

motif

Thesaurus construction guidelines: An introduction to thesauri and guidelines on their construction **Catherine Ryan**

Thesaurus construction guidelines:
An introduction to thesauri and guidelines on their construction

Catherine Ryan



This work is licensed under a Creative Commons Attribution 4.0 Ireland License.
When citing or attributing this work, please use the following: Ryan, C. (2014), 'Report on the MoTIF project: thesaurus guidelines and pilot thesaurus of Irish folklore'. Dublin: Royal Irish Academy and National Library of Ireland.

ISSN: 2009-6461

DOI: 10.3318/DRI.2014.1

Design: Fidelma Slattery



MoTIF project

MoTIF project team: Sandra Collins, Digital Repository of Ireland; Rebecca Grant, Digital Repository of Ireland; Eoghan Ó Carragáin, National Library of Ireland; Catherine Ryan, Digital Repository of Ireland/National Library of Ireland; Ger Wilson, National Library of Ireland.

We gratefully acknowledge the contributions of Dr Jodi Schneider (INSIGHT Centre for Data Analytics, formerly Digital Enterprise Research Institute (DERI)); Dr Elizabeth Mullins (University College Dublin (UCD)); Jane Burns (Royal College of Surgeons in Ireland); Dr Christoph Schmidt-Supprian (Trinity College Dublin); Dr Ríonach Uí Ógáin (National Folklore Collection, UCD); Críostóir Mac Cárthaigh (National Folklore Collection, UCD); and Anna Bale (National Folklore Collection, UCD).

Contents

6	Introduction
9	Introduction to thesauri
12	Main elements of a thesaurus
26	Planning a thesaurus
30	Constructing a thesaurus
48	Multilingual thesauri
52	Mapping thesauri
53	Thesauri and the Semantic Web
56	Conclusion
58	Bibliography
61	Appendix I: Initial list of terms
65	Appendix II: Stage 1 facet analysis
69	Appendix III: Pilot thesaurus of Irish folklore alphabetical display
98	Appendix IV: Pilot thesaurus of Irish folklore hierarchical display

Introduction

This guide was constructed as part of **MoTIF** (Mo Thesaurus of Irish Folklore), a collaborative project led by the Digital Repository of Ireland (DRI) and the National Library of Ireland (NLI).

One of the project aims was to produce guidelines on the construction of thesauri for librarians, archivists, museum professionals and other information professionals. The guidelines are contained in this document and are accompanied by a pilot thesaurus of Irish folklore.

A thesaurus is a:

‘**controlled and structured vocabulary** in which **concepts** are represented by **terms**, organised so that **relationships** between concepts are made explicit, and **preferred terms** are accompanied by lead-in entries for synonyms or quasi-synonyms’ (International Organization for Standardization 2011, 2013).

Thesauri are vital and valuable tools in content discovery, and in information organisation and retrieval, activities common to all fields, including cultural heritage and higher education as well as business and enterprise. Thesauri allow information professionals to represent content in a consistent manner and enable researchers, employees and the public to find this content easily and quickly. These guidelines will give professionals the advice that they need to improve their own data management processes by adhering to international standards and best practices.

Guidelines

These guidelines were produced to provide a comprehensive introduction to and advice on how to construct thesauri following international standards and best practice. To this end, *ISO 25964 Thesauri and interoperability with other vocabularies*, an international standard published by the International Organization for Standardization¹ was consulted along with other writings in the field by knowledge managers and knowledge organisation experts. Existing thesauri were also consulted.

¹ <http://www.iso.org/> (last accessed 22 October 2013).

The idea for the project arose following the *Digital archiving in Ireland: National survey of the humanities and social sciences* DRI report, which identified a number of problematic areas in the indexing of Irish-language names, both personal names and place names, as well a large number of either custom-made vocabularies or international vocabularies adapted for use with Irish content (O'Carroll and Webb 2012). The guidelines offer advice on how to bridge this vocabulary gap and ensure that information professionals have the advice they need to improve their own data procedures by adhering to international standards and best practices such as *ISO 25964-1. Information and documentation: Thesauri and interoperability with other vocabularies*.

The first section of the guidelines contains an introduction to thesauri, examines the differences between thesauri and other controlled vocabularies and explains why thesauri are important in indexing and searching. The second section of the guidelines introduces the main elements of thesauri: terms and concepts; relationships; notes; and methods used to structure a thesaurus. The third section looks at what to consider when planning a thesaurus while the fourth section covers the construction process itself, using a pilot thesaurus as an illustrative example of some of the decisions that need to be made. Multilingual thesauri, mapping thesauri and the Semantic Web are covered in the fifth, sixth and seventh sections.

Pilot thesaurus

A pilot thesaurus on Irish folklore was constructed as an illustrative example and proof of concept for the guidelines and is now available online.² The report data from the *Digital archiving in Ireland: National survey of the humanities and social sciences* DRI report, combined with professional knowledge and research, revealed areas where a pilot thesaurus would be of use. These included folklore, history, drama, theatre and Irish-language culture (O'Carroll and Webb 2012). Irish folklore had the most potential for reuse among specialised collections across Ireland and no thesaurus existed for this content to date. There were also a number of existing, comprehensive sources, which could be consulted in the creation of a pilot thesaurus on Irish folklore.

The pilot thesaurus contains approximately 500 terms, mostly in English, which have been organised using the method of facet analysis, the most explicit approach to knowledge organisation in the library and information science field (Hjørland 2013). It has been arranged with the fundamental facets at the top of the hierarchy. The pilot thesaurus contains examples of the most important elements in a thesaurus, including equivalence, and hierarchical and associative relationships as well as notes. These are

² <http://apps.dri.ie/motif/>

used as illustrative examples and the pilot should not be considered exhaustive in this regard. The sources consulted for this pilot include two chapters, on livelihood and household support, and nature, from Seán Ó Súilleabháin's *Handbook of Irish folklore* (Ó Súilleabháin 1942). Other sources were *Béaloides*, the journal of the Folklore of Ireland Society and Dundes' *The study of folklore* (Dundes 1965; Folklore of Ireland Society, 2012).

The creation of a more comprehensive thesaurus of Irish folklore would necessitate the inclusion of additional vocabulary resources. Potential future work could include the development of a multilingual thesaurus in both English and Irish as well as the representation of the thesaurus in the Simple Knowledge Organisation System (SKOS), a Semantic Web specification designed to support the use of thesauri, taxonomies and controlled vocabularies on the Web (World Wide Web Consortium 2012).

Introduction to thesauri

What is a thesaurus.

Different types of knowledge organisation systems (KOSs) and knowledge representation systems abound. From controlled vocabularies to authority lists and from classification schemes to taxonomies, thesauri and ontologies, different systems are used to define and describe terms and concepts, and to organise knowledge for better search and retrieval. In practice, there is overlapping in the use of terms such as controlled vocabulary, taxonomy, thesaurus and ontology to describe similar applications and knowledge organisation activities across different fields. Hedden's *The accidental taxonomist* (2010) notes that the word 'taxonomy' can be used to denote a wide range of knowledge organisation systems aside from a traditional hierarchical classification (Hedden 2010a). A number of commentators have discussed the similarities and differences between controlled vocabularies, taxonomies and thesauri (Garshol 2004; Hedden 2010a; Leise and Fast 2002; Pidcock 2003; Taxonomies and Controlled Vocabularies Special Interest Group of the American Society for Indexing, n.d.). Their essential characteristics are outlined below:

Controlled vocabulary: this is a restricted list of terms, as distinct from concepts,³ that can be used for names, places and subjects. No structure is required in a controlled vocabulary although one may be present. Equivalence terms such as *USE* and *Use For (UF)* may be used as *see reference* types and all terms in a controlled vocabulary should ideally have an explicit definition but this is often not the case. Examples of controlled vocabularies are authority lists, taxonomies and thesauri such as the Library of Congress Subject Headings, and The Getty Research Institute's *Art & Architecture Thesaurus* (AAT). They also include website site maps and navigation menus.

