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## Final Report

### **Project: Atomised Networked Transfer: LEAP2A Nottingham ePortfolio Interoperability**

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#### **1. Introduction**

This project emerged from a need arising within the University of Nottingham's Centre for International ePortfolio Development's (ClePD) existing JISC-funded SAMSON<sup>1</sup> project. SAMSON is a University of Nottingham project working towards developing flexible service-based infrastructure to support the expansion of processes and services required for new higher education/business partnerships and learning activities. Further to straight import and export of data, SAMSON required that ePortfolio data was able to be aggregated discreetly via Leap2A web services. SAMSON contains a Benefits Realisation (BR) activity involving the University of Derby and a major employer. As a user of PebblePad, the University of Derby BR activity required some enhancements to PebblePad's previous Leap2A developments.

The Project developed PebblePad's export functionality to enable 'atoms' of ePortfolio data to be pulled through on request, and implemented within the SAMSON Portal.

Technically, this required PebblePad to implement a two-legged OAuth method to allow applications to be registered with PebblePad, which in turn enables the applications to act as aggregators that can run without user interaction. PebblePad users will have the option to send assets in their ePortfolio to an authorised application that will make the assets available through a LEAP2A Atom feed.

#### **2. Organisational and technical issues**

Partnership working between both parties was successful and ran smoothly. Regular communication and iterative technical development meant that the project objectives were achieved in a timely fashion.

In terms of wider project activity, use of the portal interface with students at the University of Derby has been postponed until September/October. This is due to some operational delays within the institution in moving the BR project forward. This was partly due to the pilot timescales nearing the end of the summer term, and that it proved harder for Derby to introduce new practices with an existing cohort of students nearing the end of their course. It is envisaged that a new cohort will pilot this activity with PebblePad in September.

To conclude, organisation and technical issues were minimal in this particular pilot.

#### **3. Meeting the project requirements**

The project met with the original call in the following ways:

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<sup>1</sup> Shared Architecture for eMployers, Student and Organisational Networking  
<http://www.nottingham.ac.uk/eportfolio/samson>

### ***Pilot and further develop the Leap2A specification***

The project demonstrated how Leap2A could be employed in a component-based fashion to deliver specifically requested information from source. Piloting the oAuth approach has demonstrated how secure access to distributed ePortfolio elements could work in practice.

### ***Ensure development meets relevant systems and scenarios***

The project was informed directly by scenarios emerging from the SAMSON project, driven by real-world employer requirements (see appendix A).

### ***Inform enhancement of documentation***

oAuth information (section 5) has been developed to inform best practice on aggregation of portfolio items.

### ***Communication***

The project team participated in the project meetings, met twice as project partners, including a meeting with the Newcastle project. The Nottingham team met separately with the TAG team. Communications were enhanced through online contact and use of the Zoho project management tool. Dissemination has occurred through JISC Lifelong Learning and Workforce Development national meetings and at the Eife-L London Learning Forum 2010 through the event's interoperability challenge and presentation of a paper<sup>2</sup>. Regular discussion with the Newcastle project as well as sharing of two deliverables ensured that the approaches were joined up. Nottingham Trent University (NTU) are partners with the University of Nottingham on the SAMSON project, hence their involvement with the PIOP3 projects, the Nottingham team frequently liaised with NTU and aided them in the initial mapping stages.

## **4. Deliverables**

**Below is a summary of the original and status.**

Nott = University of Nottingham

PP = Pebble Learning

Who	Deliverable	Status	Comment
Nott	<u>Establish content of interface</u> pull-through with relation to University of Derby/Scott Wilson cohorts. <u>Test</u> previous LEAP2A exports	✓	see scenarios and 5
PP	<u>Set up oAuth service</u> + demo for Notts to test	✓	
PP	<u>Test</u> manually created LEAP2A packages modelling how feeds will be served	✓	
PP	<u>Update PebblePAD Interface</u> (menus) in flash to call 'send' functions	✓	see appendix
Both	oAuth registration developed	✓	
Nott	<u>Testing with other partners/ PIOP community</u>		
Nott	Establish <u>SAMSON partner scenarios</u> and requirements to feed into project	✓	See appendix
PP	<u>Update University of Derby system</u> for live testing with SAMSON users	✓	

<sup>2</sup> Coolin, K., Kirkham, T., Winfield, S. & Wood, S. (2010) *SAMSON & PIOP3: Working with ePortfolios to Liberate Learner Data*

