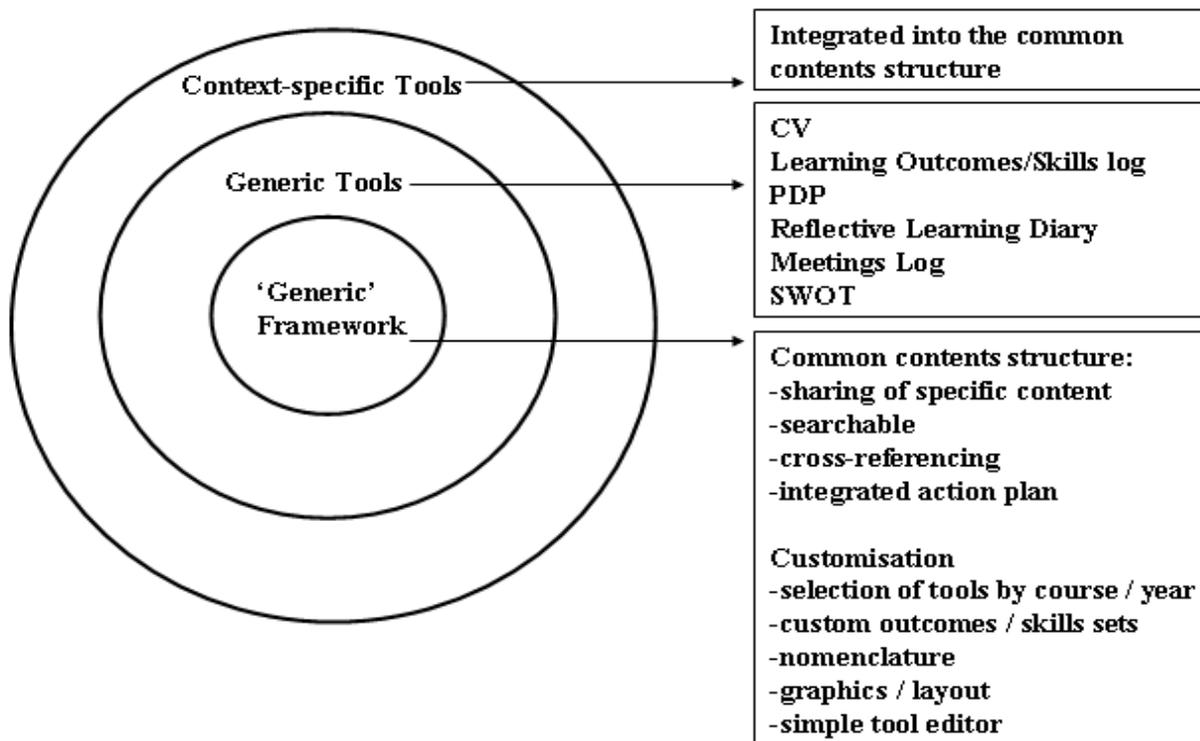


Figure 1. Overview of the ‘Generic’ *ePortfolio* developed at University of Newcastle Upon Tyne

Manage Portfolio Tools

View Settings for Course: **MB BS Medicine (MBBS: [A106])**

	Title	Tool-Class	Stage	Course Ref	Main Contents	
	Learning Outcomes	outcomes	All	-	Yes	edit
	Stage 3 Portfolio for Reproductive and Child Health	st3ejr	3	ejr_ch	Yes	edit
	CV	cv	All	-	Yes	edit
	My Learning Diary	diary	All	-	Yes	edit
	General Practice Attachment	form14	2	-	No	edit
	Link	link	All	-	No	edit
	Meetings with your Personal Tutor	tutorial	All	-	Yes	edit
	Placement Portfolio	placement	4	st4_ssc	Yes	edit
	PPD Tools	ppd	All	-	Yes	edit
	SWOT Self Analysis Tool	swot	All	-	No	edit

Install Tool: **Log of Patient and Patient visits (visit)** New tool:

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Figure 2. Tool selection by a course administrator: example from Medicine (prototype)

Nomenclature can also be customised at the course level (Figure 3). For example ‘tutor’ or ‘mentor’, ‘learning outcomes’ or ‘key skills’ etc.

Course Glossary

Glossary

View Settings for Course: **Postgraduate Vocational Training (Postgrad.: [VT])**

Glossary for Course: VT

Course eg. Course, Programme etc.

Learning Outcome eg. Learning Outcome, Key Skill etc. (please use singular)

Progression eg. Year, Stage etc.