A controlled vocabulary is used to provide consistency across search and to ensure that non-preferred terms are not overlooked. The use of controlled vocabularies to describe people, places, things, genres, forms and subjects ensures that all the relevant records are found or collocated under a single term. Controlled vocabularies also remove any ambiguity in a search and improve the precision of the results. For instance, if a purely full-text keyword search was performed on a database for the term 'roses', the results would be some text containing quotes from Shakespeare which may not be desired:

'What's in a name? that which we call a rose
By any other name would smell as sweet;'

³ For the purposes of thesauri and their construction, a distinction is made between terms and the concepts that they describe. This is discussed in the section *Main Elements of a Thesaurus*.

By contrast, a search for the controlled vocabulary term 'roses' would only bring up those documents that have been indexed, or tagged, with the subject heading 'roses'.

Taxonomies: a taxonomy is a controlled vocabulary traditionally arranged into a hierarchical tree structured using parent/child, whole/part or instance relationships. Taxonomies use *broader term (BT)* and *narrower term (NT)* to denote these relationships and may also use equivalence terms. In recent years, especially in business and corporate knowledge management, the term taxonomy has taken on a broader usage and tends to be applied to many types of vocabulary, including controlled vocabularies, authority lists, thesauri and ontologies.

For the purposes of this document, taxonomies will refer to the simpler hierarchies, which do not contain associative relationships although the hierarchies may be constructed in much the same way as a thesaurus. Taxonomies can be used for organisation and navigation both internally or in the form of a navigational menu on a website. They can also be a form of classification where, typically, a child node contains many of the properties or attributes of its parent nodes. In both cases, the taxonomy tree improves search by allowing users to browse for terms higher or lower in the hierarchy.

Thesauri: a thesaurus is also a controlled vocabulary but contains more complex relationships than a taxonomy. These relationships include hierarchical relationships such as BT and NT, *see also* and equivalence relationships as well as associative relationships such as *related terms (RTs)*.

A thesaurus can be referred to as a networked collection of terms where all terms are connected to each other and not only assists users in finding information but also in understanding it.⁴ The most recent international standard for the creation of thesauri is *ISO 25964. Thesauri and interoperability with other vocabularies* published in two parts in 2011 and 2013. This gives recommendations on the development and maintenance of thesauri for information retrieval and their interoperability with other vocabularies. It also defines a thesaurus as a:

'**controlled and structured vocabulary** in which **concepts** are represented by **terms**, organised so that **relationships** between concepts are made explicit, and **preferred terms** are accompanied by lead-in entries for synonyms or quasi-synonyms' (International Organization for Standardization 2011, 2013).

⁴ Thesauri bear some similarity to ontologies, although they both perform separate functions. Gilchrist noted that semantic networks contain more complex treatment of relationships than thesauri but 'there is no intrinsic reason why a conventional thesaurus should not be extended and elaborated to include, for example, term definitions, notes on term usage, and more explicitly defined relationships' (Gilchrist 2003). Thesauri, ontologies and other Semantic Web technologies are discussed in the section *Thesauri and the Semantic Web*.

Why are thesauri important.

Improving a user's ability to find the information that they are looking for quickly and easily is the main goal of most thesauri and other controlled vocabularies and the ISO standard mentioned above outlines how they do this. Thesauri are tools that allow both the indexer and the researcher to use the same terms to describe the same subjects or concepts, allowing for easier search and retrieval of information about a particular domain (International Organization for Standardization 2011). By doing so, they support the indexing, retrieval, organisation and navigation of information (Hedden 2010a). The relationships in a thesaurus guide users to more general or more specific concepts by allowing them to navigate through the vocabulary and to choose the most suitable terms for their content. This navigability of the thesaurus makes it much more useful than a simple controlled list of terms as it allows a user to browse a subject domain or website—the thesaurus can be displayed alphabetically by terms or instead be used as a systematic structure of hierarchical or classified relationships to act as a navigational tool and map of the domain. Associative relationships in a thesaurus can also direct a user towards related terms making connections that they may not have previously considered. In cataloguing, a thesaurus can also be used as a source of metadata⁵ for subject cataloguing (Broughton 2006a) as it can connect different objects together and improve discovery of and access to materials by exploiting all of the above features.

Thesauri also have their place in business. Significant time and money is lost when employees spend time searching for content on an intranet and cannot find it quickly or easily. Indeed, in some cases they cannot find the information they are looking for at all. If a customer cannot find a product on a website they go elsewhere, usually to a competitor (Stewart 2011). A form of faceted navigation, in which products are arranged by their characteristics or principles of division, is now visible on many websites, for example shirts may be arranged by colour, by material or by size. A business may choose a more complex thesaurus for internal search and retrieval and a simpler taxonomy for website navigation but the construction processes are the same and an effective product navigation system will employ many of the techniques of thesaurus construction.

The following sections will outline the main elements of a thesaurus as well as the main issues to consider during the construction and planning process. These sections aim to act as a comprehensive introduction to thesauri and to ensure that information professionals have the advice that they need to improve their own data procedures by adhering to international standards and best practices.

⁵ Metadata is 'data about data' or 'a set of data that describes and gives information about other data' (Oxford English Dictionary Online), available at www.oed.com (22 November 2013).

Main elements of a thesaurus

This section will outline the main elements that are needed to construct a fully functional thesaurus. It will include an overview of the terms and concepts involved and the relationships between them, the notes that can feature in thesaurus term records, and node labels and arrays. This section will also provide a brief introduction to facet analysis, a popular method of constructing a thesaurus in such a way that it conforms to the hierarchy rules outlined in ISO 25964-1, part one of the most recent international standard for the creation of thesauri. It also briefly describes the main characteristics of the ISO 25964-1 data model and the reasons for its development.

Terms and concepts

Each term in the thesaurus should be used to represent only one concept. *ISO 25964-1* is the first thesaurus standard to explicitly state the difference between *concepts*, which are units of thought, and the *terms* which we use to express them. This distinction was maintained rigorously throughout the text and a data model was included to further clarify the distinction and to ensure that it is followed.

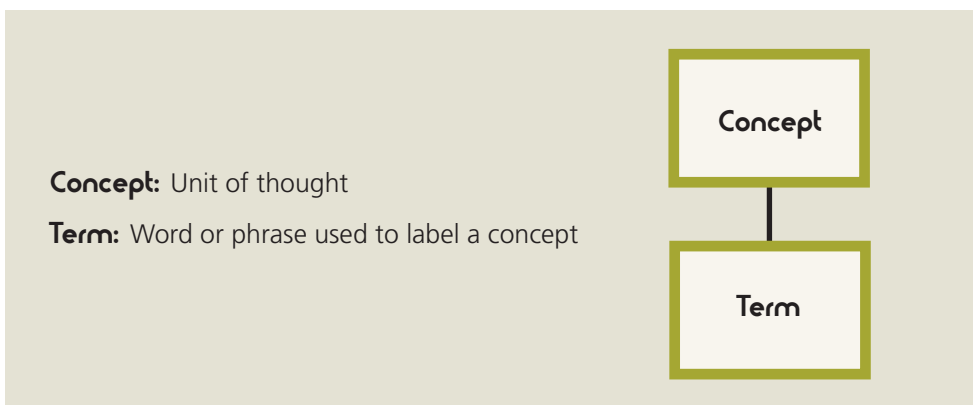


Fig. 1. Concept and term as defined by ISO 25964-1 (International Organization for Standardization 2011)

Clarke and Zeng note the importance of this distinction between term and concept when considering thesauri in an electronic environment as humans are able to see that a thesaurus contains both concepts and terms. We can use concepts and terms interchangeably and still draw correct inferences. A computer, however, is unable to do so and this can easily be seen from the following example they give showing the problem, which arises when no distinction is made between the word 'man' and the concept 'man' within the computer system (Clarke and Zeng 2012).

'man' is a three-lettered word.
 Socrates is a man.
 Therefore, Socrates is a three-lettered word.