<http://www.nottingham.ac.uk/eportfolio/samson/documents.shtml>

Both	<u>Dissemination</u> of projects and PIOP3 programme as a whole	✓	Eife-L, JISC LLLWFD events
Both	Project Management (managing progress, timescales, reporting etc.)	✓	
Deliverables shared between this project (Nottingham/Pebble Learning) and Newcastle			
All	<u>Report</u> on an agreed method of web service discovery	✓	
All	<u>Documentation</u> of technical approach (End)	✓	See OAuth documentation

## 5. Approach

### **Employer data**

The data chosen to be pulled in was directly influenced by user requirement analysis within the SAMSON project. Both PebblePad and Mahara systems were able to provide the sort of data that employers wanted to see. This was:

- CV data
- Blog
- Activity/CPD log (used in PebblePad to pull the information together)

The SAMSON portal is developed using ASP.NET and pulls web services from both PebblePad and Mahara to demonstrate aggregation of distributed ePortfolio data. The chosen security method to distribute data was OAuth<sup>3</sup>, further details on the OAuth libraries and how this was successfully implemented in PebblePad is described below.

### **OAuth Authorisation Libraries**

#### DotNetOpenAuth Library

This library provides a complete solution for basic consumer and provider OAuth implementations as well as providing OpenId support. It abstracts away most of the details from the application at the expense of flexibility. In particular this library does not currently support 2-legged OAuth.

Besides the lack of flexibility, the primary problems with this library are the relative complexity of the code base which makes it difficult to modify and debug, and a lack of implementation documentation. Excellent logging support means that it is rarely necessary to investigate the code when troubleshooting, however, lack of documentation is an issue with only the samples serving as a guide.

Adding OAuth support using the library requires implementations of four interfaces, which are primarily related to persistent storage of tokens by the application.

- `IServiceProviderTokenManager`
  - Called by the library to store and retrieve tokens, this is normally a wrapper around the storage mechanism used by the application to persist and retrieve data from persistent storage. The example code provides an example which leverages Linq2Sql for object persistence.
  - Earlier versions of the library relied on use of an ORM (Object Relational Mapper) to automatically persist some changes to token details such as the

<sup>3</sup> <http://en.wikipedia.org/wiki/OAuth>

verification code. This appears to have been rectified in the current version with the inclusion of an update method in the token manager interface to handle information that is assigned after the initial creation of the token.

- `IConsumerDescription`
  - Describes an OAuth consumer, this class can mostly be lifted from the example code in the library and tweaked to suite the applications data access requirements.
- `IServiceProviderRequestToken` and `IServiceProviderAccessToken`
  - These represent OAuth tokens for unauthorised (request) and authorised (access) tokens, a single class can be used for both since they share most of their properties.

Primary API access is through the `ServiceProvider` class which must be instantiated with a concrete instance implementing `IServiceProviderTokenManager`.

The OAuth authorisation flow is achieved by calling on the service provider to read the OAuth parameters from the request, which are returned as a different type of request token depending on the user's stage in the flow. This token is generally passed back to a method in the service provider to move to the next step in the flow, the `OAuth.ashx` file in the provider example can be used unaltered to handle the flow.

The final requirement is a page to handle authorisation of OAuth requests which shows details of the requesting application and option to allow the user to allow or deny the request. The `Authorize.aspx` from the provider example can be used as the basis for this, but will require modification to protect access so that the user is forced to login when accessing the page.

### DevDefined OAuth Library

The DevDefined OAuth library provides a more focused and flexible implementation, which is aimed only at OAuth, and abstracts less of the details away from the application.

The code is smaller and easier to modify than DotNetOpenAuth but logging is non-existent and left entirely to the application. Documentation is sufficient in combination with the samples and provides enough guidance to start implementation.

Flexibility on the consumer side in particular is much better than in the DotNetOpenAuth library, providing a fluent interface through `OAuthSession` to construct and make requests. It also provides methods to allow access to the OAuth parameters by calling `GetRequestDescription` on a `request`, this allows usage of proxy classes such as the ASP.NET webservice interfaces by injecting the parameters.

Creating a provider using the library only requires implementations of three interfaces which are used to store and retrieve tokens, consumers and nonces which are used to prevent replay attacks.

- `ITokenStore`
- `IConsumerStore`
- `INonceStore`

Access to provider functions is available through the `OAuthProvider` class, this is used with an OAuth context created by `OAuthContextBuilder` to grant and authorise tokens. The example provider has samples for the authorisation and request pages which can be used as a basis for a production provider.