PDP - how you refer to personal development planning (PDP)

To-Do List eg. To-Do List, Action Plan etc.

Student eg. Student, Trainee, Employee etc.

Personal Tutor eg. Personal Tutor, Academic Tutor, Mentor etc.

Tutorial Meeting eg. Tutorial Meeting, Mentoral Meeting etc.

Tutor2 eg. Personal Tutor, Academic Tutor, Mentor etc. (leave blank if not applicable)

Tutor3 eg. Assessor, Examiner etc. (leave blank if not applicable)

Tutor4 eg. Assessor, Examiner etc. (leave blank if not applicable)

Tutor5 eg. Assessor, Examiner etc. (leave blank if not applicable)

Figure 3. Configuring the nomenclature: example from postgraduate dentistry

ePortfolio Settings [Logout] Feedback

Use this section to configure your portfolio settings.

Share List

Individual Users - define who can access your portfolio. [Logout] Feedback

Dr Fred **Share List**

Mum an

Simon C

Paul Dru

Simon C

Permissions for Simon Cotterill

- Learning Diary and Planning Tool: Learning Diary and Planning Tool [change](#)
- SWOT Self Analysis Tool: Application for PRHO rotation at North Tyneside (with General Practice) [change](#)
- SWOT Self Analysis Tool: SWOT Analysis for GP SSM [change](#)
- Transcript: Unofficial Transcript [change](#)
- CV: myCV [change](#)
- Stage 4 Option: Clinical Anatomy of the Head and Neck [change](#)
- Stage 4 Option: Fractures in the Elderly - Mending the Bone and the Patient [change](#)
- Stage 3 Essential Junior Rotation: Reproductive and Child Health [change](#)

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Figure 4. Portfolio owners can grant access to specific parts of their portfolio

Generic Portfolio Tools

A number of ‘generic’ tools (i.e., designed to be used in a variety of educational settings) have been developed to support PDP. These structured tools include a reflective learning diary, outcomes/skills log, CV, records of meetings with tutors, SWOT and an Action Planning tool. These tools incorporate an integrated action planning feature. Actions are associated with specific records but can also be viewed in a central ‘In-box’ in which actions can be sorted by deadline or priority.

Sharing

The framework allows sharing of specific content with supervisors, peers and others, with the facility for viewers to add formative comments. It supports sharing with external users who receive instructions and a password via email when a student adds them to their ‘share list’.

can state how the workshop they attended was relevant to a skill and also, where applicable, say how they have applied their learning.

Piloting and implementation

Undergraduate Medicine at Newcastle

The *ePortfolio* was implemented in the undergraduate medical program at the University of Newcastle Upon Tyne from September 2003 (Cotterill, McDonald, Hammond and Bradley 2004d). The ‘generic’ *ePortfolio* was integrated into the bespoke virtual learning environment (VLE) for medicine at Newcastle. Generic tools (CV, learning diary, meetings with tutors, learning outcomes log, action planning and SWOT) were selected and some context-specific tools were also developed.



In 2003, students in years 1 and 2 (n=450) used the generic tools within the *ePortfolio*. This was non-compulsory; students were given the option of completing sections of a portfolio either in a paper log-book or in the *ePortfolio*. In year 4 (n=202) it was mandatory for students to complete the *ePortfolio* for one of their three student-selected components (SSCs) which ran from January to June 2004. A structured ‘Learning Outcomes and Action Plan’ was specifically designed to support the SSCs. Students were required to identify intended learning outcomes (in negotiation with their supervisors). For each outcome students stated how these would be

Figure 5. Example of cross-referencing from a portfolio for Contract Research Staff

achieved and how their attainment would be measured/quantified. During the SSC students reflected against these outcomes and evidenced their achievements. At the end of the SSC both intended and unintended learning outcomes were reviewed.