Fig. 2. Example of incorrect inference where lack of clarity between concepts and terms exists (Clarke and Zeng 2012)

This distinction is also very important when considering the possible equivalence relationships, which can exist between terms and concepts. The term/concept distinction also creates greater clarity and equality among languages when constructing multilingual thesauri. Both of these issues will be discussed below.

Compound concepts

Compound concepts are common and a decision must be made on whether or not to include them as they are in the thesaurus or to break them down into simpler concepts in a process known as 'splitting'. This decision is usually based on the needs and knowledge of the users of the thesaurus and what will be of most use and most understandable to them. Compound concepts are usually composed of the *focus* of the term, or its head, and the *modifier*, which narrows the focus and scope of the concept. For example, in cattle lore, the focus is 'lore' or 'animal lore' and the modifier is 'cattle'. In these cases, where it is possible to split the terms and with full consideration of the users of the thesaurus, the focus 'lore' and the modifier 'cattle' are split.

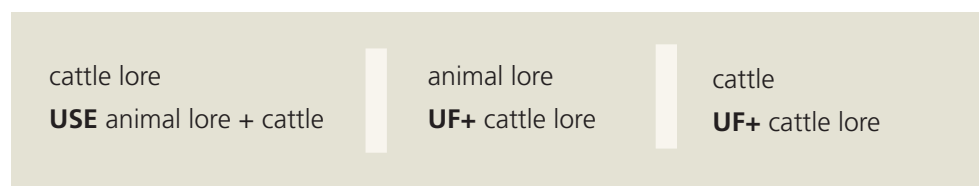


Fig. 3. Example of 'splitting' a compound concept/compound equivalence from the pilot thesaurus

This is the method undertaken by some thesauri such as the *Art & Architecture Thesaurus*.⁶ In the *AAT*, compound terms are split if the separated terms combined still express the same concept as the compound term itself. Where the separated terms express something different to the combined terms, the *AAT* recommends keeping the compound concept intact (Harpring 2009). In theory, very complex concepts could be broken down into many simpler terms but ISO 25964-1 notes that 'consistency becomes even harder to achieve if the concept is split into more than two components'

⁶ Getty Research Institute. *Art & Architecture Thesaurus*, available at: <http://www.getty.edu/research/tools/vocabularies/aat/> (22 November 2013).

(International Organization for Standardization 2011). Broughton also advises against the semantic splitting of compounds, for example 'arthritis' USE 'joints' + 'inflammation', as this can cause confusion especially where a term is well known and familiar to users (Broughton 2006a).

The decision to split compound concepts can often be a subjective one. *ISO 25964-1* outlines five options to consider when dealing with compound concepts:

1. Admit the compound concept as is;
2. Split the concept into separate terms, use the compound concept as a non-preferred term and indicate the preferred terms with a USE tag, for example USE cattle + folklore;
3. Trial the compound concept and accept or reject it after a specified time period;
4. Reject the concept but retain it as a non-preferred term pointing to a broader concept;
5. Reject the compound concept completely if irrelevant or rarely used (International Organization for Standardization 2011).

The standard also goes into greater detail on factors and circumstances to consider when deciding to split compound concepts and also recommends developing a set of criteria appropriate for the subject matter or audience in order to maintain consistency across the thesaurus. Whatever decision is made on the splitting of compounds, their treatment should be consistent across the thesaurus.

Where compound concepts can be expressed by the combination of simpler concepts, that is the focus and the modifier can be split without ambiguity or loss of meaning	cattle lore USE animal lore + cattle
Where the focus is a part or component of the modifier	household floors USE households + floors

Fig. 4. Examples where splitting of compound concepts is appropriate

Where separating the terms results in a loss of meaning	<p>hungry grass</p> <p>In Irish folklore, <i>hungry grass</i>, is a spot of cursed grass. To split these terms into <i>hungry</i> + <i>grass</i> would result in a loss of meaning and introduce ambiguity.</p>
Where the term is well-defined and familiar to users	<p>fairy forts</p> <p>The term could be split into <i>fairies</i> + <i>forts</i> but <i>fairy forts</i> is a common term familiar to users.</p>
Where a complex concept is semantically split	<p>shebeens</p> <p>Semantically splitting the complex concept <i>shebeens</i> into <i>bars</i> + <i>illegal activities</i> will be confusing for users and result in the loss of a specific term that will likely be sought.</p>
Where a concept is split into more than two components that is the focus is accompanied by more than one modifier	<p>wedding feast amusements</p> <p>USE wedding feasts + amusements</p> <p>Splitting the above into <i>weddings</i> + <i>feasts</i> + <i>amusements</i> would result in an increasing lack of consistency in indexing and search.</p>

Fig. 5. Examples where splitting of compound concepts is inappropriate

Relationships

Equivalence relationships

Equivalence relationships such as USE and UF (Use For) are used to denote equivalence between terms (not concepts) and to distinguish between preferred terms and their synonyms or quasi-synonyms. A *synonym* is a term, which has the same meaning or covers the same concept as another term or multiple terms. A *quasi-synonym* is a term that does not usually have the same meaning as the preferred term but does in the context of a specific thesaurus. USE and UF occur in pairs as the preferred and non-preferred

terms will reference each other in a reciprocal way. In addition to non-preferred terms, USE and UF relationships may also be used to denote misspellings, deprecated terms, abbreviations or slang in the thesaurus. Equivalence relationships are also used when a term is deemed too specific and can be represented by a broader term.

Synonyms/quasi-synonyms	earth UF clay	clay USE earth
Use of a broader term	dogs UF terriers sheep-dogs mastiffs	terriers USE dogs sheep-dogs USE dogs mastiffs USE dogs
Inclusion of variant spellings	taboos UF tabus	tabus USE taboos

Fig. 6. Example of USE and UF relationships

Equivalence relationships can only occur between preferred and non-preferred terms. No relationships exist between non-preferred terms. An equivalence relationship cannot occur between a term and a concept; this is because it is the term that represents the concept. In a multilingual thesaurus, equivalence relationships exist between concepts across languages but these do not use any explicit relationship terms to express this.

English	Gaeilge
dogs UF hounds	madraí UF cúнна
hounds USE dogs	cúнна USE madraí
ga: madraí	en: dogs

Fig. 7. Example of an equivalence relationship across and within languages

Hierarchical relationships

Hierarchical arrangements are common in thesauri and are represented using the *broader term* and *narrower term* relationships. These terms denote relationships between the concepts (not the terms) in a thesaurus and indicate whether a concept contains or is contained by another concept. The BT and NT relationships correspond to the terms *superordinate* and *subordinate* used in classification and the terms *parent* and *child* used by taxonomists (Broughton 2006a). BT relationships are used to direct users to a concept that is higher up in the thesaurus hierarchy and therefore a broader or more general concept than the one they were seeking. Likewise, NT relationships direct users further down the hierarchy to more specific terms. Usually, each term has only one broader term (*monohierarchy*) but, occasionally, some terms may have more than one broader term (*polyhierarchy*). Hedden advises against the overuse of polyhierarchies as they can become confusing and take away from a clear, navigable structure (Hedden 2010a).

Like USE and UF, BT and NT are reciprocal in nature and occur in pairs.

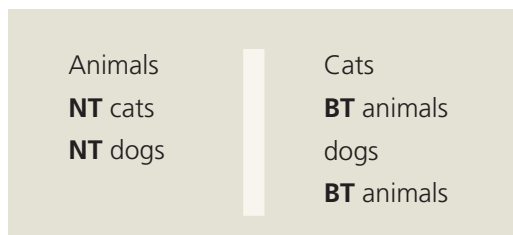



Fig. 8. Examples of BT and NT reciprocal relationships


Hierarchical relationships can be used to broaden and narrow a search effectively and ensure that narrower terms fall within the scope of the broader terms, thereby allowing for an *exploded search*, also called *recursive retrieval*. An exploded search occurs when the terms further down in the hierarchy from the selected term are retrieved along with the selected term. This feature is dependent on the capabilities of the indexing and display software. Exploded search may not be implemented in specific software packages.




