

# **NATIONAL STRATEGY FOR METADATA INTEROPERABILITY:**

## **A SCOTTISH PARTNERSHIP**

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# National Strategy for Metadata Interoperability: A Scottish Partnership

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## Abstract

This paper sets out the thinking behind establishing an interagency partnership in Scotland with the aim to standardise vocabularies in a Scottish education context. The paper explores the proposal for a National Strategy and a common approach in tagging learning resources and assessment items designed for use in Scottish schools and colleges that is also consistent with international technical standards and uses the services available in the community to manage this process.

## Introduction

The use of electronic environments is increasingly becoming the norm for delivery of assessment and teaching materials. As teachers and learners become more digitally able and experienced they have increasing needs and expectations of these systems. The national education agencies that provide services to schools and colleges need to be able to meet these expectations.

Metadata is a key element in supporting efficient and flexible delivery of digital resources and this transformation is leading to metadata becoming increasingly valuable.

**What is metadata?**

*Metadata is descriptive information about a resource (such as information on how and when and by whom a resource was created, or to which educational topics or courses the resource relates). Metadata can be compared to the information held in an electronic library catalogue record, on which searches can be performed to find a particular resource.*

Metadata enables teachers and learners to discover the resources they need by facilitating searching within learning repositories, VLEs, websites, and Content Management Systems. There are a number of learning repositories and resource collections available to teachers and learners within Scotland's educational community, for example Glow<sup>1</sup> for the schools sector, COLEG's Repository for Scotland's Colleges<sup>2</sup> for the college sector, and other examples such as JORUM<sup>3</sup> which provide resources for the HE sector.

The development of Glow has been a major driver in Scotland to progress towards interoperability between systems. Glow is a Scottish Government-funded national schools intranet, digitally linking Scotland's 800,000 educators and pupils. It is funded by the Scottish Government and managed by Learning and Teaching Scotland (LTS) in partnership with RM. This service offers an opportunity for the national education agencies in Scotland to work collaboratively to provide a more accessible, user-friendly platform to make their resources available to schools. In order to allow for inter-repository searching interoperability of content and metadata is required.

Additional drivers include the Curriculum for Excellence (CfE)<sup>4</sup> and Assessment is for Learning (AifL)<sup>5</sup> initiatives which promote the use of formative assessment and more flexible summative assessment models, including on-demand, personalised and adaptive assessment. The infrastructures and processes to facilitate the re-use of content to support these approaches need to be put in place. Sophisticated metadata, controlled vocabularies and well structured taxonomies are key to underpinning many of these processes.

**What is a controlled vocabulary?**

*A controlled vocabulary is a preferred set of terms commonly used and agreed by stakeholders.*

<sup>1</sup> <http://www.glowscotland.org.uk>

<sup>2</sup> <http://www.coleg.org.uk/coleg/69.html>

<sup>3</sup> <http://www.jorum.ac.uk/>

<sup>4</sup> Curriculum for Excellence is the programme of work undertaken by LTS, SQA, Scottish Government and HMIE that is reviewing the current Scottish curriculum. For more information see <http://www.curriculumforexcellencescotland.gov.uk/>

<sup>5</sup> Assessment is for Learning is a national initiative with representation from all parts of the Scottish education community. For more information see <http://www.ltscotland.org.uk/assess/for/index.asp>

**What is a taxonomy?**

*A taxonomy is a hierarchical structure of terms which can be used for the classification of resources and can provide a means of navigation within classification systems.*

These drivers call for a move towards a centrally managed vocabulary and taxonomy approach in Scotland and consistency in use of these in order to enable interoperability, sharing and ultimately making search and delivery of learning and assessment materials more accessible to teachers and learners. In order to understand how to progress this move we must first consider the current landscape.

**Current UK Landscape**

A recent research report for Becta (formally known as the British Educational Communications and Technology Agency) on the Education and Children's Services Sector Strategy for Vocabularies (Mackenzie-Robb et al, 2008) which looked at the current vocabulary landscape across the UK, showed in its key findings that;

- There are very many controlled vocabularies in use within the education sector, and their primary use is information search and retrieval.
- Despite the need to support information sharing and achieve a common language, and to cope with a rapidly changing environment, there is a considerable lack of knowledge and understanding about controlled vocabularies within organisations.
- There is a great deal of activity around controlled vocabularies and information management in general, but little evidence of knowledge sharing.
- There is strong support for a sector wide strategy for controlled vocabularies, and this should be centrally managed, with strong high level support.
- There is almost universal support for a centrally managed vocabulary management service for education, with already high levels of awareness of Becta's Vocabulary Management Service.<sup>6</sup>

Rather than a centrally managed approach, the ownership of vocabularies mostly sits within the department who created them and are mostly managed in-house, but notably an example of an existing centrally hosted approach is the Integrated Public Sector Vocabulary (IPSV)<sup>7</sup>, which is used by several organisations and centrally managed. However, over and above a centrally managed service there is a need for central governance of standards.

