Abstract
The Quatro project has applied semantic web technologies to trustmark schemes and quality labels. Drawing on past and original research, the project has defined a vocabulary that can be used by any trustmark scheme (TMS) and a technical platform to deliver the trustmarks in a format that can be processed by semantic web agents.

Keywords
Quatro project, Dublin Core Conference, Submission Paper, Trustmarks, Quality Labels, Group URIs, Common description

1. Introduction
Trustmark schemes have been established in many parts of the world, some are online versions of existing schemes, others have been developed specifically for the web. Two notable areas of interest for trustmarks are those designed to give consumers confidence in eCommerce operations and those that indicate that medical information has been peer reviewed. Operators of both types of TMS are among the partners in the Quatro project.

In all cases encountered, the model is essentially the same: a website is submitted for review by the TMS. If the site meets the TMS criteria it is allowed to show a logo. If a user clicks on the logo, a database is interrogated and the current record for that site is displayed, usually showing information such as the date on which the site was last reviewed. Despite the presence of a hyperlink that links to a database record, trustmarks are designed solely to be read by humans and not machines. As a result of Quatro, they will be available to both.

2. The vocabulary
A significant amount of research has been done into trustmarks, particularly in Europe. Research has focussed on how trustmark schemes operate, what benefits they confer on the user and the websites carrying them etc. One such project in 20012 produced a list of criteria that any trustmark scheme would be likely to use when assessing a website. Quatro

Contributions from other Quatro project members
See www.quatro-project.org

has used that a starting point to create a generic vocabulary, available for royalty-free use by quality label and trust mark schemes around the world. The vocabulary is divided into four categories:

• General Criteria, such as whether the labelled site uses clear language that is fit for purpose, includes a privacy statement, data protection contact point etc.
• Criteria for labelling to ensure accuracy of information such as the content provider’s credentials and appropriate disclosure of funding.
• Criteria for labelling to ensure compliance with rules and legislation for e-business such as fair marketing practices and measures to protect children
• Terms used in operating the trust mark scheme itself such as the date the label was issued, when it was last reviewed and by whom.

The complete vocabulary is available on the Quatro project website both as a plain text document and as an RDF schema, the namespace for which we have defined as http://purl.org/quatro/elements/1.0/.

Trustmark schemes will, of course, continue to devise their own criteria. However, where those criteria are equivalent to those in the Quatro schema, use of common elements offers some distinct advantages.

Firstly, a trustmark that is machine readable and uses common descriptors will be interpreted more easily by semantic web tools than one that uses purely proprietary elements and a proprietary platform. If a user agent is configured to look for Trustmark A but
finds a site that is accredited by Trustmark B, at least
the common elements will be recognised, even if those
specific to Trustmark B are not. The incentive for
content providers to gain accreditation for their
material is therefore enhanced if the TMS uses at least
some of the common descriptor set.

Secondly, a common set of elements makes it is
possible to apply machine-learning techniques to the
difficult area of ensuring that an accredited site
continues to meet the TMS criteria. A machine cannot
tell whether an email sent to an eCommerce operator
will be responded to within a given time, but it can
detect that a contact route is still provided 6 months
after the site was last reviewed by a human, even if the
nature of the contact route changes.

For example, a site may offer a simple mailto link
for contact but subsequently change this to a web
form. Content analysis by machine learning will
continue to recognise this as a contact route. Likewise,
a document that is properly referenced is relatively
easy for a machine to identify. If a TMS includes the
criterion that all medical documents are properly
referenced and a new medical document is added
without such references, it can be detected and the
TMS alerted that the site needs re-checking.

On both counts the use of a common vocabulary
offers commercial advantages to trustmark scheme
operators by increasing the value of the labels for
content providers and end-users.

3. The Technical Platform

In its simplest form, a trustmark would be a series
of elements encoded in much the same way as any
other metadata. However, a trustmark will generally
apply not to a single resource but to a group of
resources, such as all those on a particular website.
This presents a problem for RDF which is based on a
single URI as a subject. An identical problem obtains
for content labelling for other purposes such as child
protection.

