



**Facilitating Access to Information on  
Learning Technology for Engineers**

# **GUIDELINES FOR FAILTE METADATA**

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# Chapter 1: Introduction

The FAILTE project is building a database of engineering, web based learning and teaching resources. FAILTE is building on previous work by three United Kingdom Higher Education projects within the engineering subject area. These are EEVL, LTSN Engineering and EASEIT-Eng. The database is intended to be used by academics and will be searchable online, via a World Wide Web interface, accessible from the EEVL and LTSN Engineering web sites.

This document begins with a description of how a resource is selected for inclusion in the FAILTE database. Guidelines for completing a record are then presented.

The record fields are based upon a metadata set, which was compiled through comparison of Dublin Core metadata (<http://purl.oclc.org/dc>), IMS metadata (<http://www.imsproject.org>), and EEVL database fields. The metadata set was first described in the Draft guidelines document, which formed the basis of this version.

In the guidelines below, instructions for completing a FAILTE database record are presented field by field. The database fields are described in the order in which they appear in the draft database.

## Chapter 2: Selection of resources

A simple flow chart of the seven stages of the decision-making process for the selection of FAILTE resources has been created for ease of reference. This is available in Appendix A of these guidelines. When selecting resources for description in the FAILTE database, the following questions must be asked:

### 1) Is the resource web based?

If this is not the case, then a web presence may be sufficient. Substantial and potentially very useful resources may have records created for them, if there is a web presence that would provide the compulsory URL. In this instance, however, it is not the material on the web that is to be described, but the resource itself.

For resources that have a web presence that in itself could also be useful to some extent, then two records may be created: one to describe the material available on the web and another to describe the actual resource. The relationship between the resources should then be described in the Relationship field of the record.

### 2) Is the resource a collection of pointers to third party resources?

Large, web based collections of resources are not suitable for the FAILTE database, since they do not constitute learning and teaching resources in themselves. Consider that they may be useful as potential sources of individual resources, which can be included.

**Small collections**, when based around a theme, may be a resource in their own right, since their material might constitute a course or a module. Records may be created for both them and the resources they consist of, the relationship between them being described by the Relationship field.

### 3) Can the resource be classified as an Engineering resource?

If the resource can be classified under the subject headings used by the EEVL Internet Hub, then it is suitable for FAILTE. The list of EEVL Browse Headings should be used to help in the allocation of the subject headings. If none of the terms listed as EEVL Subject Headings can be used to describe the content of the resource, then it cannot be classified as an Engineering resource and it should therefore not be included.

### 4) Does the resource contain *only* advice on aspects of learning and teaching?

It is important that the resource itself can be used in learning and teaching activities and does not simply consist of advice. Resources containing advice in addition to material that can be used in learning and teaching may be selected for FAILTE. Advice-only resources are not to be included in the database, although details of them can be passed on to LTSN Engineering.

### 5) Is the resource material of a suitable level to be taught to higher education students?

This is important, since it is intended that the FAILTE database will be used primarily by members of the higher education sector. Only material which is relevant to this level of engineering education should be included in the FAILTE database. This can often be ascertained when reading about the resource, since the intended users of resources are sometimes described, but if so be careful: FAILTE intends to offer independent descriptions, so check whatever the web site claims, if possible.. The amount and level of prior knowledge assumed by a resource are also a good indicator of its educational level.

### 6) Is the resource *only* specific to the needs of the creators?

Some resources meet all the criteria listed above but are unlikely to be useful to the FAILTE end user because the material has been created for a specific need or audience, thus limiting its usefulness to others.

A resource which has been created for a particular purpose but which contains material that can be adapted for use by others may be selected for FAILTE. However, the creator may not be prepared to allow others to use the material in this way, so it would be advisable to contact the creator in the first instance, before time and effort are invested in creating a record for such a resource. Such contact is at the discretion of the cataloguer.

### **7) Is the resource intended to accompany/act as a taught course?**

FAILTE records are intended to provide detailed information about the educational aspects of resources that have a clear **pedagogic intent** behind their creation. If the pedagogic intent is not apparent, then the resource may be better suited for inclusion in EEVL's wider ranging collection.

Pedagogic intent is a difficult concept to describe and to assess. If the resource constitutes a complete course, or a unit of a course (e.g. a lesson), or if it can easily be used as part of a taught course or unit of a course, then it can be said to have pedagogic intent. However, if the resource is intended to provide information, lacks a structure that facilitates learning and understanding, and cannot be easily used as an integral part of a course, then the pedagogic intent is limited and the resource should not be selected.

Examples of information resources without these structures are: technical and product specifications; tables of physical properties; news items and research papers.

**Signs** of pedagogic intent that you might look for are: statements of pre-requisite knowledge and learning objectives; assessments; exercises and activities designed to promote reflection on the information provided; worked examples showing how the material might be applied in contexts that the student would understand (given pre-requisite knowledge).

This is possibly the most difficult of selection criteria to apply, and if problems are encountered please contact Jenny or Phil for advice.

## Chapter 3: Overview of FAILTE metadata elements

This chapter introduces the terminology used to describe the way metadata elements have been translated into database fields and how these are to be used. The characteristics of the elements are also summarised in a table for easy reference.

### 3.1 Element types

The table below describes five different ways in which the metadata elements are used as database fields. The terms described below are used throughout this document.

Automatically generated:	The database will generate a value automatically. For some elements, the value may be altered by the cataloguer. Other values will be protected.
Restricted vocabulary:	Only the terms allocated to that element can be used. Please see the summarised characteristics of the elements in section 3.3 below, for a summary of the restricted vocabularies.
Free text:	Textual entries will be created for this type of element. Cataloguers should be aware that some free text elements will be restricted in length.
Standard regulated:	Some elements will describe characteristics for which there exist international standards of expression. The international standards are to be used in the recording of such characteristics.
Table for guided entries:	Some elements are intended to describe characteristics of a resource which cannot be expressed using any of the methods described above. However, the description can be stored in a structured way that will facilitate data integrity for the database. This type of element appears as a table in the database, to guide the cataloguer to record information in a structured way for the FAILTE project.

## 3.2 Obligation to record an element

There are some FAILTE metadata elements that the cataloguer must use, and others which ideally should be used, when completing a FAILTE record. This is to enable the management of the database and as a recommendation for good practice in cataloguing a resource for FAILTE. Throughout this document, the obligation to use each metadata element is described using the following terms:

### **Compulsory**

This means that a FAILTE record will not be complete without this information being included. Only the Record ID, Title and URL of a resource are completely Compulsory. Without these, a record cannot be saved into the database.

### **Optional**

This term is applied to metadata elements that are considered to be essential parts of a record, where the information is available and applicable to the resource being described. The use of metadata elements that are optional is at the discretion of the cataloguer, although it is recommended that cataloguers should use them wherever possible, and the final decision rests with the record validator.

### **Conditional**

Elements that are Conditional are paired with other elements in such a way that where one element is used, the other one must also be used, for the record to make sense, and therefore one element becomes Compulsory. This relationship of dependency is explained for each element that has a Conditional obligation.