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<sup>6</sup> <http://bank.vocman.com>

<sup>7</sup> <http://www.esd.org.uk/standards/ipsv>

In the Education Sector Strategy report, strategic direction is cited as a key barrier.... 'Respondents are not aware of much in the way of national policy direction or local initiatives, nor of central government initiatives. None of the respondents are able to reference a senior manager within their own organisations who promotes the use of controlled vocabularies at both operational and strategic levels.'

The Information Standards Board (ISB) set up by DfES will have responsibility for enforcing information standards across the sector for learners and children's services in England. At this stage there is a lack of clarity on the relationship of the ISB to Scottish Organisations and direction is needed on whether they should follow the ISB or create a group of their own.

Interestingly, the issues and barriers around the implementation of controlled vocabularies are less technical and more organisational. Winkley and Busuttill-Reynaud (2008) suggest in a recent service study for Becta that

'...many components of a potential service are in place (including the VMS itself), and delivery of a pilot service for metadata-based multi-repository searching is both achievable and of considerable interest to publishers as it opens a new and potentially effective channel for teachers and learners to find and access resources.' The real challenges are issues such as cultural change, proving the benefits and funding.

However, the vision of effective searching and increased visibility and accessibility of learning and teaching resources, interoperability and shared services and re-use of information will benefit both end users and vocabulary owners. These drivers and benefits informed the set up of the Metadata Partnership Group in Scotland.

### **The Metadata Partnership Group**

In November 2006 a sector-wide interagency group was formed, with the clear aim to standardise vocabularies for use in a Scottish educational context. The member organisations in the group each have a role to play in ensuring that a national metadata framework for Scotland is based around its qualifications and learning and teaching material.

Key members of the group are;

**Scottish Qualifications Authority (SQA)** – SQA is the national body in Scotland responsible for the development, accreditation, assessment and certification of qualifications other than degrees.

SQA has previously established a metadata application profile relevant to its resources and assessments and is currently in the process of scoping a Scottish Teaching and Assessment Resource in collaboration with Learning and Teaching Scotland. This resource aims to meet the key objectives from CfE and AiFL in delivering more flexible learning and teaching models.

**Learning and Teaching Scotland (LTS)** - as the lead organisation for curriculum development in Scotland, LTS offers support and guidance to teachers, early years practitioners, schools and education authorities to help improve achievement for all.

LTS has completed two main prongs of metadata work in the last two years

Firstly taxonomies for the existing curriculum structures as used by LTS and Glow have been published through the Becta Vocabulary Bank. These have been used by commercial content providers to tag their content for use in Glow Learn - the Glow VLE. The second piece of work has been to commission consultants to help draw together a metadata strategy for LTS and to draft additional taxonomy areas for educational subjects. Future developments include the move to the Curriculum for excellence and the implementation of the recommendations from the strategy consultation.

**Colleges Open Learning Exchange Group (COLEG)** - as first choice provider of learning solutions for Scotland's colleges, COLEG produces innovative learning materials and e-learning tools which are highly flexible and easy to access. COLEG promotes and facilitates the sharing of resources within the Scottish college community.

COLEG is currently implementing a repository which will be accessible to its 39 member colleges. The repository will provide access to a wide range of learning resources which have been created by or are relevant to Scotland's colleges. The repository system will offer unlimited access to users to search and download these resources, handling this user access via OpenAthens.

In support of this work COLEG has created a metadata application profile which provides vocabulary terms suitable for the Scottish college community. COLEG is also implementing a set of taxonomies for classification of its materials, which include taxonomies for Higher National, Graded Unit and National Qualification materials. This metadata and taxonomy work has been undertaken in consultation with SQA, LTS and SCRAN to share knowledge and good practice, and to encourage a consistent approach across the national agencies.

**Scran** - Scran is a charitable online learning resource base with over 360,000 images and multimedia files from museums, galleries, archives and the media. Scran is one of the largest educational online services in the UK supporting over 4,000 institutions and also over 4,000 home users.

A case study of Scran's current development working with metadata interoperability will follow.

**Becta** - Becta has a UK remit and leads the national drive to inspire and lead the effective and innovative use of technology throughout learning.

Becta has played an advisory role to the group and representatives regularly attend or present at its meetings. The Becta Vocabulary Management services offer a centralised repository for developing, managing and

publishing educational vocabularies and will allow the partner agencies to use and contribute to publicly available controlled vocabularies in a central resource.

Other organisations with an interest in this area, including HMIE, JISC, SFEU are invited to join or attend meetings as appropriate.