Fig. 9. Examples of mixed categories or types in BT and NT reciprocal relationships

Fig. 9 shows an example of mixed categories in a hierarchy. In this instance, a search for dogs would also retrieve information about dog kennels, which many not be desired by the user. This mixing of categories can be avoided by constructing a thesaurus using the three main types of hierarchical relationships. These are:

-  **The generic relationship:** also known as the genus/species or a thing/kind relationship. This relationship can be tested using the all-and-some test. In the above example, some animals are dogs and all dogs are animals so dog is placed correctly in the hierarchical arrangement. However, some animals are not dog kennels and all dog kennels are not animals. By using this test we know that the placement of the concept 'dog kennel' under 'dog' does not follow a logical arrangement and should be reconsidered.⁷

-  **The partitive relationship:** also known as the whole/part relationship. In this type of relationship, a narrower term belongs under, and only under, one particular broader term, and cannot form part of another term under any circumstances. *ISO 25964-1* recommends that the partitive relationship only be used for systems and organs of the body, geographical locations, disciplines or fields of discourse, and hierarchical social structures (International Organization for Standardization 2011).

-  **The instance relationship:** this relationship is used to name particular instances of a class of things, for example dogs **NTI** Spot. (See Fig. 11 for list of relationship codes.)

Associative relationships

Associative relationships denote related terms in a thesaurus. They are used to indicate that different terms in a thesaurus are related in some way or have an overlapping scope. They thus allow users to expand their initial search into different aspects of the subject. As Hedden notes:

‘since the purpose of the associative relationship is to inform the indexer/ searcher that other terms exist, it is the associative relationship indicating related terms in other hierarchies that is most helpful’ (Hedden 2010a).

ISO 25964-1 also notes this and recommends that, as terms within the same hierarchy will already be covered by BT and NT relationships and will share a common broader scope, they do not need a separate RT relationship. However, this should be reconsidered where concepts in the same hierarchy have an overlapping scope. In this instance, an RT link is recommended.

⁷ If the thesaurus follows a hierarchical thing/kind logical order but the creator wishes to link the concept 'dog' with the concept 'dog kennels', two options are available. The first is to create an associative relationship, which will be covered in the next section. The second is to create a ConceptGroup, another potential element of a thesaurus as outlined by *ISO 25964-1*. This is explained in the section on the *ISO 25964-1* data model.

Hedden also notes a number of types of associative relationships that are found in thesauri. These include associative relationships between *processes* and *agents* such as 'fishing' and 'fishermen', between *objects* and their *properties* such as 'land' and 'productivity of the land', and between *raw materials* and their *products, parts* and the *whole*, between *cause* and *effect*, and others (Hedden, 2010a).

dogs RT dog kennels	dog kennels RT dogs
smithing RT smiths	smiths RT smithing

Fig. 10. Examples of associative relationships

Other relationships and codes

Other relationship terms that may be found in a thesaurus record include:

TT	Top term	A relationship term pointing to the top or broadest term in the relevant hierarchy.
BTG/ NTG	Broader/narrower term (generic)	More specific broader/narrower terms. Used if the thesaurus editor would like to specify which of the hierarchical rules the relationship follows.
BTP/ NTP	Broader/narrower term (partitive)	More specific broader/narrower terms. Used if the thesaurus editor would like to specify which of the hierarchical rules the relationship follows.
BTI/ NTI	Broader/narrower term (instantial)	More specific broader/narrower terms. Used if the thesaurus editor would like to specify which of the hierarchical rules the relationship follows.
CC	Concept code (notation)	Used to indicate the notation that represents a particular concept. Notation is used to denote the order of concepts in a display. A thesaurus need not include notation.

Fig. 11. List of relationships and codes in a thesaurus.

Notes

Another component of thesauri is notes, its descriptive elements. These appear in the preferred term records themselves and can include scope notes, history notes and definitions of the preferred term. Additional notes describing the administrative aspects of a term may also be created but not necessarily displayed to the users. Such information could include the term identifier, when the thesaurus term record was created, who it was created by and when it was modified. The capability of the software chosen to construct the thesaurus will determine if these administrative details are included.

Users, however, will need to be able to see the descriptive elements which relate to the term or the concept itself. These are:

SN	Scope note	A short note in the term record, which describes what the term means, how and when the term should be used and when it should not be used. These notes are used extensively to help disambiguate terms and ensure consistency across the thesaurus. They may be made visible to all or to internal editors only.
HN	History note	A short note on the history and evolution of the concept, e.g. if it changed over time, if it replaced any other term, etc.
DEF	Definition of the term/concept	Thesauri may also include a definition of the term. This may be included in the scope note.

Fig. 12. List of notes in a thesaurus.

Facets and facet analysis

Facet analysis has become a popular choice in the construction of thesauri, beginning with the *Thesaurofacet* in the 1960s and includes the *Art & Architecture Thesaurus*, one of the most widely used thesauri online, which uses facet analysis to construct its hierarchical structure. It is now 'firmly established that a classification of some sort is the best starting point for the construction of a thesaurus' (Broughton 2006b) and that 'the effectiveness of a thesaurus is likely to be reduced if relationships between terms in an alphabetical list are determined without resort to classification' (Aitchison, Gilchrist and Bawden 1997). Will states that facet analysis 'is an important technique which should underlie the construction of any type of knowledge organisation system' and, in recognition of this, facet analysis has been incorporated into the ISO 25964 standard for the construction of thesauri for information retrieval (Will 2013).

ISO 25964-1 defines a facet as a 'grouping of concepts of the same inherent category' and gives examples of some high-level facet categories, including objects, materials, agents, actions, places and times. It also defines facet analysis as the 'analysis of subject areas into constituent concepts grouped into facets, and the subdivision of concepts into narrower concepts by specified characteristics of division'(International Organization for Standardization 2011).

La Barre outlines the history of facet analysis where the fundamental categories of facets were first devised by Ranganathan as part of a library classification scheme in the 1920s and 1930s. Ranganathan proposed five categories: Personality, Matter, Energy, Space and Time, or PMEST, which could cover all aspects of a discipline or subject. These were later expanded by Brian Vickery for the Classification Research Group (CRG) based on the Aristotelian fundamental categories—thing, kind, part, property, material, process, operation, agent, patient, product, by-product, space and time. The CRG went on to state that these categories act as guides to analysis and should not be imposed on subjects (La Barre 2012). Aitchison *et al.* outlined the fundamental facets which have been settled on after years of research. These are outlined in the table below. Broughton also suggests additional categories such as genre for humanities subjects. Ultimately, the choice of facets will depend on the subject matter and what is most practical (Broughton 2006a).

<p>Entities</p>	<p>(By characteristics)</p> <ul style="list-style-type: none"> Abstract objects Naturally occurring entities Living entities. Organisms Artefacts (man-made) Attributes Materials Parts/components Whole entities <p>(by function)</p> <ul style="list-style-type: none"> Agents (performers of actions) Patients (recipients of actions) End-products
<p>Actions/Activities</p>	<ul style="list-style-type: none"> Processes (intransitive actions) Operations (transitive actions)
<p>Space/place/location</p>	
<p>Time</p>	

Fig. 13. Fundamental facets (Aitchison et al., 1997)

Facets can be found either at the top level of the hierarchy where the fundamental facets themselves are the primary organisation of the thesaurus, or further down in a thesaurus, which is organised primarily by subject. The advantages and disadvantages of this type of display will be discussed as part of the section on systematic display.

In the online environment, 'facets' can operate a little differently. One example is a clothing website where shirts are arranged by colour, material, size or any other characteristic. Such divisions have been referred to as facets but this is not strictly speaking division by facet. It is instead dividing by characteristics or principles of division, where one or more facets are organised and searchable by their attributes (Broughton 2006b).

Node labels and arrays

Node labels are entries in a thesaurus which indicate how the terms have been grouped. Subordinate groupings of sibling concepts are known as arrays. Node labels usually appear in brackets and are used to divide groups into facets, sub-facets, arrays and characteristics. If the grouping is divided further by sub-facets such as people or animals, then the node label appears as follows: (people), (animals). The division into characteristics is usually called the characteristic or principle of division. If the node label is used to denote a characteristic or principle of division the word *by* is introduced, for example a people facet may be divided (*by age*), (*by occupation*) and by other characteristics.