Cross referencing

The generic framework supports the cross-referencing of different parts of the portfolio (Figure 5). For example a record of a workshop can be cross-referenced with one or more learning outcomes or skills. In this example the user

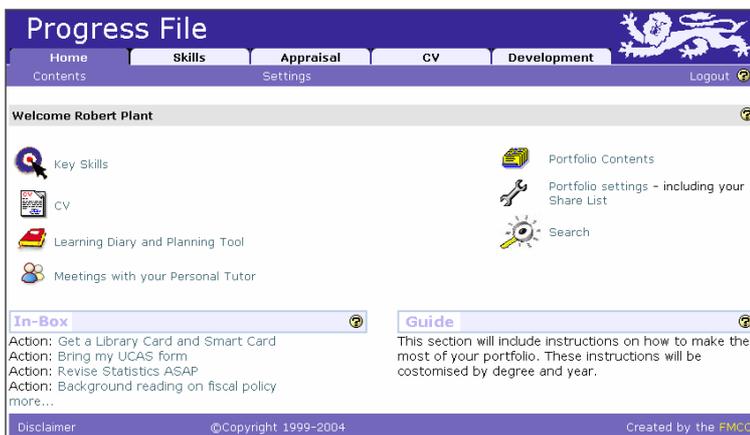


Figure 6. The ‘generic’ *ePortfolio* with customised title, tabs, graphics and tool selection



Figure 7. The portfolio integrated within the VLE for Medicine at Newcastle (year 1 view)

A new VLE for Medicine at Newcastle was launched in September 2004. The *ePortfolio* was integrated into this VLE (Figure 7) and is now available to students in all five years of the program.

Contract Research Staff

The ‘generic’ *ePortfolio* has also been configured to support Contract Research Staff (CRS) in the Faculty of Medical Sciences at The University of Newcastle Upon Tyne (see Figure 5). This has been tested by volunteers in a small-scale feasibility study (Cotterill, Heseltine, Drummond and McDonald 2004c). The *ePortfolio* has been designed to increase recognition and promote the development of generic research and other transferable skills, which are particularly important in the CRS context. In this case it was configured to incorporate the skills set developed in the Research Career Builder (<http://www.shef.ac.uk/~gmpcrs/rcb.html>). It also aims to provide a facility for CRS to record and reflect on their achievements on an on-going basis to promote pro-active personal development and career planning.

Undergraduate and Postgraduate Dentistry

A collaborative project is using the *ePortfolio* framework and developing context-specific tools for dentistry. This project involves five dental schools and two postgraduate Deaneries in the UK. The portfolio began piloting in September 2004. It is being piloted with undergraduates at Queen Mary’s School of Medicine and Dentistry in London and with postgraduate vocational trainees in the Northern Deanery (Figure 8). The aim is to develop a flexible portfolio which will cross the undergraduate-postgraduate divide in dentistry.

The University of St Andrews

The University of St Andrews is currently using the ‘generic’ *ePortfolio* in the Medical degree program September 2004.



Figure 8. Prototype *ePortfolio* for postgraduate dentists (CV section)



Figure 9. The *ePortfolio* at the University of St Andrews (Learning diary section)

Undergraduate Bioscience

The ‘generic’ *ePortfolio* has also been adapted for undergraduate bioscience at the University of Newcastle Upon Tyne with the aim of supporting PDP and promoting awareness of transferable skills and common learning outcomes across a number of modular programs (Figure 10). Piloting is planned to begin later in 2004.

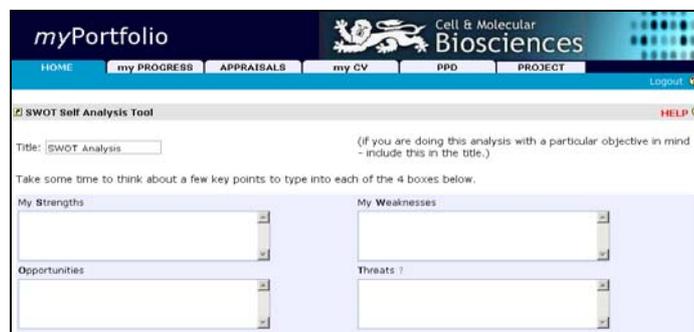


Figure 10. Prototype system for Biosciences (SWOT section)

Preliminary evaluation findings (summary)

Three evaluation studies have been completed (two in undergraduate medicine, one with CRS) and there is ongoing evaluation of the *ePortfolio* in medicine and in the other contexts during 2004/5.

Undergraduate medicine

i) Year 1 Evaluation

Ethical approval was granted for a study to evaluate student perceptions of the paper log book and *ePortfolio* used by students in years 1 and 2. The portfolio was not mandatory in 2003/4 and students had the choice of using electronic or paper versions. Two focus groups, involving 12 year 1 students, were facilitated by a 4th year student as part of their SSC in medical education. Issues raised in the focus groups were used to inform the design of a questionnaire for the wider year group.