Project partners’ experience of working with PICS5
has been informative in devising a schema for RDF
Content Labels6. A set of documents produced under
the aegis of the Quatro project and other activities in
Europe and Japan gives use cases, test data and a full
description of the schema7. Essentially the system
allows for a single description to be applied to any
number of resources. This can be done in two ways.
Firstly a resource can be linked directly to a
description using a tag such as:

```xml
<link rel="meta"
href="http://www.example.org/labels.rdf#labe l_1"
type="application/rdf+xml" />
```

The RDF instance, labels.rdf, would include a
description – a content label – with an rdf:ID of
“label_1”.

However, the real power of the system comes from
the second method - a simple rule set. All resources on
a content management system or server can include a
common link or HTTP response header that points to a
single RDF instance. It is likely that this file will be
under the control of the content provider’s editorial
department rather than a production centre. Data in the
RDF instance will allow an agent to take the URI of a
particular resource and apply the rules that then lead to
the correct content label.

Using this method, a trustmark operator, for
instance, would be able to accredit a limited portion of
a website or a suite of web properties. For ICRA’s
child-centred labelling system8, it allows content
providers to apply different labels to different
resources on their network. Further uses quickly
become apparent, such as film classification or
applying a single set of management information to a
large collection of resources.

The label schema supports three basic “types” of
description:

- A content label – a class whose properties provide
  the description. This is the one used by the Quatro
  and ICRA labelling schemes.
- A classification – a class that itself provides a
description such as “Suitable for persons aged 12
  years and over”
- Management Information – a class whose
  properties would typically include the DC
  metadata set, Creative Commons licence etc.

An important component of the RDF Content Labels
schema is the idea of defaults and overrides. An RDF
instance can declare global, default descriptions that are
then overridden if a rule leads to a label of the same
type. In other words, one might declare a website to be
published by the Example Content Production Company
with unrestricted copyright as default management
information. However, a different set of management
information would override this in the “Madrid” section
of the site were published by España Example and all
rights are reserved. Classifications and Content Labels
can be overridden in the same way but act independently
of each other.

3.1 Example

The following code fragment exemplifies several
features of the platform.

```xml
<label:RuleSet> <label:hostRestriction>example.org
</label:hostRestriction>
<label:hostRestriction>example.com
</label:hostRestriction>
```
4. Relevance to Dublin Core

Although Quatro and Dublin Core are responses to very different demands made by different constituencies, there are clear areas of common interest and interoperability.

4.1 The Vocabulary

There is no direct mapping between the bulk of the Quatro vocabulary and the DC elements and terms since they serve different purposes. However, Dublin Core metadata is highly relevant to the elements used by TMS operators in the administration of their schemes. `dcterms:issued` is used directly, `quatro:lastReviewed` and `quatro:withdrawn` are both defined as subProperties of `dc:date`.

4.2 The Platform

As the example in section 3.1 shows, the RDF Content Labels platform makes specific provision for management information as a separate entity from descriptions such as quality and content labels. Dublin Core elements can therefore readily be applied to groups of resources in a manner that is machine processable. Critically, management information can be applied in a manner that readily fits in with the typical workflow of large content providers.

5. Application

Quatro is approaching the end of its first year. Both the vocabulary and technical platform are already published with implementation under way by two trustmark schemes (IQUA and WMA) and ICRA. Work has now begun to develop applications to make use of the machine-readable labels. These are:

- A browser-independent helper application that will recognise semantic web data where present on websites and provide a visual interpretation. A user will therefore be able to see that a site has a trustmark whether or not the actual trustmark logo is visible to them.
- A wrapper for search results that will indicate the presence of trustmarks and/or other metadata on the websites listed. This will be available for inspection by clicking an icon adjacent to the relevant result.

The applications will use common code elements to identify the labels and use relevant methods to attempt to gain trust in them. These include automated database look-up and machine-learning based content analysis. The first application sits on an end-user’s computer, the second is an option for search engines.
6. Summary

The Quatro project presents a method of grouping URIs that share common descriptions. It is hoped that this will have wide interest and application in the DC community, however, the focus of the project is on bringing trustmarks (quality labels) into the semantic web. A royalty-free vocabulary has been devised for use by trustmark schemes. Use of this common basis for a variety of labelling schemes offers significant advantages to trustmark operators and endusers.

7. References

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