The group operates at two levels; The Advisory Group and The Working Group. The aim is for the Advisory Group to advise on strategies and agree actions for the Working Group to undertake and report back on.

The group has already undertaken considerable work in collecting and mapping its vocabularies used in each organisation and these are intended to be made available in the Becta Vocabulary Services to enable interoperability. The following is a case study of work already undertaken by Scran to demonstrate interoperability between the Scran service and the Glow environment using the current vocabularies in the Becta Bank.

#### *Case Study of metadata interoperability*

As part of the development of Glow, Scran were asked by the Scottish Government to provide a single sign on solution to allow authenticated access to all Glow users who were also valid Scran users, and to allow Scran content to be searchable and findable within Glow.

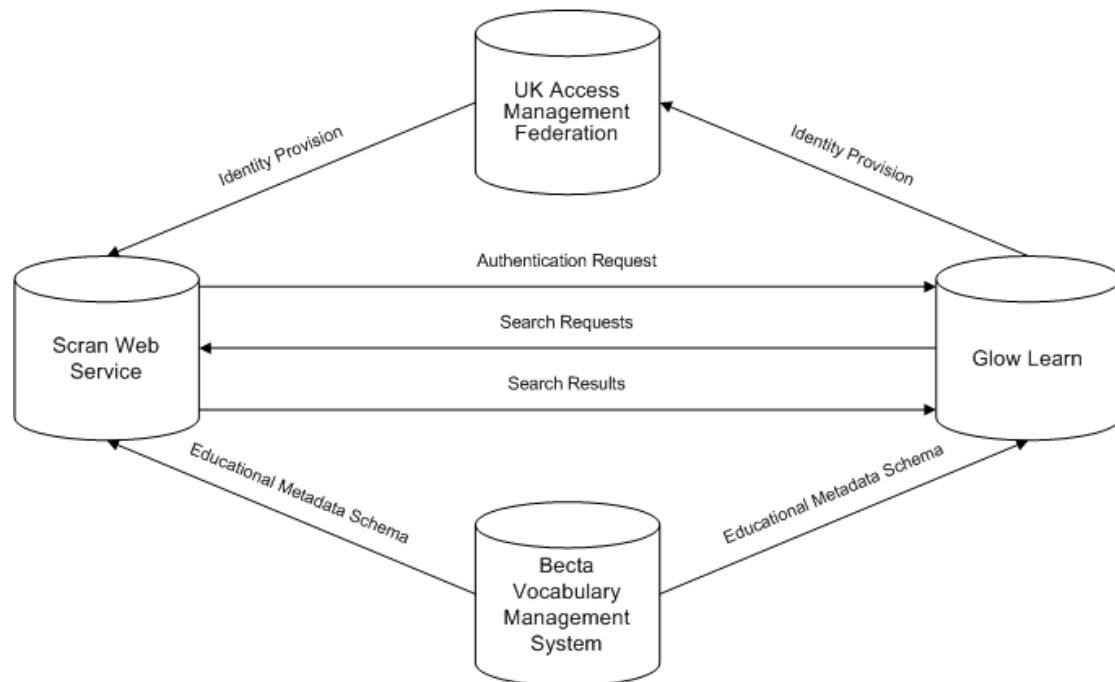
For authentication, Glow supports Shibboleth and is an Identity Provider as part of the UK Access Management Federation. Scran therefore became a Service Provider as part of the UK Federation. Any authentication requests for Scran access from Glow users, either from the Glow portal or directly from the Scran web site, are redirected to Glow's UK Federation log in page and the user's identity is then securely passed back to the Scran web site for verification against Scran's own database of valid users.

For cross searching and resource discovery, Glow supports SRW. Any searches of Scran content on Glow are passed to Scran's SRW interface, and the search results generated are passed back to Glow in the same manner. If the user finds a resource that they are interested in, clicking on the appropriate link in their search results in Glow redirects them to the persistent URL for that resource in Scran. The user's identity is then authenticated as described above before they are given access to the full resource.

Keyword searches (free text entry) in Glow are mapped against all of the available Dublin Core fields in Scran's resource database.

For controlled vocabulary searches, it was decided that both Glow and Scran should use the same source for their educational metadata schema in order to provide the required level of interoperability, as it was generally thought that any use of user controlled vocabulary or folksonomy would quickly prove to be unworkable. The agreed source for the educational metadata schema is the Becta Vocabulary Management System. Both Glow and Scran base their controlled vocabulary searches on the educational taxonomies published to

the Vocabulary Management System by Learning and Teaching Scotland, ensuring that any controlled term passed between the two systems by SRW as described above is identical in each system, and therefore only relevant resources are returned to the user.