### 3.3 Summarised characteristics of FAILTE metadata elements.

<b>FAILTE elements</b>	<b>Type</b>	<b>Obligation</b>	<b>Definition</b>
<b>GENERAL</b>			
Record ID	Automatically generated	Compulsory	A number given to the resource for the purposes of the database. (FAILTE)
Title	Free text	Compulsory	"The name given to the resource" (DC)
Alternative titles	Free text	Optional	Any form of the title used as a substitute or alternative to the formal title of the resource. (FAILTE)
Subject classification	Restricted vocabulary	Compulsory	"The topic of the content of the resource" (DC)
Main URL	Free text	Compulsory	"A location or a method that resolves the location of the resource." (IMS)
Secondary URLs	Free text	Optional	Any alternative location of the resource (FAILTE)
Description	Free text	Compulsory	A textual description and general account of the resource. (FAILTE )
Rights: Cost of the resource	Restricted vocabulary	Optional	Information about fees charged by those holding "rights in and over a resource." (DC.rights)
Rights: Conditions of use	Free text	Optional	Information about conditions of use stipulated by those holding "rights in and over a resource." (DC.rights)
Awards	Restricted vocabulary	Optional	Awards of approval by external bodies. (FAILTE)
Language	Restricted vocabulary	Compulsory	The human language in which the resource is written. (FAILTE)
Reference	Table for guided entries	<i>URI</i> : Optional <i>Description</i> : Conditional	Information on, and hyperlinks to reviews of the resources. (FAILTE)
Version	Free text	Optional	The version or edition of the resource. (FAILTE)
Date of publication	Restricted format	Optional	The date on which the resource was published/created, if given. (FAILTE)
Date modified	Restricted format	Optional	The date on which the resource was last updated or modified, if given.
Medium of the resource	Restricted vocabulary	Optional	The material or physical carrier of the resource. (FAILTE)
Technical requirements	Free text	Optional	A description of any specific software requirements and/or required operating systems/browsers needed in order to access the resource. (FAILTE)
Relationship between resources	Table for guided entries	Optional Conditional	The type of relationship that exists between two resources in the FAILTE database paired with the FAILTE ID number of the resources that is related to the one being described. (FAILTE)
Country of origin	Restricted vocabulary	Optional	The country in which the resource was created. (FAILTE)
Catalogue	Table for guided entries	Optional Conditional	A catalogue number or code assigned to the resource paired with the name of the catalogue scheme through which the number has been assigned. (FAILTE)
Contacts	Table for guided entries	Optional Conditional	The name, contact details and role of any contact associated with the resource for whom FAILTE has permission to store data about. (FAILTE)
<b>EDUCATIONAL</b>			
Resource type	Restricted vocabulary	Compulsory	The specific kind of resource, most dominant first (IMS).

Educational description	Free text	Optional	A textual account of educational aspects of the resource. (FAILTE) Comments on how the resource is to be used. (IMS)
Educational level	Restricted vocabulary	Compulsory	Levels of HE that the resource is likely to be relevant to. (FAILTE)
Time to use the resource	Restricted vocabulary	Optional	The size or duration of the resource (FAILTE) Approximate or typical time it takes to work with the resource. (IMS)
Interactivity type	Restricted vocabulary	Compulsory	Type and level of interactivity between an end user and the resource. (FAILTE)
Intended end user role	Restricted vocabulary	Optional	Normal user of the resource, most dominant first. (IMS)
Tutor support documentation	Restricted vocabulary	Optional	The existence and type of tutor support documentation available with the resource itself. (FAILTE)
<b>METAMETADATA</b>			
Record contributors	Restricted vocabulary	Compulsory	The person/persons involved in the creation of the record. (FAILTE)
Record validator	Restricted vocabulary	Optional	The name of the person responsible for the final draft of the record. (FAILTE)
Date record entered	Restricted format	Compulsory	The date on which the record is entered into the database. (FAILTE)
Date to be reviewed	Restricted format	Compulsory	Date on which the resource and record are expected to require re-assessment. (FAILTE)
Date last reviewed	Restricted format	Optional	Date on which the resource and record were last assessed. (FAILTE)
Date last modified	Restricted format	Optional	The date on which any modification to the record was made. (FAILTE)
Language of metadata	Restricted vocabulary	Compulsory	The human language of the metadata record. (FAILTE)
Decision	Restricted vocabulary	Compulsory	A representation of the status of the metadata record.
Comments	Free text	Optional	Annotations made by cataloguers

# Chapter 4: Using the FAILTE metadata elements

## GENERAL ELEMENTS

### 1) Record ID

**Definition:** A number given to the resource for the purposes of the database. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Automatically generated

**Entry guidelines:** The Record ID will be an automatically generated number and will be used for the identification of individual records. Sequential numbers will be generated automatically by the database when records are begun and no two numbers will be the same.

## 2) Title

**Definition:** "The name given to the resource" (DC).  
**Obligation:** Compulsory  
**Type of element:** Free text

**Entry guidelines<sup>1</sup>:** When looking for the main title of a resource, the cataloguer should look at the source coding of the web page. If metadata headings are given, then the title that is displayed in the metadata should be recorded as the title of the resource. (NB metadata might also be contained in a separate file available through the web page.)

If there is no formal metadata, but there is a title described as such in the source coding, then this should be recorded as the title of the resource. Otherwise, some degree of discretion in determining the title must be used by the cataloguer.

The title should be recorded as it is given, preserving the **original wording, order and spelling**. Only the first letter of the first word and proper nouns should be capitalised. Initial articles from the title should be omitted, except where the article is an integral part of the name, as for The Register. (<http://www.theregister.co.uk/>) Information regarding the version or edition of the resource should be omitted at this stage and recorded separately for the Version element.

**Acronyms and abbreviations** should be catalogued as Alternative titles, unless they are an integral part of the name of the organisation/service which people would expect to see, and which the organisation is commonly known by. In this case, the acronym should be bracketed and put after the full name. For example, the resource at <http://www-cacse.ucsd.edu/> would have the Title entry "Center for Advanced Computational Science and Engineering (CACSE)"

**Punctuation** need not reflect the usage of the original. **Subtitles** should be separated from the title by <space>colon<space>, for example: "Radioactivity Basics - Integrated Environmental Management, Inc." is the title of the resource at <http://www.iem-inc.com/prmbasic.html> as it appears in the coding for the web page. This should be recorded as "Radioactivity Basics : Integrated Environmental Management (IEM), Inc."

EEVL cataloguing conventions, as listed in the EEVL Manual and quoted below, should also be followed:

### *Corporate body headings*

Use the correct and fullest name :

University of London not London University

### *Research groups / University Departments / Subordinate Bodies:*

Department of Mechanical Engineering at the University of Sheffield

Mobile Robot Laboratory at the College of Computing at Georgia Institute of Technology

### *Commercial sites*

Use standard abbreviations in the names, without full stops.

Ltd not Limited

Inc not Incorporated

### *Titles with single letters*

Do not use full stops, and leave a space between letters for initials etc

G Cussons Ltd

A J Langley Group plc

but

ABI Electronics Ltd

SKF Group

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<sup>1</sup> These guidelines are adapted from the EEVL manual and RDN Cataloguing Guidelines: (<http://www.rdn.ac.uk/publications/cat-guide/>)

Avoid adding descriptive phrases to the title, except in the following cases - mailing lists, magazine / journal (where it is not obvious from the title), catalogue, software.

Example:        geo-tectonics mailing list

### **Foreign Language Titles**

If the foreign language resource has been translated into English, use the title in English and put the foreign language title as an alternative title. Otherwise, the language of origin should be used.”

### 3) Alternative titles

**Definition:** Any form of the title used as a substitute or alternative to the formal title of the resource. (FAILTE)

**Obligation:** Optional

**Type of element:** Free text

**Entry guidelines:** This element can include title abbreviations as well as translations and acronyms. Where there is more than one alternative title, these should all be listed on separate lines. For example, two alternative titles for the Codes and Standards Training Inc resource are:

“CASTI Engineering Community  
CASTI Group of Companies”

(<http://www.casti.ca>)

The guidelines for the format of this element are otherwise the same as those for the recording of the Title element.

## 4) Subject classification

**Definition:** "The topic of the content of the resource."(DC)

**Obligation:** Compulsory

**Type of element:** Restricted vocabulary

**Entry guidelines:** EEVL Subject headings will be used as a subject classification vocabulary. These are to be selected from a list displayed by the database. The headings should be chosen through consultation of the EEVL Browse headings. These consist of lower level terms to help in the allocation of headings and are listed in Appendix B.