The *ePortfolio* proved to be acceptable, navigable and easy to use, though some students wanted a more ‘quirky’ /‘fun’ design. Most students thought that the *ePortfolio* was ‘a good idea’ but there was a need for better clarity of purpose (i.e., a training issue) and some questioned the motivation to use it when it was not assessed. There was positive feedback on the facility to browse the Learning Outcomes of the curriculum. The structured learning diary was perceived as useful at first but less so over time.

ii) Year 4 SSC

Year 4 students were required to complete the *ePortfolio* for one of their three SSCs running from January to June 2004. A questionnaire-based evaluation study was granted ethical approval and students provided written informed consent to participate prior to commencing their SSC.

Participants were asked to complete 2 questionnaires. These were designed to assess potential changes in awareness of learning outcomes, factors influencing use of the *ePortfolio*, attitudes and perceptions of educational impact, and usability.

All students completed the *ePortfolio* (n=186) and 105 students had completed the questionnaires by 30/06/2004. The *ePortfolio* proved to be feasible, acceptable and facilitated the evidencing of learning outcomes. Most respondents perceived it as being beneficial (80% thought it was a useful learning experience). It had a positive impact on planning and organisation of learning:

It encouraged me to really give thought to what I wanted to achieve during the option, which was especially useful as this was my first option. As a result of the portfolio I think I got much more out of the option than I would have otherwise.

The quantitative and qualitative data suggest that the *ePortfolio* had an impact on the way some students approached their SSCs and the process prompted reflection in some students (72% spent time considering what they had learned from their SSC). Barriers to using the *ePortfolio* were access to computers (students predominantly used computers on-location at their SSC, at home, and/or at the University) and limited time.

Contract Research Staff

There was a small scale feasibility study of using the *ePortfolio* for CRS. Eleven volunteers were involved in piloting after receiving written instructions on using the portfolio. The volunteers were able to use the CRS *ePortfolio* to record skills, courses, presentations, and other CV information. Users were asked to cross-reference one or more workshop records with specific skills (see Figure 5), and 9 out of 11 users found this straight forward. All gave positive feedback on usability / navigability:

The beauty of this tool is that, being web-based, it is easily accessible. Once familiar with the sections within the tool I found it easy to use and simple to navigate.

Overall the *ePortfolio* was found to be acceptable, navigable and easy to use. There were some suggestions for specific parts of the portfolio and it is planned to link in data from other systems to avoid possible duplication (from the University publications database for example).

Integration with VLEs

Another aim of the FDTL-4 project is to explore the integration of *ePortfolios* with VLEs. As well as being capable of running on a 'stand-alone' basis the *ePortfolio* has also been fully embedded in the VLE for Medicine at Newcastle (Figure 7). The *ePortfolio* draws on student/staff data from central management information systems (MIS). Authentication was via a *Zope* product (acl users folder) and more recently via LDAP. The 'generic' *ePortfolio* has also been configured to work with the *Blackboard* VLE

either via a 'tab' or tool bar option (Figure 11). A separate Joint Information Systems Committee (JISC) funded project at the institution is developing 'single-sign-on' systems (<http://iamsect.ncl.ac.uk/>) which will remove the need for users to re-enter passwords to use the *ePortfolio* framed within *Blackboard*.

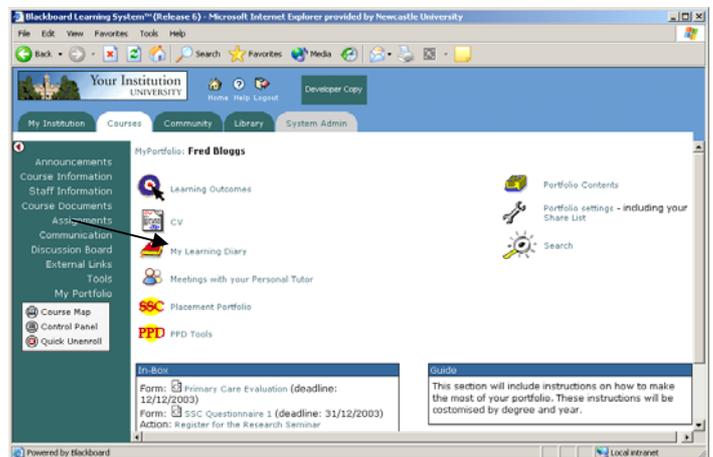


Figure 11. The 'generic' *ePortfolio* integrated with Blackboard

In September 2004 the team at Newcastle Upon Tyne embarked on a further JISC funded project to extend the 'generic' portfolio and develop a 'Web services' interface so that it can interoperate with other systems (<http://www.ePortfolios.ac.uk/ePET/>).