Fig 14. Node labels and arrays.

Schedule order, notation and citation order

In pre-coordinate indexing, complex subject descriptions are applied by a cataloguer in a predetermined order before search, for example *animal lore in the eighteenth century*. In contrast, the post-coordinate method of indexing separates out complex concepts into simple terms, which are applied to the content and are only combined at the time of search, for example *animal lore + eighteenth century*.

Pre-coordinate indexing is most useful when organising physical objects on shelves and to do this consistently, ordering rules are necessary. Broughton (2006a) notes that the development of the thesaurus, beginning in the early twentieth century and picking up speed with the advent of electronic catalogues and databases, has trended towards post-coordinate indexing.⁸ Broughton also notes that post-coordinate indexing system is most useful online. It seems at first glance that the notion of linear order and pre-coordinate indexing in an online environment are obsolete concepts. Nevertheless there are some advantages to introducing rules for ordering into an online thesaurus. Ordering allows for better management of compound concepts by creating relationships without ambiguity and it supports browsing tools by detailing the exact location of concepts. Furthermore, a thesaurus designed to be used online may find use within a physical collection and so ordering rules should be considered (Broughton 2006a).

Schedule order

The schedule order in a thesaurus outlines how the categories in the thesaurus should be displayed. Categories have traditionally appeared in the order of general-to-specific as follows:

Time - Space - Agent - Product - Patient - Operation - Process
- Material - Property - Part - Thing - Kind

This order (or something similar) may appear either at the top of the thesaurus as fundamental facets or within each subject where subjects are the top classes of the thesaurus.

Citation order

The citation order is order in which concepts are cited when indexing for a pre-coordinated system. The citation order is usually the reverse of the schedule order, moving from the specific to the general and allowing the pre-building of compound concepts to be done in a consistent way:

⁸ These guidelines will not address the advantages and disadvantages of using either pre- or post-coordinate indexing. The Library of Congress (2007) has outlined these advantages and disadvantages with reference to works and comments by experts in this field.




Kind - Thing - Part - Property - Material - Process - Operation
- Patient - Product - Agent - Space - Time

An example of this is *smiths in the Middle Ages*. *Smiths* are agents, in this case people, and, as agents come before time, are placed before the *Middle Ages* in the compound concept.

Notation

Many thesauri come with a set of symbols (numeric, alphabetic or signs), which have been added to each concept in the thesaurus to indicate where it is located in the hierarchy. Notation codes are not necessary in a thesaurus but are especially useful for printed thesauri with an alphabetical display as the notation refers back to the systematic display and the concepts' location within it. Notation is not necessary for an online thesaurus which links concepts in the background but may still be useful as a control number or identifier for the concepts, which may ensure greater consistency and accuracy in translation. It may also be useful if the software only displays node labels and subordinate concepts alphabetically instead of by time, size or other criteria. In this situation, notation allows the thesaurus editor to organise the concepts as they wish.

Broughton outlines some of the advantages of using notation and these include:

-  It can control the order of the terms;
-  It can provide reference points from an alphabetic display to a systematic one;
-  By implementing order on the thesaurus, notation allows the thesaurus to be used for physical collections and the ordering of a physical sequence (Broughton 2006a).

Different notations or symbols may be used, for instance the Dewey Decimal System uses numeric symbols to organise concepts and also to combine different symbols when creating compound concepts.

ISO 25964 data Model

To encourage interoperability, *ISO 25964-1* has modelled and defined all of the above relationships and notes and created a data model, which is available freely online with an accompanying XML schema.⁹ The model outlines the basic classes: *Thesaurus*, *ThesaurusConcept*, *ThesaurusTerm*, *ThesaurusArray* and *Note* as well as the relationships

⁹ <http://www.niso.org/schemas/iso25964/> (22 November 2013).

that exist between the concepts. The model makes explicit the distinction between terms and concepts. The data model also contains information on other potential elements of a thesaurus, including *ConceptGroup*, a special grouping for terms relating to a particular subject, domain, theme or other categories, which can be brought together from different hierarchies and sits parallel to the thesaurus itself (International Organization for Standardization 2011). In the earlier example of 'dogs' and 'dog kennels', where the two concepts sit in separate hierarchies, they may be brought together under a *ConceptGroup* if it is considered important enough in light of the subject matter and the audience with full consideration of resources.

Clarke and Zeng outline the main benefits for defining the structure of a thesaurus and creating a data model. These are:





'easier implementation by computers, consistency enforced in thesaurus construction and mapping, greater interoperability between thesauri and with other vocabularies, and enhanced performance at all stages from design of the thesaurus through development, management, and exchange' (Clarke and Zeng 2012).

Planning a thesaurus





A thesaurus is a long-term project, which requires a significant amount of planning and a number of aspects of the thesaurus need to be considered before the construction begins (Hedden 2010a). *ISO 25964-1* recommends planning the objectives and features of the thesaurus as well as the resources available for the thesaurus, deciding who will be responsible for different aspects of thesaurus construction and maintenance, and choosing the software for the thesaurus (International Organization for Standardization 2011). Some additional essential points have been drawn from standards and writings on the construction of thesauri and these are outlined below. More detailed discussion on planning and maintaining thesauri and taxonomies can be found in *ISO 25964-1* (2011), Hedden (2010b) and Stewart (2011). A taxonomy governance checklist, published by Term Management, LLC guides the planning process (Doane 2011).

Planning

Documentation should first be written regarding the purpose and objectives of the thesaurus, its intended users, scope and content.

-  The main purpose of the document should be stated clearly. Usually the main purpose of a thesaurus is to provide indexing and retrieval support. In enterprise, a simpler taxonomy is more commonly used to provide a navigational structure for a website.
-  The intended users should be identified. This may include both information professionals and end-users. A clear idea of the intended users will make design decisions easier. This will also identify whether or not a large enough user base exists to justify the construction.
-  The scope and content of the thesaurus should be outlined. Content will include both the subject and types of content, for example textual and non-textual resources. The scope will include what types of subject as well as the types of entities that will be included.
-  The documentation should outline who has responsibility for each aspect of the thesaurus construction and management, from planning to design, dissemination and maintenance. This may be the task of a single editor or an editorial team.






Resources should be considered. These include:

-  People: it should be determined if there are sufficient people available to construct the thesaurus as well as to provide IT support if the thesaurus will be in an electronic format or integrated with other software applications. IT support will also be required regardless of whether the management software is open source or custom built. People proficient in various languages will need to be available if constructing a multilingual thesaurus.
-  Vocabulary resources: sufficient and relevant vocabulary resources should be sourced in preparation for construction and selecting terms. Examples of vocabulary resources have been outlined in the section *Constructing a thesaurus*.
-  Software: decisions must be made in relation to following:
 - Will the thesaurus management software be open source, commercial or custom built?
 - Is there technical support available for the thesaurus management software?
 - Is there an option to publish the thesaurus online and how will this be displayed? Will it be searchable?
 - All expected thesaural relationships, features and notes should be supported and tested in a trial run where possible. These can range from the basic relationships and notes to more sophisticated disambiguation protocols, which are found in commercial environments. Search and display features should also be considered.¹⁰
 - Relationships should be automatically updated if records are amended or updated.
 - How will the thesaurus integrate with other applications and systems? *ISO 25964-1* details a number of considerations here including the ability to search, to use Boolean operators, to navigate up and down a hierarchy, to display a thesaurus alphabetically or systematically among other considerations. A useable interface is required for users and end-users alike. More detailed considerations can be found in *ISO 25964-1*, Section 16.
 - Is an import/export function available and does it export in standard formats, including MARC (MACHine Readable Cataloguing) and Semantic Web standards such as SKOS and others if required?
-  Funding: is there sufficient funding available to support all of the above?