## 5) Main URL

**Definition:** "A location or a method that resolves the location of the resource." (IMS)  
**Obligation:** Compulsory  
**Type of element:** Free text

**Entry guidelines:** The main URL of the learning and teaching resource itself, or of the page/site containing information about a non-web based resource should be recorded for this element. Any alternative URLs, including any mirror sites are to be described separately. (See below, "6) Secondary URL")

The URL of a resource may be copied from the **address bar** at the top of the browser window. Please ensure that the **link works** and that it takes you to the page you intended it to. If this is not the case, try checking the properties of the link you followed to access the page in the first place.

The URL will be used as an identifier for the resource, but will also be used to link to the resource, and therefore should be the URL leading directly to the learning and teaching resource itself.

Where a resource is available in more than one **language**, please give the URL from which a language choice can be made. It may also be necessary to describe where to find the links to the actual resources from the web page at this level, for which purpose, please use the Description element.

Similarly, where a small collection of resources is being described as a single resource, and is available from a web page which contains **other material**, it can be difficult to locate the collection being described at that URL. In this situation please give brief instructions for finding the collection within the contents of the Description element.

When a URL is entered by a cataloguer, the database will perform a check to ensure that the entry is unique. If there is a similar record entry already in the database, the new entry will still be permitted, but a warning will appear to the cataloguer. The cataloguer should then check the record of the resource that has a similar URL, to ensure that there is no **duplication** of resources described by FAILTE.

## 6) Alternative URL

**Definition:** Any alternative location of the resource. (FAILTE)

**Obligation:** Optional

**Type of element:** Free text

**Entry guidelines:** Any alternative URLs for a resource will be recorded for this element. These might be discovered when a cataloguer attempts to create a new resource with an almost identical URL to one already catalogued, which the database will notice and inform the cataloguer of.

Where the Alternative URL is for a **mirror site** of the resource, this should be described. For example, for the NTNU Virtual Physics Laboratory at <http://www.phy.ntnu.edu.tw/java/index.html> the Secondary URL would be expressed thus:

“<http://www.abdn.ac.uk/physics/ntnujava/index.html> – Scottish mirror site”

Where there is **more than one** Secondary URL for a resource, these should be recorded on two separate lines, as with the Alternative Titles. For example:

“<http://www.failte.ac.uk/>  
<http://failte.ac.uk/>”

## 7) General description

**Definition:** A textual description and general account of the resource. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Free text

**Entry guidelines:** This is a basic, textual description of the resource. It is essentially intended to describe the material that is available on the web itself. However, where a resource with limited web presence has been selected because of its importance as a substantial or very useful resource, then the description should concentrate on the **resource itself**, rather than the web page.

Individual characteristics of a resource can be mentioned here. The description is intended to be **brief and concise**, and it should be original work. It may be based on existing descriptions of the resource, but these should be edited, to ensure that only information that is useful to FAILTE and its end users will be stored in the database. Advertising phrases should be avoided.

Factors such as the **content of the resource**, any additional technical information that can be described, and relevant additional information about the creators of the resource can be recorded as part of the description. Also, any information about how to **locate the resource** from within the web page for which the URL has been recorded can be included in this entry when it is not immediately obvious where the learning and teaching material is from the URL which has been recorded. Educational aspects of the resource will not be described here, however, since another element is to be used for the description of such characteristics.

The element will be used as an **introduction to the resource** for the end user, since it will be displayed with the information about resources which is initially presented to the end user in the search results.

## 8) Rights: Cost of the resource

**Definition:** Information about fees charged by those holding “rights in and over a resource.”  
(DCMI, DC.Rights)  
**Obligation** Optional  
**Type of element:** Restricted vocabulary

**Entry guidelines:** The information recorded for this element is intended as a rough estimate of the cost per student, of using the resource, which is comparable across FAILTE resource records only.

The cost of a resource is difficult to record and to describe to the end user because, where a charge is made, there is often more than one deal on offer, with different charging mechanisms. The different charging mechanisms also make it difficult to compare the costs involved with different resources.

To overcome this, the cataloguer should **estimate the minimum cost per student**. The cost of a single user licence would represent this cost, or a calculation for a multiple user licence, based on a **typical class size of 30 students**. This means finding the cost of delivering the resource to more than one user, and dividing this by 30 to arrive at the cost per user. (Please note: It may be necessary to ascertain that a multiple user licence would cover 30 student users or more.)

All calculations should take into account any discounts offered for UK HE institutions.

The cost will be described by one of the values that have been set for this element, listed below:

Unknown,  
Free,  
<20,  
20-50,  
50-100,  
100-500,  
>500

The values all refer to the cost in pounds sterling and are intended as a rough guide to the end user.

## 9) Rights: Conditions of use

**Definition:** Information about conditions of use stipulated by those holding “rights in and over a resource.” (DCMI, DC.Rights)

**Obligation:** Optional

**Type of element:** Free text

**Entry guidelines:** **Copyright** notices and Rights-management statements should be quoted here. Information about required **registration or authentication** to use a resource should also be described for this element. Brief directions as to how the resource may be used should be given, with any warnings of how it may not be used. A hyperlink to information about such matters can be included.

When cataloguing a resource which has a web presence, but is not available over the web itself, please be careful to record the rights claimed for the learning and teaching resource itself, rather than for the web site.

When researching this information about a resource, it may be necessary to **contact the rights holder(s)** to ask them how they would like the resource to be treated. The contact details of any rights holders will be recorded separately in the database, and those involved will need to be contacted to request permission to store information about them in any case. Ideally, only one request for information about the resource and for permission to store information should be sent to each person/group involved. Guidelines to describe the procedure for requesting permission are being prepared as a separate document.

## 10) Awards of approval

**Definition:** Awards of approval by external bodies. (FAILTE)  
**Obligation:** Optional  
**Type:** Restricted vocabulary

**Entry guidelines:** This element will be used to record awards of approval granted to a resource. **Six separate awards** have been chosen for representation in the FAILTE database. Other awards, which have not already been selected for FAILTE, may not be recorded immediately but note should be taken of them. (Please use Description and Comments elements for this.) The awards will then be investigated and assessed for inclusion as a value for this element.

A resource might advertise the award on its own site, or the cataloguer might otherwise be aware of the award. Cataloguers are not expected to perform an extensive search for an award. Icons for the awards to be recorded will be stored in the database and displayed to the end user as part of a resource's record, also providing links to the web sites of the awarding bodies. The awards listed below are to be included:

EASEIT-Eng,  
Bobby,  
EEVL Choice,  
UCISA,  
EASA,  
Scout Report Selection,  
Unspecified

## 11) Resource Language

**Definition:** The human language in which the resource is written. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Restricted vocabulary

**Entry guidelines:** Initially, the predominant language of resources included in the FAILTE database will be **English**. This may change through time, however, and the set of languages that have been established as possible entries may need to be expanded.

All languages used to a significant extent in a resource should be recorded for the FAILTE record. If this is not possible because the list of terms needs to be expanded, please inform the FAILTE team.

Where the resource is available in more than one language, each language should also be recorded within the Language element.

The information will be stored in the database as a three letter, lower case code, in accordance with the **ISO 639-2/B** standard. This will enable the information to be easily exported/imported in a standard, interoperable format.

The languages and codes currently used are:

English (eng)  
French (fre)  
German (ger)  
Japanese (jpn)  
Spanish (spa)

## 12) Reference to reviews

**Definition:** Information on, and hyperlinks to, reviews of the resources. (FAILTE)

**Obligation:** Optional

**Type of element:** Table for guided entries

**Entry guidelines:** Where a resource is known to have been reviewed, the review should be recorded and referenced for this element. References need not actively be sought for inclusion in the database.