### ***Implementing OAuth in PebblePad***

Implementing 2-legged OAuth in a portfolio system like PebblePad requires more planning of access controls than is required for the regular 3-legged variant. In 3-legged OAuth the user is involved in the process and grants a single application access to parts of their portfolio which they choose, in the 2-legged version, the consumer (or receiving system) is trusted to access the data of any user in portfolio system without explicitly requesting permission from the individual users.

For the PebblePad implementation of 2-legged OAuth we chose to restrict full read access to the portfolio to 3-legged OAuth only. Trusted consumers can access basic overview information and create new assets within a user's store but it cannot read existing assets without the user granting access through the regular 3-legged OAuth process.

This allows for common use cases in external tools such as the Moodle block like displaying notifications and sending reports to the portfolio without any external setup by the user, but it does not cover use cases where an external system needs to aggregate assets in users' portfolios with minimal user interaction.

We choose to address this by implementing a new option that allows a trusted consumer to read a limited set of assets chosen by users. This appears to the user as a 'send to <consumer>' option, which in turn grants the consumer permission to read the asset through PebblePad's Leap2A feeds. This then allows the consumer to read from any user's portfolio without any additional setup while protecting the private data stored in the portfolio.

There are limited training courses available on such technologies, and the project budget did not enable the project team to attend a course, instead, the team researched at depth OAuth and its variants through engaging in forums, literature and trial and error. It is the PebblePad way to involve all the company's developers in the process of knowledge transfer, we achieved this through project work and internal training to share any new knowledge gained.

#### ***Service discovery***

Initial prototyping work was undertaken by PebblePad using an XML file in a known location. The group also, drawing on methods employed in the EU TAS3 project, put forward the suggestion of using a centralised database storing information about each application/service.

#### ***Scope***

The funding was fairly minimal and as such the project focussed on the core technological work to implement and test OAuth.

## **6. Recommendations**

The team recommend using existing XCRI structures and recommended vocabularies for Leap2A qualifications.

The group discussed the website and would like to put forward the suggestion that the main website should be very clear, with static info and the wiki used behind the scenes for development. A forum would be ideal to replace individual consultation, which is fairly resource heavy for partners.

## **Appendices**

### **Appendix A**

#### **Scenarios of practice**

##### **Companies sending employees on Learning and Development held at more than one institution**

Company X is a large engineering company employing over 3000 staff across the UK. The company are committed to up skilling their employees through regular career and professional development (CPD) and at one time have up to 150 employees undertaking courses, such as Higher National Diplomas, Foundation Degrees, Degree and post graduate and professional qualifications. The Human Resources (HR) department have the task of managing the career development for these employees and ensuring that they succeed on their courses. Employees are spread across the UK attending numerous institutions and keeping track of them all is a time consuming task, involving many phone calls and visits. Contact with the academic staff delivering the programmes varies in consistency, with some (perhaps closer) dialogue. The HR manager is interested in having a single online interface to see at a glance all of their employees on CPD and at which institutions. Drilling down into information about their course, tutor and updated progress reviews from the employees themselves. Institution X has a PebblePad ePortfolio, and institution Y uses Mahara. Employees are asked to fill in a brief weekly report in the ePortfolio describing the focus of their project and any academic deadlines that their employer should be aware of. They also upload their CVs to the ePortfolios. However, as it would be impractical for the HR manager to log in and access many different ePortfolio systems, they took advantage of the SAMSON interface, which is a portal accessing and aggregating the relevant learner data from the two institutions. The HR manager has a login to the interface and can view the ePortfolio data that has been shared with SAMSON. Data is accessed through a trusted oAuth connection, and is pulled using the Leap2A standard to enable consistent aggregation onto the portal. As a result, the HR manager is able to better support employees and manage their time and workload, being sensitive to any pressure points and deadlines approaching within the course. If any issues arise, or the employee is having difficulties, the HR manager has prior warning and can further support their staff.