¹⁰ More sophisticated software packages are able to remove ambiguity in search completely by clarifying a term using AND and AND NOT features. For example, fluke AND fish AND (NOT luck). It should be determined if this level of sophistication is required

Design

A number of aspects of thesaurus design will need to be considered before construction. These will be determined based on the planning considerations outlined above as well as the limitations of any software chosen for the project.

-  Will the thesaurus be available in print or electronic formats, or both? Most thesauri are now available in electronic formats.
-  Will the style of the display be alphabetical, hierarchical, classified or another type of display? If electronic, will the software support this type of display? Can this display be easily updated? See the section on systematic display for more information on these types of display.
-  Will the features such as node labels and guide terms be included and supported by the software?
-  What types of relationships and other elements will be included in the thesaurus? A full thesaurus will generally include all types of relationships, non-preferred terms, scope and other notes. A navigational taxonomy may not need to contain associative relationships or scope or other notes.
-  How many levels of hierarchy will be needed? Subject experts expect deep hierarchies and indexers expect consistency across the thesaurus. However, a navigational taxonomy on a website may not need to be so detailed and may only contain one or two levels for ease of navigation and use (Hedden 2010a).

Research and construction

It is recommended that the thesaurus construction begin with a selection of between 100 and 500 terms. More may be researched and added to the thesaurus at a later date but this is a good starting point for construction (Stewart 2011). Vocabulary resources, the process of selecting terms and constructing the thesaurus are outlined in the section on selecting terms.

Testing and reviewing the thesaurus

A review of the constructed thesaurus should be undertaken by subject experts, professionals and users. This should highlight any gaps in the thesaurus, any questions over terms chosen, any missing or redundant features as well as any usability issues. Testing

should also be considered throughout the life of the thesaurus. Continuous testing and evaluation allows editors of a thesaurus to determine how the thesaurus is being used, to identify common misspellings and synonyms that could be added, and to determine which searches are not producing any results and could be improved.

Post construction maintenance and administration

Similar to the *Oxford English dictionary*, a thesaurus is never really finished. Trends in subject areas and in business processes, changes in scope and in language itself mean that a thesaurus is in need of updating and maintenance over the long term. Procedures for review and updating of the thesaurus should be in place. If dealing with a multilingual thesaurus, full consideration should be given to the impact that any change will have on the other languages.

Communication and dissemination

A thesaurus is built to be used so the greater the audience, the greater the likelihood that this will happen. Aitchison *et al.* recommend that a notification of intent be published in the relevant journals to alert subject experts and professionals in the field who may be interested in either using the thesaurus or contributing to its construction. Once the thesaurus has been constructed and tested, it should be deposited in the appropriate national centre for controlled vocabularies and information management. If it is in English, it should be deposited in the international clearinghouse, the Subject Analysis Systems Collection,¹¹ Faculty of Library Information Science in the University of Toronto (Aitchison *et al.* 1997).

¹¹ <http://oneresearch.library.utoronto.ca/content/information-studies-inforum> (22 November 2013).

Constructing a thesaurus

Once the initial planning has been completed, the construction of the thesaurus can begin. Certain aspects of the planning process may overlap with the initial stages of the construction process as it informs the design and display of the thesaurus.

The process of constructing a thesaurus has a number of broad steps (Aitchison *et al.* 1997; Broughton 2006a; Hedden 2010a; International Organization for Standardization 2011). These are:

1. Selecting and recording terms.
2. Determining the preliminary structure of the thesaurus (subject or faceted display).
3. Analysing terms and grouping them according to basic facets.
4. Creating hierarchical and associative relationships along with scope and other notes where required.¹²
5. Creating an alphabetical list from the systematic (hierarchical) display.
6. Soliciting feedback and review by experts
7. Creating documentation including an introduction outlining the purpose, scope and number of terms as decided in the planning stages. An editorial guide should also be written.

It should be emphasised that constructing a thesaurus is an iterative process; some stages inform development and improvement of previous stages. The next few sections will address each of these steps briefly.

Step 1: Selecting and recording terms






Following on from the decision to create a thesaurus and a planning overview, the next step is to research the content that exists on the subject of the thesaurus and determine how it can be put into the thesaurus. A review of existing vocabulary resources must be undertaken and terms extracted and selected from these. The following two sections outline this process.

Assemble vocabulary


The first step in the construction of a thesaurus is to perform a content audit and gather terms from the vocabulary resources available on the subject or subjects. A content audit

¹² *ISO 25964-1* recommends constructing the equivalence and hierarchical relationships before inputting any associative relationships. This is because the most useful associative relationships are between hierarchies and are easier to input once all hierarchies have been completed (International Organization for Standardization 2011).

seeks a list that is representative of the field, rather than an exhaustive list of terms. A number of vocabulary resources have been suggested by standards and experts (Broughton 2006a; Hedden 2010a; International Organization for Standardization 2011) and these can be generally divided into the following categories:

-  **Existing vocabularies:** *ISO 25964-1* recommends consulting existing vocabularies such as classification schemes and other thesauri (International Organization for Standardization 2011). Other vocabularies such as taxonomies or lists of subjects and other keyword headings if they are available can be added to this list. Existing vocabularies will offer synonyms and relationship terms that may not have been previously considered. Reuse, subject to copyright, of existing thesauri and vocabularies or relevant parts of these vocabularies will significantly reduce the time taken and cost involved.¹³
-  **Published works:** published works such as books, journals, abstracts, summaries, conference papers, reports and pamphlets should be consulted for terms. Specialist catalogues and bibliographies can identify recent publications in the field of interest. Particular attention should be paid to the titles and subtitles of journal articles and other documents, the tables of contents found in books, any section headings or image captions. Broughton notes that journals are useful to consult as they give an indication of the trends in research and terms from these documents will remain current for a number of years (Broughton 2006a). If documents are online, automatic selection of terms may also be an option.
-  **Reference tools:** tools such as indexes and databases are useful for gathering terms on a subject. *ISO 25964-1* recommends that dictionaries and encyclopaedias not be used for selection of terms but instead for their definitions and as confirmation of correct placement of terms in a hierarchical structure after term selection (International Organization for Standardization 2011).
-  **Web resources:** navigational menus and feedback from web search logs and other search analytics can be valuable vocabulary resources if dealing with online content.
-  **Internal team sources:** Stewart also suggests using invoices, meetings minutes, correspondence, procedural documents, orientation materials and company intranets. Again, not all terms need be sourced, focus should be placed on titles, subtitles, tables of contents, section headings and summaries (Stewart 2011).

¹³ Even a simple abstraction of how the terms and hierarchies are organised in another thesaurus may reduce the lead-in time for the project.

 **People:** Subject experts, project participants, managers and users can provide many valuable terms and suggest subjects to be considered or identify any gaps in the thesaurus coverage.

Stewart recommends gathering terms only from *critical core content*. In a business, this could be the documents that are essential to doing one's job and selecting the top 20 per cent of these documents in terms of importance. Subject experts will be able to help in the identification of the core content in a subject thesaurus (Stewart 2011). Aitchison *et al.* and Hedden suggest recording potential terms, preferably in an electronic format, noting the preferred terms, the source of the term, any equivalent or related terms, or any notes and definitions (Aitchison *et al.* 1997; Hedden 2010a). The frequency of the terms' appearance in the literature may also be recorded. The thesaurus management software should be able to record all the information outlined in the *ISO 25964-1* data model, including the date the term was created, when it was modified and who was responsible.

PILOT THESAURUS OF IRISH FOLKLORE—ASSEMBLING THE VOCABULARY

The pilot thesaurus limited its scope to collecting approximately 350 terms from two chapters of Seán Ó Súilleabháin's *Handbook of Irish folklore*. These two chapters, on livelihood and household support, and nature were chosen as they contained a broad range of terms, which could be used to demonstrate most thesaural relationships and facet analysis. Due to the time frame of the project, the approach to identifying terms was selective rather than comprehensive.