This element has been split into two parts: a brief description of the review, and a URL for the review. The two parts of the element are conditional upon one another, so both parts to this element are required.

Reviews and case studies carried out by EASEIT-Eng and as part of the FAILTE project will be recorded. The main URL of any web based review should be recorded – please see guidelines for the “Main URL” element for help in identifying and recording URLs for the purposes of the FAILTE database.

### 13) Version or edition

**Definition:** The version or edition of the resource. (FAILTE)

**Obligation:** Optional

**Type of element:** Free text

**Entry guidelines:** The version of the resource should be recorded here and expressed in exactly the same way as it is expressed in the metadata of the site, or in the resource itself. This element should be left blank in instances when no version or edition is specified on the web site of the resource.

## 14) Date of publication

**Definition:** The date on which the resource was published/created, if given. (FAILTE)

**Obligation:** Optional

**Type of element:** Restricted format

**Entry guidelines:** The date of publication of the version of the resource being catalogued will be recorded. The date of publication may be recorded in metadata for the web site; it may appear as a launch date for a web site; or it may not appear at all, in which case this element will remain empty.

The date will be recorded in the **ISO 8601** format, e.g. 1982-08-13. If the day and/or month are not given, these shall be expressed as two zeros, e.g. 1982-00-00 or 1982-08-00. The time need not be recorded for FAILTE purposes.

## 15) Date modified

**Definition:** The date on which the resource was last updated or modified, if given. (FAILTE)

**Obligation:** Optional

**Type of element:** Restricted format

**Entry guidelines:** The date on which a resource was last modified often appears under a heading such as "Last updated", often to be found at the bottom of a web page. It might also appear in metadata for the web site provided by its creators. This date is quite important information for FAILTE end users, so it is worth searching for.

The date will be recorded in the **ISO 8601** format, e.g. 1982-08-13. If the day and/or month are not given, these shall be expressed as two zeros, e.g. 1982-00-00 or 1982-08-00. The time need not be recorded for FAILTE purposes.

## 16) Medium of the resource

**Definition:** The material or physical carrier of the resource. (FAILTE)

**Obligation:** Optional

**Type of element:** Restricted vocabulary

**Entry guidelines:** The resource may be available in more than one medium. If the cataloguer is aware of alternative media then the existence of non-web based versions of the resource can be recorded for this element.

This element can also be used to indicate when a resource is not web based in itself but is available in another format, such as on CD-ROM, and has a web presence.

Web based, Diskette, CD-ROM, Print, VHS, DVD, Streaming media.

## 17) Technical requirements

**Definition:** A description of any specific software requirements and/or required operating systems/browsers needed in order to access the resource. (FAILTE)

**Obligation:** Optional

**Type of element:** Free text

**Entry guidelines:** If a resource requires specialist software or has a recommended minimum hardware requirement, this information should be recorded.

Examples: Platform, Operating System, or machine specification. Some resources might only run on PCs. Other resources might require a certain plugin to be installed in order for them to run.

Any technical requirements specified by a resource should be recorded.

## 18) Relationship with other resources

<b>Definition</b>	The type of relationship that exists between two resources in the FAILTE database, paired with the FAILTE ID number of the resource that is related to the one being described. (FAILTE)
<b>Obligation</b>	Optional
<b>Type of element</b>	Table for guided entries

**Entry guidelines:** This element describes a link between two resources included in the FAILTE database. Each relationship type recorded in a single record will be linked to a FAILTE ID number. The ID number becomes compulsory once a relationship has been recorded. Any number of such pairs of entries can be created for each record. Relationship types can be repeated, since more than one resource might be related in the same way to the resource being catalogued.

The description of the relationship will use the vocabulary recommended by the Dublin Core Metadata Initiative as a qualifier for the element DC.Relation, which is also recommended by IMS for its relation.kind element. The default entry "none" has been added to the list for FAILTE purposes.

None  
Is Part of  
Has Part  
Is Version of  
Has Version  
Is Replaced by  
Replaces  
Is Required by  
Requires  
Is Referenced by  
References  
Is Format of  
Has Format

Currently relationships that we attempt to catalogue are of the "Is Part of" type.

## 19) Country of Origin

**Definition:** The country in which the resource was created. (FAILTE)  
**Obligation:** Optional  
**Type of element:** Restricted vocabulary

**Entry guidelines:** This element is included in order that users can identify whether the teaching style of the resource is likely to be in keeping with that of their own country or culture. This is an element that is optional for the cataloguer to describe since relevant information is not always easy to find or to ascertain.

Information within the resource itself, might give a clue as to where the resource was created, so this should be carefully investigated. For instance, if the resource has been created by a particular institution or group of institutions, then looking up information about the institution(s) might reveal the country where the resource originates. Alternatively, the URL of a resource might have a domain name which suggests a particular country: e.g. ".ac.uk" for the UK and ".edu.au" for Australia. These techniques provide clues as to where the resource originated, but if there is any confusion about where a resource comes from, then it would be better to leave this element as the default "unknown".

Entries in the FAILTE database will be stored in the ISO 3166-1993 (E) codes. The set of values for this element are:

- Unknown
- Great Britain (GB)
- United States of America (US)
- France (FR)
- Germany (DE)
- Japan (JP)
- Spain (ES)
- Australia (AU)
- New Zealand (NZ)
- South Africa (ZA)
- Canada (CA)
- Unknown

## 20) Other catalogue entries

**Definition:** The names of cataloguing or identification schemes and the identifiers of the resource under those schemes. (FAILTE)

**Obligation:** Optional

**Type of element:** Table for guided entries

**Entry guidelines:** The entry for this element will be used to link the FAILTE record of a resource to records in other catalogues that describe the same resource, or one from which the FAILTE resource has been sourced.

The identification schemes currently referred to by FAILTE are:

EEVL record ID numbers

EASEIT-Eng database record numbers

ISBN/ISSN

Of these, EEVL and EASEIT Eng are the more important.

For each of these, the identification code(s) of the resource should be recorded. Space is provided for recording more than one code for all of the schemes.

## 21) Contacts

**Definition:** The name, contact details and role of any contact associated with the resource for whom FAILTE has permission to store data about. (FAILTE)

**Obligation:** Optional

**Type of element:** Table for guided entries

**Entry guidelines:** No contact information will be stored in the FAILTE database or supplied to the end users until **permission** to do so has been obtained from the individual. Different parties may be associated with different roles in relation to the resource, so more than one contact may be catalogued for each record.

Of all of the parties whose contact details will be stored, one **key contact** will be selected. This is to be the contact for FAILTE internal use, and the recommended contact for the end user.

The following details should be recorded for the contact element, if they are available and if data protection has been obtained:

### **1) The name of the contact:**

The surname should appear first, followed by a comma, space and then the first name(s) or initial(s). Where a whole name is provided, this should be used rather than the initial.

Titles such as Miss, Mr, Mrs or Ms, Dr should not be recorded.

### **Examples:**

Smith, David  
Hughes, Mary Elizabeth  
Brown, C.R.

The name of an organisation such as a publishing company should be given in the shortest form in which it can be understood and identified internationally.

### **2) The role of the contact:**

The roles which can be used to describe the contact are:

Creator - the primary named entity responsible for the creation of a resource.

Contributor - a named entity or entities involved in the creation of a resource.

Publisher - "an entity responsible for making the resource available." (DC)

Rights holder - an entity holding rights in and over a resource.

Distributor - the supplier of the resource.

Unspecified - a role associated with the resource that cannot be categorised, for whatever reason.

### **3) The type of contact:**

The types of contact which can be assigned to this part of the contact element are:

Unspecified - a role associated with the resource that cannot be categorised, for whatever reason.

Individual – a person involved with the resource.