Discussion

The 'generic' *ePortfolio* framework has been designed to be highly configurable in recognition of diverse and changing requirements. It features course-level customisation for selection of component tools, learning outcomes/skills sets, nomenclature, graphics etc. The *ePortfolio* has been successfully applied in a range of contexts at both the University of Newcastle Upon Tyne (Medicine, Contract Research Staff, Dentistry, Bioscience) and at St Andrews University. The *ePortfolio* can be used on a 'stand-alone' basis but it has also been designed to integrate with managed learning environments (MLEs).

The three evaluation studies undertaken so far provide positive data on acceptability and usability. In addition, feedback from users and other stakeholders in the various implementations has fed into the iterative development of the *ePortfolio*.

There are also some positive results from the initial evaluation studies in relation to the educational objectives. In particular, the evaluation of student perceptions of the year 4 portfolio in Medicine did suggest an impact of PDP on the approach to learning for some students during their

SSCs. The portfolio was used to evidence learning outcomes and also the evaluation suggested that the process had facilitated reflection on learning. The long-term impact of this process is unknown. The use of cross-referencing, particularly used in the CRS pilot, also indicates the potential for linking portfolio records to learning outcomes—this might be classed as a form of ‘metacognition’. In this context users documented how particular workshops helped develop particular skills and there is also a prompt to ask how this learning has been applied in practice. This needs further testing in a wider cohort of users.

While these preliminary findings do include some positive results there is a need for further research. In the wider literature there is limited evidence to suggest that PDP does improve learning (Evidence for Policy and Practice Information and Co-ordinating Centre 2003), but there is a need for more work here.

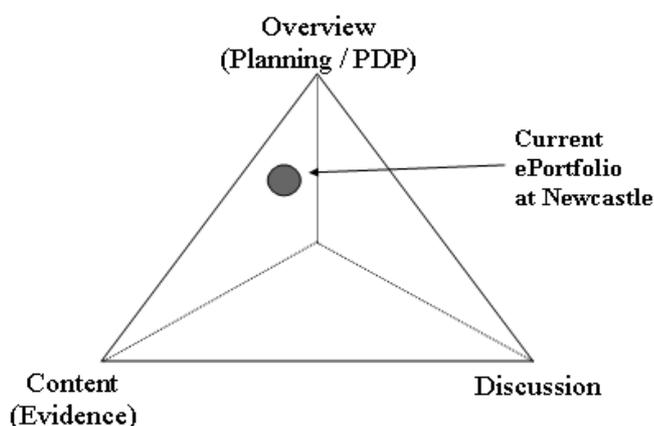


Figure 12. Perceived location of the *ePortfolio*—based on van Tartwijk, 2004

The tools developed within the *ePortfolio* are skewed towards PDP (Figure 12) because of national and context-specific requirements. However, there is a diverse range of *ePortfolio* requirements (Cotterill, Darby, Jones, Roberts, van Tartwijk and Veugelers 2004a). The underlying ‘generic’ *ePortfolio* architecture could support tools developed for many other purposes while still supporting customisation, sharing, cross-referencing etc.

This paper has focussed on the technology and educational objectives. However, it is also important to remember the importance of training, support/facilitation, dedicated time and resources in the portfolio building and PDP processes.

Summary

A ‘generic’ *ePortfolio* framework has been developed at the University of Newcastle Upon Tyne as part of a collaborative FDTL4 project (<http://www.ePortfolios.ac.uk>). The framework has been designed to support ‘value-added’ features such as sharing and cross-referencing. It has been designed to be highly configurable so that different component tools, terminology

and learning outcomes/skills sets can be customised for use in different contexts. The *ePortfolio* was implemented in the undergraduate medical program at the University of Newcastle Upon Tyne from September 2003. It has also been trialled with Faculty contract research staff and is being applied to other contexts (including undergraduate and postgraduate dentistry and biosciences and the University of St Andrews). The *ePortfolio* can be run on a ‘stand-alone’ basis but has also been embedded in a bespoke VLE for Medicine and there has been work to integrate the *ePortfolio* in Blackboard. Initial evaluation of the *ePortfolio* is positive in relation to PDP and the evidencing of learning outcomes.

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This paper was previously presented at ePortfolios 2004, La Rochelle
<http://www.eife-l.org/observatory/proceedings/ep2004>