Most Irish-language terms were excluded from the pilot thesaurus and will need to be considered at a later date as part of a multilingual thesaurus. Some commonly used Irish terms were included in the pilot but this was not done exhaustively. If present, Irish terms are considered non-preferred terms within an English-language thesaurus unless no English-language equivalent exists. In an Irish-language thesaurus, these terms would be considered preferred terms.

Additional sources consulted included some article titles from *Béaloidéas*, the Journal of the Folklore of Ireland Society (Folklore of Ireland Society 2012). Another source was Alan Dundes' *The study of folklore* as it provided a list of many forms of folklore (Dundes 1965).

Existing vocabularies and thesauri such as the *Art & Architecture Thesaurus* (AAT), *AGROVOC*, *the thesaurus of the Food and Agriculture Organisation of the United Nations*, and the American Folklore Society (AFS) *Ethnographic Thesaurus* were examined as examples of different types of structure, display and scope in thesauri.

A comprehensive thesaurus would be extended to cover many of the vocabulary resources listed in this section and would include consultation with experts.

Select terms


After assembling the terms gathered from published literature, existing vocabularies and other vocabulary resources, they must then be organised into a standard list of significant terms, which is representative of the domain and supports information retrieval. This process includes:

- Grouping terms with similar meanings and choosing a preferred term. Preferred terms may be decided upon in consultation with subject experts and a review of terms common in the literature. The intended user group should also be considered when choosing the preferred term. 'Cats' would be more appropriate for the general public while '*felis catus*' would be more appropriate for a veterinary or zoology thesaurus. Spelling should also be considered, especially if there are variants across the literature. If a spelling variant is popular, it should be included as a non-preferred term. Decisions will also need to be made on the inclusion of abbreviations, jargon, loan words and proper nouns.


Synonyms	Preferred Term
care and management of domestic animals care of animals care and management of livestock	animal husbandry
Variant Spellings	Preferred Term
taboo tabu	taboo

Fig. 15. Example of chosen preferred terms in the pilot thesaurus of Irish folklore

- Using qualifiers and definitions to distinguish homonyms from one another. Homonyms are words that are spelt the same but have different meanings. Examples are:
 - bows (musical instruments)
 - bows (ships)
 - flukes (fishes)
 - flukes (anchors)

 Deciding on the form of entry. In order to standardise the list and ensure consistency, the grammatical form of the selected terms must be decided. This will vary among languages and dictionaries should be consulted to determine what forms are most typical in each language. As per *ISO 25964-1*, terms in English are treated as follows:

- Nouns and noun phrases—these are the most important terms to consider when constructing a thesaurus. In English, count nouns (dogs, cats) will appear in the plural in the thesaurus. Non-count nouns (livestock) appear in the singular.
- Verbs—Verbs are also important when gathering terms. They will take the gerund or verbal noun forms, for example fishing and hunting. In a thesaurus, verbs should never be in the infinitive ('to hunt') or the participle ('hunted') forms. This is standard among thesauri.
- Adjectives—should be avoided in a thesaurus unless they are deemed significant to the subject or concept. Adjectives such as red, hungry, etc., should ideally be avoided as these can be found in many different contexts and could potentially confuse results. This may not be possible if the adjectives are considered important in parts of the literature.
- Adverbs—should be avoided in a thesaurus.
- Articles (a, the)—should be avoided unless they are an integral part of the term. If articles are used, equivalence relationships should be set up between the preferred term (which uses the article) and the non-preferred term (which does not use the article).

 Deciding on the treatment of compound terms. See the earlier section *Main elements of a thesaurus* for recommendations on when to split complex concepts and when to retain them.

PILOT THESAURUS—SELECTION OF TERMS

During the selection process, terms for the pilot thesaurus were recorded in Microsoft Excel. A more comprehensive thesaurus may require use of thesaurus-management software from the beginning. Where synonyms existed, a preferred term was chosen and non-preferred terms were also recorded. Any related terms were also recorded. Definitions were included where any terms were ambiguous and qualifiers were used where necessary.

The pilot thesaurus of Irish folklore followed the guidelines set out by *ISO 25964-1*. This included the recommendations on forms of entry for the English language. Non-scientific terms were chosen above scientific terms where they appeared as this matched the terms found in most of the vocabulary resources consulted as part of the content audit and selection. Some adjectives were included as part of the *Properties* facet but only where they appeared in the vocabulary resources and were considered important.

In line with trends in thesaurus construction and best practice and on the recommendation of international standards discussed in the section on compound concepts, these guidelines and pilot will employ the method of ‘splitting’ compound terms where practical and in such a way as to avoid inconsistency, that is no more than two components per compound concept. Compound concepts will be split when they can be expressed without ambiguity as the combination of two simpler terms. Additionally, compound concepts will be split when:

- they are not in the core scope of the thesaurus;
- they are too specific for the scope of the thesaurus;
- are rarely used in the collection;
- they contain more than one difference.

The other options for the treatment of compound concepts outlined in the section on compound concepts will be employed where appropriate, taking into account user expectations and their familiarity with the compound concepts in question.

Step 2: Determining structure and display

Systematic display

Thesauri can be displayed systematically as well as alphabetically and, as Broughton (2006a) notes, the easiest way to establish the correct relationships between terms is to construct a systematic display first, that is, to analyse and organise the terms either in a classified (subject) or hierarchical display. Relationships can more easily be established from this method than by simply working with an alphabetical list.

There are a number of ways of structuring a thesaurus systematically and a decision will have to be made on which method to use as this will impact on how the terms are grouped in the initial analysis. The three main ways of structuring a thesaurus are:

Structuring by facets: this approach involved using the facets themselves as the top classes or divisions. In this approach, terms are grouped according to fundamental facets such as things, materials, activities, etc. This is a more bottom-up approach and ensures that all terms within each facet are of the same type or category as the top classes or divisions. *ISO 25964-1* notes that thesauri organised in this way usually have less need for major revisions as time moves on and the subject evolves (International Organization for Standardization 2011).

Fig. 16 takes some examples from the pilot thesaurus of Irish folklore and shows some of the fundamental facets: *Place/Space*, *Objects* and *Activities*.

Structuring by subject: This approach uses a classification scheme with subjects or fields as the top classes or divisions. The subjects would then be further sub-divided either into narrower subject categories, which could then be divided further and so on. As the terms would be grouped into subjects first, this can be viewed as more of a top-down approach. The advantage of this approach is that themes and concepts within subjects that may be important to users are kept together. One disadvantage is that some concepts can appear in multiple subjects resulting in multiple polyhierarchies, which can be difficult to manage effectively.

In Fig.17, the subject *nature* is not divided by facet and the concept of *weather forecasting* is located under *weather*. This groups the topics together but *weather forecasting* is neither a type of weather nor something found in *nature*. While the structure may appear hierarchical, in fact the terms lower down the structure do not

Place/Space	Activities
natural landscapes	economic activities
rivers	agriculture
mountains	crop cultivation
man-made landscapes	ploughing
pastures	digging
fallow land	harvesting
orchards	threshing
Objects	winnowing
natural objects	land management
celestial bodies	fertilisation (agricultural)
solar system	irrigation
the sun	drainage
the moon	crop rotation
the planets	land rotation
man-made structures	animal husbandry
buildings	milking
residential buildings	breeding
houses	
farm buildings	
cow-houses	

Fig. 16. Example of a thesaurus with facets as top-level categories as found in the pilot thesaurus of Irish folklore

necessarily conform to the hierarchy rules recommended by *ISO 25964-1* as they are not kinds of, or types of the broader categories, in this instance *weather*.

Some thesauri are structured first by subject and then by facet. The below example also contains *livelihood and household support*, objects, activities and processes can be grouped together under the same subject. This is an example of a subject divided into its fundamental facets.