Group – a number of people associated with the resource who have a collective identity.

Commercial organisation – an organisation which is occupied with or engaged in commerce or work intended for commerce.

Educational institution - an established organisation or corporation (such as a college or university) especially of a public character.

**4) The postal address of the contact:**

For FAILTE purposes, this should include the full details of the address as found on the web page, and the post code or zip code, if either is available.

**5) Telephone number of the contact:**

This should include the international dialing code. The initial zero (for those making calls within the country of the contact) should appear in brackets after the international dialing code and before the main bulk of the number. The only space which should appear in the number is after the international dialing code

**Example:**

+44 (0)1509227192

**6) Fax number of contact:**

This should include the international dialing code. Please see instructions for recording the Telephone number for full guidelines.

**7) The data protection status of the information:**

This is to be indicated by the following terms:

not yet asked – The process of requesting commission has only just begun. (Default)

applied for - Permission has been applied for.

granted - Permission has been granted.

refused - Permission has been refused.

Not needed – Permission for storing contact details is not needed since the contact is an organisation or institution, and therefore permission need not be requested in the same way as for an individual.

# EDUCATIONAL ELEMENTS

## 22) Resource type

**Definition:** The specific kind of resource, most dominant first (IMS).

**Obligation:** Compulsory

**Type of element:** Restricted vocabulary

**Entry guidelines:** A list of assigned terms and examples have been compiled to **categorise and describe types** of learning and teaching resources. More than one term may be selected, since some resources incorporate more than one mode of learning, or even more than one type of resource within a whole package. The terms are listed below:

### VOCABULARY:

#### Tutorial/explanation

Examples: Lecture notes  
Text book  
Handout  
Presentation slides  
Worked examples

#### Assessment/test

Examples: Examination style  
Questionnaire (IMS and SeSDL)  
Formative assessment

#### Assignment/task

Examples: Problem statement  
Exercise  
Experiment  
Work sheet

#### Activity (incl. simulation)

Examples: Modelling  
Simulation

#### Images/movie

Examples: Diagram  
Graph  
Table  
Illustration

#### Resource Pack

**Definition:** A complete package for a module including learning and teaching material of all types, and with tutors' instructions and learning objectives specified.

## 23) Educational description

**Definition:** A textual account of educational aspects of the resource. (FAILTE) *Comments on how the resource is to be used. (IMS)*

**Obligation:** Optional

**Type of element:** Free text

**Entry guidelines:** This element is to complement the Description element, but is intended to contain information about **learning and teaching aspects** of the resource which are not covered by any of the other elements.

The reason for a separate description element is that it is anticipated that end users will be especially interested in the learning and teaching aspects of resources in the FAILTE database. FAILTE markets itself as a database of learning and teaching resources particularly, and seeks to provide information which is specific to this type of resources. Thus it is important to provide information on **pedagogical/educational characteristics** of resources which can easily be identified and described.

Any information on educational objectives and/or benefits claimed for the resource should be described here.

## 24) Educational level

<b>Definition:</b>	Levels of HE that the resource is likely to be relevant to.(FAILTE)
<b>Obligation:</b>	Compulsory
<b>Type of element:</b>	Restricted vocabulary

**Entry guidelines:** When selecting a term to describe a resource's educational level, consider the **amount of prior knowledge** required by the learner to use the resource effectively: the vocabulary is intended to reflect this.

The terms have been chosen to map roughly onto different year levels of the English HE system in the following way:

<b>Foundation</b>	Material which may be expected to be a pre-requisite to degree level study. Typically covered in A level or at FE college. May be covered at the start of a Scottish degree.
<b>Introductory</b>	Material suitable for an initial study of the topic, probably in the first or second year of study.
<b>Intermediate</b>	Material which assumes some "university level" knowledge prerequisite, suitable for 2nd/3rd year of a three year degree.
<b>Advanced</b>	Material that would not necessarily be covered in a general graduate degree: may be covered in a specialist degree, a final year option or a taught post-graduate degree.
<b>General</b>	Any or all of the above
<b>Unknown</b>	Where none of the terms above can be applied, for whatever reason.

## 25) Time to use the resource

**Definition:** The size or duration of the resource. (FAILTE) *Approximate or typical time it takes to work with the resource. (IMS)*

**Obligation:** Optional

**Type of element:** Restricted vocabulary

**Entry guidelines:** The typical learning and teaching time period the resource is intended to cover will be recorded on a four point scale which is outlined below:

10-30 minutes

A lesson

Several lessons

A complete module

(NB a "lesson" can be estimated to be about 30 - 60 minutes long.)

## 26) Interactivity type

**Definition:** Type and level of interactivity between an end user and the resource. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Restricted vocabulary

**Entry guidelines:** The type and level of interactivity are to be catalogued together, in one element for FAILTE. The set of terms to be used are:

Highly Interactive: Most of the learners' time is spent interacting through input and feedback.  
Interactive: Requiring **input** from the user and **responding** to this. (Thus resources which require the following of links cannot be classified as Interactive.)  
Expositive: **No response** to the user that is dependent on the user's input, beyond the normal responses of hypertext. (i.e. clicking on links.)  
Unknown: This is only to be used when creating a basic record that is not yet ready for validation.

The default entry will be Unknown.

## 27) Intended end user role

**Definition:** Normal user of the resource, most dominant first. (IMS)

**Obligation:** Optional

**Type of element:** Restricted vocabulary

**Entry guidelines:** Whilst all learning and teaching resources are created for ultimate use by a learner, some learning and teaching resources are intended for the academic to deliver to students. Other resources are formed for the student to learn from directly, although they may still be intended for use alongside other learning and teaching material. The following terms have been chosen to describe these and related concepts:

**Tutor:** The resource is intended for a tutor to deliver to students. The tutor **provides support** for students using the resource.

**Author:** The resource is intended for an author to use in the **creation** of a larger learning resource or a learning resources package.

**Learner:** The resource has been created for the learner or **student to use directly**.

## 28) Tutor support documentation

**Definition:** The existence and type of tutor support documentation available with the resource itself.  
**Obligation:** Optional  
**Type of element:** Restricted vocabulary

**Entry guidelines:** This element should be used to describe whether or not tutor support documentation has been provided for the resource, and if so, whether this is a weighty tome or a simple instructions leaflet. Some of the larger resources may be quite complicated, and the existence of support documentation could be of importance for the FAILTE database end user.

The terms to be used are:

- Minimal: For resources with some basic tutor support documentation, such as an **instructions page or a leaflet**. This type of documentation can easily be read through before beginning use of the resource.
- Comprehensive: For resources with substantial tutor support documentation which appears on **several pages**. This type of documentation may need to be studied in full, requiring some investment of time by the tutor before using the resource, or may contain basic information for use before beginning to use the resource, along with some additional material for use as and when necessary.
- Extensive: For resources with a large amount of tutor support documentation which are large enough to require an **index or contents page** and which are intended largely for reference.

(NB “Extensive” documentation may not actually contain an index or contents page, but where support documentation is extensive enough that one would be useful, then this term should be applied. Similarly, the presence of an index or contents page does not always imply that the documentation is extensive: it may be more appropriately described as “Comprehensive”.)

# METAMETADATA ELEMENTS

## 29) Record contributors

**Definition:** The person/persons involved in the creation of the record. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Restricted vocabulary

**Entry guidelines:** The recording of the names of record contributors is especially useful in a database that is contributed to by a number of people, so that cataloguers can **identify each other's work**.

Each time a person logs in and views a record in edit mode, their **initials will automatically be added** to the record as a contributor. If that person has already been recorded as being involved in the creation of the record, however, then the initials will not be added again.

## 30) Record validator

**Definition:** The name of the person responsible for the final draft of the record. (FAITLE)  
**Obligation:** Optional  
**Type of element:** Restricted vocabulary

**Entry guidelines:** FAILTE records will all be checked by a validator before they can be made accessible to database end users.