Although most of the functionality described above is still a work in progress, it is hoped that the development will be finished by Summer 2008, providing a concrete example of interoperability between four different systems (as shown in the diagram).

The aim is to join up the work already undertaken in this area by the partner organisations and build on this to deliver a set of joint objectives.

#### *Joint objectives of the partnership*

The group seeks to maximise the benefits of, and gain best value from the work of individual agencies in Scotland to create an effective and efficient partnership on metadata by:

- Developing and implementing a strategy to converge and map application profiles
- Coming to a consensus on a set of common vocabularies for learning objects and assessment items, in order to consolidate these in a Scottish Education context with reference to international standards
- Adopting a common and consistent approach to review these vocabularies when appropriate
- Playing a prominent role in the national strategy for the management of vocabularies and taxonomies

- Informing and influencing member organisations' approaches to work on metadata, taxonomies and vocabularies through the above activities

## Next steps

It is clear that there is support for a centrally managed approach by specialists across the board but what is not clear is who will manage it. The members of the partnership have a number of options to move forward;

1. Continue to manage internally and separately using own terms with the option to undertake mapping for purpose of making materials available in Glow. This would suggest re-inventing the wheel and studies such as that by Campbell and Carrier (2005) recommend re-use of existing vocabularies, but also interoperability would prove challenging and less future proof.
2. Manage on a Scottish national level. This would mean fewer stakeholders than on a UK level and therefore easier to manage and agree on a core set of terms. The work would also be of direct relevance and use to the Scottish curriculum taxonomies in development. The existing Metadata Partnership Group could provide the platform for this.
3. Manage on a UK national level. This begs the question of ownership and as well as taking longer to initiate it would be more difficult to manage and would require a body other than the Metadata Partnership Group.

The drivers in Scotland previously mentioned mean that there is an urgency to move towards a joint approach and for the reasons stated above the Metadata partnership group agrees that – for the time being – managing a central approach on a Scottish national level is the most practicable solution. As part of this solution agencies propose the use of the existing centralised vocabulary management service (VMS) to manage and publish vocabularies and taxonomies for use by third parties.

The specific benefits of a joint approach in Scotland include;

- Standardised metadata will enable inter-repository searching and provide the underpinning information to support a central resource and single sign-on solution for learning, teaching and assessment materials where appropriate
- Commercial companies and institutions will be able to download approved and quality assured controlled vocabularies by the national agencies for tagging through the public interface of the Becta Bank

- Sharing best practice and resources for developments such as a National Taxonomy will ensure the necessary expertise to inform effective working practice and appropriate use of public funds where relevant

However, the potential barriers will need to be considered more fully;

- Agreeing of terms and definitions whilst ensuring that organisational needs continue to be met
- The resource implications of mapping in the Becta Studio - this is a labour intensive and manual process
- Technical standards integration in practice!
- Ongoing maintenance including version control – the agencies signed up to the Becta services will benefit from dynamically updated changes feeding into their internal systems, however these changes need to be effectively communicated and adopted by third party users
- Commercial providers in England mapping to the vocabularies e.g. content for Glow will have to be interoperable

It is likely that a monolithic taxonomy which all would use internally would not be realistic as each organisation has its own needs and focus, so the aim is to achieve an agreed degree of interoperability between them and to define a core set of terms.

Flett and Glichrist suggest that the Becta's Vocabulary Studio & Bank system could be used to store the master copy of the National Education Taxonomies and make it available to other agencies. Modifications would then be pushed out to all subscribed consumers of the national taxonomies who could take the core taxonomies in the Becta tool, replicate them and add their own terms to them. The Spine of Concepts is currently in development and once a substantial spine has been completed the terms could then be mapped which would enable further interoperability.

The argument of folksonomies vs controlled vocabularies and which would lend itself more to a national approach has also been explored.

#### **What is a folksonomy?**

A folksonomy is an information description and retrieval methodology consisting of collaboratively generated labels that categorize content, e.g. photos, Web pages, and Web links, etc

Folksonomies are an uncontrolled architecture and user-driven and therefore lacking in structure - such an architecture would be unsuitable for achieving semantic interoperability. Although a benefit of folksonomies is that terms used should make sense in the community of practice, users who have spent much time interacting with the content they tag may lack objectivity and the lack of a controlled set of terms could result in inconsistent or irrelevant tags.

Additionally, Flett and Clichrist recommend that core taxonomies are built, using the LTS taxonomies as a foundation. This would enable semantic interoperability, as well as reducing the expense of individual organisations developing individual taxonomies.

## **Conclusion**

The recent research in the area of controlled vocabularies demonstrates the support and need for centralised services and management of these services. The CAA conference will provide an appropriate platform for receiving feedback on the proposed approach to further inform the next steps and the role of the Metadata Partnership Group.

## References

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