##### **Apprenticeship scenario**

Company X has 10 apprentices in various different departments within the organisation. They study one day a week at local colleges, the rest of the week spent with the company. The apprentices have a work-based mentor and are co-ordinated through the HR department. The quality of mentoring is variable, with some apprentices receiving better support than others. There is also concern from the company that they are not fully aware of the apprentices' progress at college – whether they are achieving and attending, and how they can best support the apprentice to succeed. The company is also keen that the apprentice is linking their college study to the work place to ensure consistency in learning outcomes and best prepare the apprenticeship for work. The HR department keep in touch with the colleges through the assessors, however, their experience with different colleges is variable, and the company does not always feel that a clear picture of progress is available. Some of the colleges use an ePortfolio to record evidence against competencies. These systems are accessible by the apprentice and their assessor to ensure they are meeting the requirements of their course and are not generally accessible to the employer. However, using the SAMSON portal, relevant data on achievement and areas to focus on was pulled from the various ePortfolios using the Leap2A data standard to ensure consistent information. Furthermore, the apprentices also were asked to keep a weekly blog briefly covering their experiences during the week as well as any areas they feel they would like to

improve. Using Atom, this data was also pulled into the SAMSON portal. Thus, the employer benefitted from a single point of access displaying a holistic view of their apprentices, a useful function for all parties. Work-based mentors, HR, assessors and apprentices were able to join up the whole experience in a more coherent fashion, enabling early intervention in case of any problems and improving the learning experience. The apprentice is located at the centre of these interactions and controls access to the data, and it is this 'non big brother' approach that motivates the apprentice to feel in control of their learning.

## Appendix B: Instructions for PebblePad users

### University of Derby / Scott Wilson SAMSON pilot

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#### PebblePad instructions for Scott Wilson students

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##### FIRST LOGIN ONLY

To begin, you will need to do the following **once only**:

1. Log in to PebblePad
2. Create an ‘activity log’
  - Click “tools → my settings → preferences tab” and turn on the “activity log asset type”
  - Click ✓ to save
  - Click “create new → more... → activity log
  - Give the ‘activity log’ the title “Scott Wilson updates”
  - Click the numbers at the bottom to set up your log. Note, you can ignore screen 3 (setting hours) and screen 4 (reflection)
  - Click ✓ to save

You have now created your “Scott Wilson Updates” activity log. This is where you will attach your weekly updates.

The “Scott Wilson update” activity log is similar to a scrapbook, where you can attach any other PebblePad ‘assets’ (documents, blog items, etc.)

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##### WEEKLY ACTIVITY

##### Creating the “weekly update”

To create the weekly update:

1. Click ‘create new → ‘thought’
2. Enter a title E.g. “<yourname><date>” and click ✓ to save
3. Enter your weekly update in the ‘description’ box

*This will consist of the following type of information*

- *What have you worked on this week*
  - *Deadlines/away days approaching*
  - *If you are feeling any areas of pressure*
  - *Anything Scott Wilson can help you with?*
4. Click ‘add date’
  5. Click ‘3’ and ‘send to... → activity log. Choose ‘Scott Wilson updates’ and click the green tick

Use this same ‘Scott Wilson update’ activity log each week.

This will then provide both yourself and Scott Wilson a record of all of your updates.

### **Sharing with Scott Wilson**

Once you have created your weekly update (above), you need to send this to Scott Wilson.

*(Note – this will be available once the Uni Notts work with PebblePad is complete)*

1. Click “tools → my assets” and click on your “Scott Wilson Updates” activity log
  2. In the right hand pane, click “send to → Employer”
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Appendix C: SAMSON Portal screenshot: PebblePad data pull.

The screenshot displays the 'Student Zone' interface for 'My Students | David Villa'. Under the 'Shared Data | PebblePAD' section, a list of documents is shown, each with a yellow document icon. The documents are: 'Weekly Updates', 'test interoperability', 'mind flay', 'Evidence', 'A Personal Space for Learning', 'thought three', 'Scott Wilson updates', 'Stuart 5th May 2010', 'second thought wednesday 12:45', 'Reflection', 'Reasons', and 'Impact'. The document 'A Personal Space for Learning' is expanded to show its content: 'Sutherland, S (2005) ePortfolios: a personal learning space in de Freitas, S and Yapp, C (2005) Personalisation in the 21st Century Stafford: Network Press' and an 'Updated Date: 11/5/2005 2:13:07 PM'.

**Student Zone**

**My Students | David Villa**

**Shared Data | PebblePAD**

- Weekly Updates
- test interoperability
- mind flay
- Evidence
- A Personal Space for Learning
  - Sutherland, S (2005) ePortfolios: a personal learning space in de Freitas, S and Yapp, C (2005) Personalisation in the 21st Century Stafford: Network Press
  - Updated Date:** 11/5/2005 2:13:07 PM
- thought three
- Scott Wilson updates
- Stuart 5th May 2010
- second thought wednesday 12:45
- Reflection
- Reasons
- Impact

Appendix D: PebblePad screenshot – Send to SAMSON