It is anticipated that the function of a validator will be important in instances where a record might be created by more than one individual. The record validator will **add some cohesion** to individual records and might also act as a **trouble-shooter** for describing characteristics that are awkward to catalogue.

To begin with, only one individual will be able to validate a record before it is included into the database. The initials of the person who does this will automatically be inserted into the record in this field. Currently, Phil Barker (PB) is the record validator.

### 31) Date record entered

**Definition:** The date on which the record is entered into the database. (FAILTE)

**Obligation:** Compulsory

**Type of element:** Restricted format

**Entry guidelines:** The information will be **automatically generated** by the database, when a record is validated. The date will be recorded in the **ISO 8601** format, e.g. 1982-08-13

## 32) Date to be reviewed

**Definition:** Date on which the resource and record are expected to require re-assessment.  
(FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Restricted format

**Entry guidelines:** This element is important for the management of the FAILTE database. It can be used in comparison with the “Date last reviewed” (see below, element number 33).

**Periodic checks** will be carried out, to compare the two dates. Where the “Date to be reviewed” entry pre-dates the “Date last reviewed” by more than a **year** (or where there is no “Date last reviewed” entry after more than a year), the records will be reviewed. The records needing review will be identified by the database using an **automated procedure** which can be run **whenever necessary**, depending on the growth rate of the database.

A default time period of 1 year is to be used to set the date, although it will be possible for this to be over-ridden by a manual entry. The date will be recorded in the **ISO 8601** format, e.g. 1982-08-13

### 33) Date last reviewed

**Definition:** Date on which the resource and record were last assessed. (FAILTE)

**Obligation:** Optional

**Type of element:** Restricted format

**Entry guidelines:** This element will be **maintained manually**, since the database will not be able to make a distinction between when a record has been altered due to a comprehensive review or just modified. The date should be recorded by the cataloguer whenever a full review of the record has been carried out.

The date will be recorded in the **ISO 8601** format, e.g. 1982-08-13

### 34) Date last modified

**Definition:** The date on which any modification to the record was made. (FAILTE)

**Obligation:** Optional

**Type of element:** Restricted format

**Entry guidelines:** The date of the last modification of the record will indicate to the end user how **current** the record is.

This will be automatically completed when any alteration is made to an already validated record. The date will be recorded in the **ISO 8601** format, e.g. 1982-08-13

## 35) Language of metadata

**Definition:** The human language of the metadata record. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Restricted vocabulary

**Entry guidelines:** To begin with, the language of metadata in the FAILTE database will all be English. However, the database might be expanded in the future, or the records might be exported. Therefore an indication of the language of the metadata is important.

For the sake of comprehension, **only one language** will be used to catalogue each resource in FAILTE records, except in cases where a quotation from the resource is made in another language. In such instances the human language of the metadata will not have been altered.

The language will be expressed in accordance with the **ISO 639-2** standard.

## 36) Decision

**Definition:** A representation of the status of the metadata record. (FAILTE)  
**Obligation:** Compulsory  
**Type of element:** Restricted vocabulary

**Entry guidelines:** This element is included to aid in the management of the FAILTE database records. Some of the terms will be automatically selected by the database, while others will need to be set by the cataloguer. Only those to be set by the cataloguer are described below:

**Admitted:** The record has been created but has not been completed.

**Pending:** The record is complete and awaiting validation.

**Unsuitable:** The resource is not considered to be suitable for inclusion in the main database. The record has been created and is marked by this term to prevent further effort in investigating the resource again.

**Valid:** The resource is considered suitable for the main database, and the record is complete. Only Phil Barker will be able to validate a record.

**Aged:** The resource is no longer available, or is outmoded and no longer considered suitable for the FAILTE database.

## 37) Cataloguer comments

**Definition:** Annotations made by cataloguers. (FAILTE)

**Obligation:** Optional

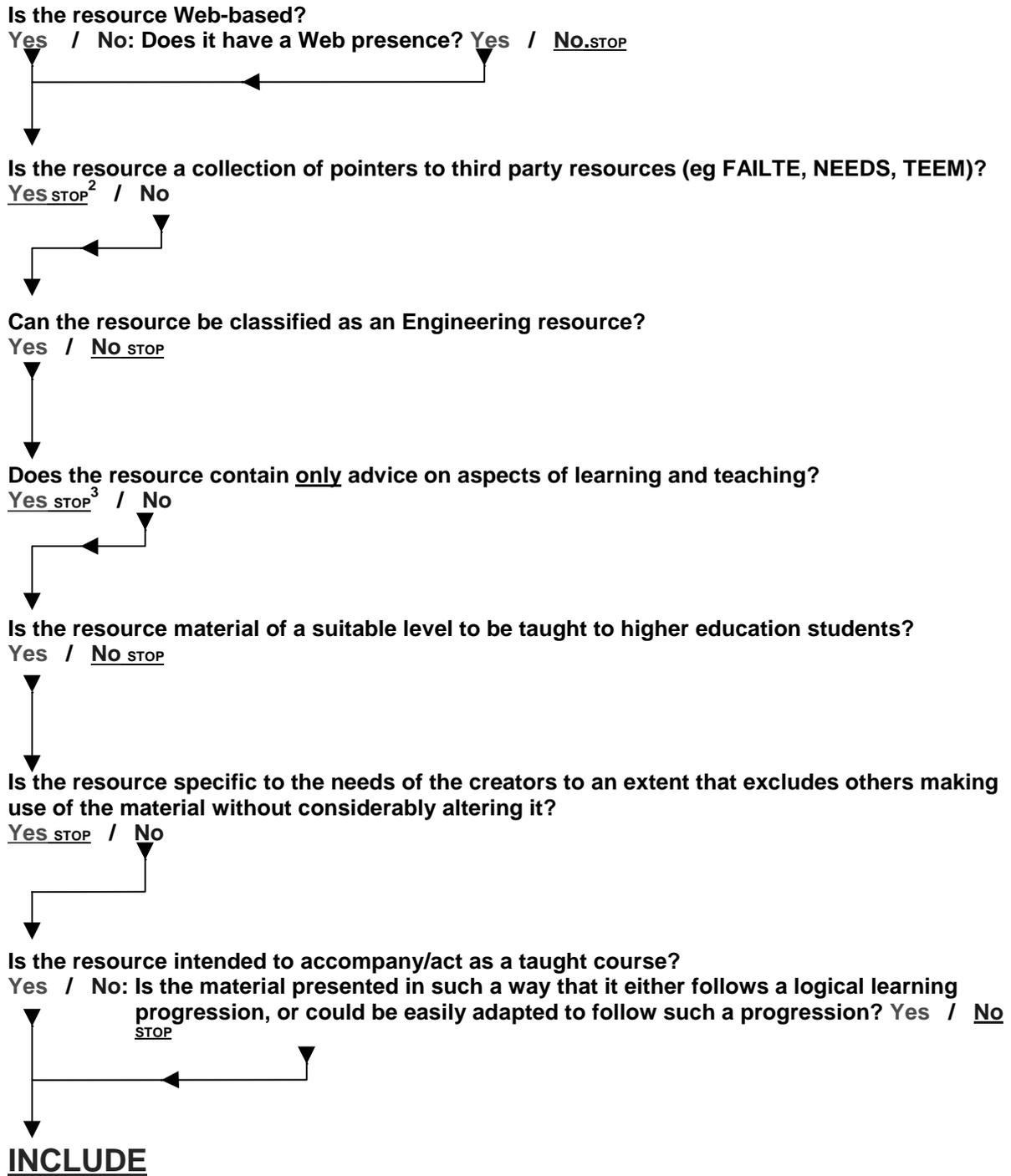
**Type of element:** Free text

**Entry guidelines:** This element can be used to add any notes to a record.

An **example** of when this element will be useful is when a record is created by more than one person and the first cataloguer wishes to leave a message for subsequent cataloguers. Also, a cataloguer might want to leave a message to justify the Decision status of a particular record.

A reviewer can use this element to make any comments on the record.

# Appendix A: Failte Resource Selection Flow Chart



<sup>2</sup> You might consider including individual resources from this collection, however.

<sup>3</sup> Such material might be useful to LTSN Engineering: details of the resource can be passed on to them.

# Appendix B: EEVL Browse Headings

## 1. **\*\*Aerospace and Defence Engineering\*\***

(No EEVL Browse headings exist for this Subject heading.)

## 2. **\*\*Bioengineering (General)\*\***

Anything which doesn't fit in to the subcategories

### **\*\*Biomechanics\*\***

*Biomechanics is a branch of physiology that applies engineering principles to biological systems.*

- Human locomotion
- Muscle movement
- Orthopaedics
- Sports medicine
- Prosthetics\*
- Human rehabilitation engineering

### **\*Biomedical engineering\***

*Application of engineering to biomedical practice and clinical research*

- Biomedical equipment
- Medical imaging
- Biomedical technologies

### **\*\*Biomaterials\*\***

*Natural or synthetic materials used in contact with living tissue, and biological fluids for prosthetic, diagnostic, therapeutic or*

- Storage applications.
- Blood substitutes
- Bone cement
- Dental materials
- Prosthetics\*
- Biofluids

\*cross-over areas

## 3. **\*\*Chemical Engineering (General) \*\***

- General chemical engineering and chemical technology
- Applied chemistry
- General processing principles and design
- Process control
- Chemical engineering economics
- Loss prevention (safety etc.)
- Unit operations and processes include thermodynamics, heat transfer, combustion, mass transfer & separation techniques momentum & phase transfer
- Chemical plant
- Chemical agents and compounds
- Biotechnology (note: this is a area of fringe interest to EEVL)

### **\*\*Chemical Engineering Science\*\***

- Applied chemistry & biochemistry
- Fluid mechanics & particle mechanics
- Heat & mass transfer
- Thermodynamics
- Catalysis
- Combustion
- Cryogenics
- Separation techniques
- Chemical reaction engineering

#### **\*\*Chemical Process Operations\*\***

- Environmental impact and life cycle analysis
- Safety, reliability & loss prevention
- Unit operations
- Process analysis
- Process chemistry
- Process control & dynamics
- Process design
- Process economics

#### **\*\*Chemical Plant\*\***

- Process plant & equipment
- Equipment design & manufacture
- Plant economics
- Plant layout
- HVAC (heating, ventilation & air conditioning)

#### **\*\*Process Industries, Materials and Products**

- Biochemical engineering
- Chemicals production (general) (incl. fine chemicals)
- Environmental technology (incl. air, water, solid waste pollution)
- Explosives & fuel technology
- Fibre & textile technology
- Food & drink
- Forestry technology
- Glass & ceramics technology
- Inorganic chemicals technology
- Leather industry
- Metallurgical technology
- Nuclear technology
- Oil & gas technology
- Nuclear technology
- Metallurgical technology
- Metals, metallurgy and corrosion
- Minerals processing technology
- Organic chemicals technology incl. petrochemicals, agricultural chemicals
- Paint, dye & coatings technology
- Pharmaceuticals
- Polymer technology (rubber & plastics)

#### **4.\*\*Civil Engineering (General) \*\***

Anything which doesn't readily fit into subcategories

#### **\*\*Construction and Building Engineering General\*\***

Anything which doesn't readily fit into subcategories

## **\*\* Construction and Building Components and Products\*\***

- Part of buildings: roof/stairs/elevators
- Products used in constructions; bolts, nuts, fasteners..

## **\*\* Construction and Building Equipment\*\***

- Cranes
- Plants
- Lifting equipment
- Access equipment
- Conveyors
- Loaders

## **\*\* Construction and Building Management\*\***

- Fire and safety
- Site organisation
- Legislation and regulation
- Maintenance
- Testing
- Professional services

## **\*\* Construction and Building Material\*\***

- Bituminous materials
- Concrete
- Insulating materials
- Masonary materials
- Metals, plastics wood and other structural materials
- Strength of building materials; mechanical properties
- Strength of building materials; test equipment and methods
- Non-mechanical properties and tests of building materials

## **\*\* Construction and Building Methods\*\***

- Green Building
- Energy-efficient building
- Types of buildings

## **\*\* Facilities/ Services\*\***

- HVAC
- Plumbing

## **\*\* Surveying\*\***

- Chartered surveying

## **\*\*Engineering Geology\*\***

- Engineering geology and geotechnics including rock and soil mechanics
- Seismology and earthquake engineering

## **\*\*Hydraulic and Waterworks Engineering\*\***

- Dams and reservoirs
- Flood control/land reclamation
- Meteorology
- Waterworks
- Maritime and port structures and other waterways
- Hydrology
- Hydraulic engineering
- Coastal engineering

(for Underwater operations see also **Petroleum and Offshore Engineering**)

### **Structural Engineering**

- Structural analysis and design including statics and dynamics
- Structural elements and members
- Buildings and towers
- Foundation engineering and tunneling
- Bridging and superstructures
- Structural surveying (note; Chartered Surveying appears under **Construction and Building Engineering**)

### **Transportation and Planning**

- Air transportation
- Highway transportation
- Railroad transportation
- Waterway transportation
- Highway engineering
- Urban planning, development, and traffic

### **Water, Sewage and Waste Treatment**

- Sewage and industrial waste treatment
- Water resource and supply

## **5. Electrical, Electronic and Computer Engineering (General)**

Anything which doesn't readily fit into subcategories

### **Communications Engineering**

- Electronic equipment
- Radar
- Radio and television
- Electro-optical equipment
- Electro-optical communication
- Telephone and other line communications
- Signal processing used in communication
- Image and pattern recognition used in communication

### **Computers and Data Processing** [see note 1]

- Computer hardware (circuits and logic elements)
- Computer system organisation
- Computer methodology
- *NOT software*

### **Control Engineering**

- Automatic control principles and applications
- Control devices

### **Electrical Engineering General**

Anything which doesn't readily fit into subcategories

#### **Electrical Circuits Components and Equipment**

*Electrical components and apparatus made from them*

- Electrical components (eg. inductors, transformers)
- Electrical systems and installation

Look for words like: system, installation, cabinet, box, transformer, inductor

### **\*\*Electrical Power Sources and Motors\*\***

*sources used for providing power to electrical circuits as well as electric motors and generators*

- Electrical power supply and battery
- Electric motor and generators

Look for words like: battery, fuel, cell, motor, generator, supply,

### **\*\*Electrical Transmission and Distribution**

*Electrical energy supply*

- Substation
- Pylons
- Power cables

Look for words like: substation, wiring, pylon, wiring, mains

### **\*\*Electricity, Magnetism and Materials\*\***

*Electric and magnetic fields as well as materials used in making electrical components*

- Electric and magnetic fields
- Materials used in making electrical components
- Insulators and coating materials

Look for words like: wave field, emission, insulator, coating, resistive..

### **\*\*Electronics Engineering General\*\***

Anything which doesn't readily fit into subcategories

#### **\*\*Electronic and Themic Materials\*\***

*Materials used in manufacturing electronic components*

- Materials used in manufacturing electronic components
- Semiconductors/superconductors
- Insulation and filler materials

Look for words like: semiconductor, silicon, wafer, GaAs, gallium, insulator, filler

#### **\*\*Electronic Circuits (including pcs and ics)\*\***

*Circuits made from several components or whole circuits on silicon chips.*

- Printed circuit boards (pcb)
- Integrated circuits (ic)
- Other electronic circuits

Look for words like: printed circuit boards, integrated circuits, single chip processor, base board, pcb, ic, wafer, smt, surface..

#### **\*\*Electronic Components and Tubes\*\***

*Individual components (other than silicon chips) used in constructing electronic circuits.*

- Electronic components (eg. Resistor, capacitor, diode, transistor and valve)
- Cathode ray tubes (crt)

Look for words like: crt, cathode ray tube, television tube, Braun tube (German and Japanese sites), resistor, capacitor, ballast, diode, LED, photodiode, potentiometer.

#### **\*\*Electronic Equipment\*\***

*Completed equipment, whole systems.*

- Completed equipment
- Electronic systems

Look for words like: system, installation, cabinet, box...

### **\*\*Light and Optical Technology\*\***

- Light optics and optical devices
- Cameras and photography
- Holography
- Lasers
- Printing and copying

### **\*\*Robotics\*\***

- Robots
- Control of robots
- Remotely operated vehicles (ROVs)

### **\*\*Sound and Acoustical Technology\*\***

- Acoustics, Noise, sound
- sound Devices equipment and systems
- Sound technology and ultrasonics

## **6.\*\*Engineering General \*\***

Anything which doesn't readily fit into subcategories

### **\*\*Engineering Management\*\***

- Cost and value engineering; industrial economics
- Industrial engineering and management
- Production planning and control
- Quality control
- Professional services

### **\*\*Engineering Mathematics\*\***

- Applied mathematics
- Statistical methods

### **\*\*Engineering Physics\*\***

- Applied physics
- High energy physics
- Nuclear physics
- Plasma physics
- Solid state physics

### **\*\*Instruments and Measurements\*\***

- Acoustical and optical measuring instruments
- Electrical and electronic measuring instruments
- Mechanical and miscellaneous measuring instruments
- Moisture pressure and temperature measuring instruments
- Radiation measuring instruments

### **\*\*History of Technology\*\***

- Communications
- Computers and information processing
- Manufacturing
- Scientific instruments
- Technology and engineering

## **\*\*Occupational Safety and Health\*\***

- Fire prevention
- Occupational Health
- Occupational safety

## **7.\*\*Engineering Design\*\***

- CAD/CAM\*

## **8.\*\*Environmental Engineering (General)\*\***

- Environmental engineering general
- Environmental impact and protection
- Environmental law and policy
- Environmental surveying
- Remote sensing

## **\*\*Materials and Energy Recycle and Reuse\*\***

- Recycling
- Re-manufacturing

## **\*\*Pollution\*\***

- Air pollution
- Water pollution
- Land pollution
- Noise pollution
- Water sewage and treatment
- Industrial and hazardous waste
- Domestic solid waste treatment

## **\*\*Renewable Energy Resources\*\***

- Tidal energy
- Wind energy
- Solar energy
- Geothermal engineering
- Biomass/biofuels

## **9.\*\* Manufacturing Engineering (General) \*\***

Anything which doesn't readily fit into subcategories

## **\*\*Manufacturing Operations and Systems General\*\***

Anything which doesn't readily fit into subcategories

### **\*\*Automated manufacturing systems\*\***

- Computer-integrated manufacturing (CIM)
- Flexible manufacturing systems (FMS)
- Cellular manufacturing (CM) systems
- Assembly automation etc.

### **\*\* Machinery & machine tools\*\***

- Tool management
- Tool wear
- CNC

- Machine tools, etc..

### **\*\* Manufacturing Processes\*\***

- Casting
- Forming
- Joining, etc..
- Precision engineering
- Metrology (including coordinate and measuring machines (CMMs))
- Tolerancing
- Automated inspection

### **\*\*Materials Handling and Packaging\*\***

- Materials handling
- Packaging

### **\*\* Robotics\*\***

- Robots
- Control of robots

### **\*\* Product and Process Design and Development General\*\***

Anything which doesn't readily fit into subcategories

#### **\*\*CAD/CAM/CAPP Issues\*\***

- CAD/CAM
- Process planning, CAPP

#### **\*\*Materials and Energy Recycle and Reuse\*\***

- Recycling
- Re-manufacturing

#### **\*\*Mechatronics\*\***

#### **\*\*Rapid prototyping (and other prototype development)\*\***

Rapid prototyping/solid freeform fabrication/layered manufacturing  
Rapid tooling

## **10. \*\*Materials Engineering (General)\*\***

Anything which doesn't readily fit into subcategories

### **\*\*Construction and Building Materials\*\***

- Bituminous materials
- Concrete
- Insulating materials
- Masonary materials
- Metals, plastics wood and other structural materials
- Strength of building materials; mechanical properties
- Strength of building materials; test equipment and methods
- Non-mechanical properties and tests of building materials

### **\*\*Metals, Metallurgy and Corrosion\*\***

- All metal groups
- Powder metallurgy
- Welding and bonding
- Metal plating
- Corrosion

### **\*\*Polymers, Ceramics and Composites\*\***

- Polymers and polymerisation
- Plastics and plastics processing
- Rubber and elastomers
- Ceramics
- Composite materials

## **11.\*\*Mechanical Related Industries (General) \*\***

Anything which doesn't readily fit into subcategories

- Engineering mechanics
- Mechanical design
- Mechanical drives and transmissions
- Lubricants and lubrication
- Mechanical and miscellaneous measuring instruments

### **\*\*Aerospace Engineering\*\***

- General aerospace engineering
- Aerodynamics
- Aircraft
- Aircraft engines
- Rockets and propulsion
- Spacecraft
- Space flight
- Space physics

### **\*\*Automotive Engineering\*\***

- General automotive engineering
- Automotive engines and related equipment
- Automobiles and smaller vehicles
- Buses, tractors and trucks

### **\*\*Control Engineering\*\***

- Automatic control principles and Applications
- Control devices

### **\*\*Fluid Flow, Hydraulics and Pneumatics\*\***

- Fluid flow
- Hydraulics, pneumatics and related equipment
- Vacuum technology

### **\*\*Fuel and Energy Technology\*\***

- Fuel combustion and flame research
- Liquid fuels
- Solid fuels
- Energy management

### **\*\*Heat and Thermodynamics\*\***

- Heat and mass transfer
- Thermodynamics
- Industrial furnaces and process heating
- Space heating and air conditioning
- Refrigeration and cryogenics

### **\*\*Naval and Marine Engineering\*\***

- Naval architecture
- Naval vessels
- Shipbuilding and shipyards
- Small craft and other marine craft
- Marine engineering

### **\*\*Nuclear Engineering\*\***

- Nuclear reactors
- Radioactive materials
- Nuclear power plants

### **\*\*Plant and Power Engineering\*\***

- Hydro and tidal power plants
- Internal combustion engines
- Steam power plants
- Thermoelectric magnetohydrodynamic and other power generators
- Heat exchangers
- Turbines and steam engines.
- Compressors and pumps
- Pipes tanks and accessories
- Plant engineering generally

### **\*\*Railway Engineering\*\***

- Railway plant and structures
- Railway rolling stock

## **12.\*\*Mining and Mineral Processing Engineering (General)\*\***

- Exploration and prospecting
- Mines and quarry
- Mines and mining: coal
- Mines and mining: metal
- Mines and mining: non-metallic
- Mineralogy

## **13.\*\*Nanotechnology\*\***

- Biological nanotechnology
- Chemical nanotechnology
- Nanocomputing
- Nanoelectronics
- Nanofabrication
- Nanomaterials
- Nanorobotics

## **14.\*\*Petroleum and Offshore Engineering\*\***

- Oil field equipment and production operations
- Petroleum and related deposits
- Petroleum refining
- Geological/geochemical prospecting
- Underwater operations