Subject arrangement	Subject and facet arrangement
Nature	Livelihood and household support (activities)
<ul style="list-style-type: none"> weather weather phenomena rain snow weather lore weather forecasting 	<ul style="list-style-type: none"> animal husbandry breeding agriculture crop cultivation land management
	(equipment)
	<ul style="list-style-type: none"> hunting equipment traps snares
	(products)
	<ul style="list-style-type: none"> food drink
	(events)
	<ul style="list-style-type: none"> meals

Fig. 17. Example of structuring by subject similar to the structure of Ó Súilleabháin's Handbook of Irish folklore (1942)

Using characteristics of division: Characteristics of division are used to organise sub-facets into arrays in both subject and faceted type displays. They are also an increasingly important part of website navigation where customers may browse products by attributes such as size and price. Occasionally, these arrangements are also referred to as 'facets' but, strictly speaking, they are not. In the example given below, the terms are organised into two facets, *Clothing and Electronics* (which may both be organised under a fundamental Products facet.) There are two sub-facets in clothing, *Shirts and Skirts*, and these are then arranged by their attributes, *gender, size and colour*. The facet *Electronics* contains two sub-facets, *Cameras and Televisions*. These are then arranged by their attributes, *optical zoom, screen size, display and price*. As mentioned, characteristics of division can be found in all thesauri, for example in the *pilot thesaurus of Irish folklore*, animals will be ordered *by age, by degree of domestication, by function and by species*.

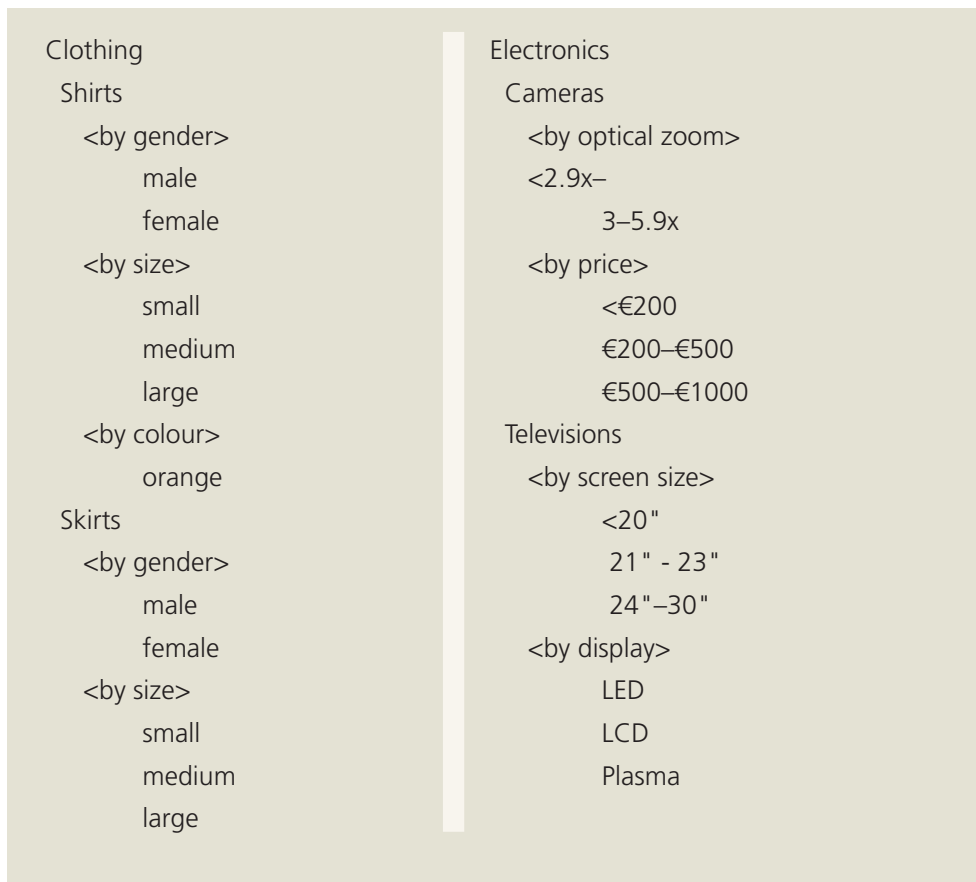


Fig. 18. Example of structuring a taxonomy on a website

As mentioned, the facet analysis approach is primarily a bottom-up approach where terms are selected from the vocabulary resources and grouped into facets. Will notes that the process of analysis is iterative and that top-down and bottom-up approaches are frequently combined with building hierarchical trees as the hierarchical relationships created are tested to ensure that they conform to the rules for structuring the hierarchies or that concepts are located in the correct categories (Will 2013).

PILOT THESAURUS—CHOICE OF STRUCTURE

The decision was taken to structure the pilot thesaurus of Irish Folklore using fundamental facets as the main divisions. Facet analysis, with facets as top concepts (TTs) in the hierarchies was chosen as this is a more flexible structure which can be more easily updated and the terms gathered logically fell into fundamental categories. This approach was also considered as a good demonstration of the hierarchy rules laid down by *ISO 26594-1*. While the topics will be split among different fundamental hierarchies, a reference book, the *Handbook of Irish folklore*, exists and is organised according to subject should this be required.

Step 3: analysing terms—vocabulary analysis

As mentioned in a previous section, facet analysis is now a popular choice for the construction of thesauri. If we begin with a list of concepts, which are then grouped into fundamental categories similar to the above, then we automatically establish hierarchical relationships between these concepts that conform to the rules of relationships set down by *ISO 25964-1*, that is that each narrower or subordinate concept must belong in the same type category or be the same kind of thing as the broader concept, that it must be a unique part of the broader concept or that it must be an instance of the broader term (International Organization for Standardization 2011).

PILOT THESAURUS—VOCABULARY ANALYSIS I

Initial analysis

Terms in the vocabulary analysis process were recorded in Microsoft Excel for the initial analysis and Microsoft Word for the secondary analysis as this allowed for easier basic arranging and subdividing. Database packages such as Microsoft Access may also be considered. Dedicated thesaurus management software can also be implemented from the beginning of the project.

In the first stage of the analysis, the selected terms were organised into basic facets, which roughly corresponded to those outlined by Aitchison *et al.* (1997). These were:

- Entities: abstract objects, materials, attributes, parts/components, living entities, naturally occurring entities, man-made objects, agents, patients and end-products
- Activities and actions: processes and operations
- Place/Space/Location
- Time

The process of arranging terms under facets is an iterative one. Terms may be arranged and rearranged until the most appropriate structure is determined. The approach taken for the pilot thesaurus combined top-down and bottom-up approaches, looking at both the fundamental facets as outlined in the facet analysis literature and the terms that were extracted from the *Handbook of Irish folklore* and other sources. Context was also considered when placing terms, for example in a biology thesaurus, fruit would be considered a reproductive organ. In the Pilot thesaurus of Irish folklore, it is considered a product.

Following initial groupings, review and analysis, the fundamental facets decided on for the pilot thesaurus were:

- Time
- Place/Space/Environment
- Products
- Activities
- Processes and Phenomena
- Events
- Agents
- Objects
- Materials
- Attributes and Properties
- Parts

These fundamental facets will be complemented by the facets of *Genre and Form* as well as *Abstract Concepts*.

It should be noted that facets in different thesauri covering another subject may be completely different. Facets should be considered in terms of the subject matter and what is most appropriate for the thesaurus in question.

The placement of many of the terms was obvious but some required additional thought and an expansion or readjustment of the fundamental facets as outlined above:

- The *Time* facet is an easy facet to populate and includes all terms relating to divisions of time such as the days, weeks, months, years, etc. It also contains divisions of historical and chronological time as well as seasons.
- Some thought went into the arrangement of rivers and other natural objects as well as cities and other types of urban landscape as distinct from individual buildings. The *Place/Space/Environment* facet contains all natural features and types of environment or landscape. All features which comprise a natural landscape are placed here and these include rivers, lakes and mountains. Man-made landscapes are placed here and include features of rural or arable landscapes such as orchards, pastures and gardens. Towns and cities are included as part of the urban landscape and environment as they are considered areas as a whole. These are distinct from the individual building structures, which are found in towns and cities and are placed under the *Objects* facet.

- Animals, fish and people were placed under the *Agents* facet as these were living creatures, which can perform actions and can have an effect on the environment around them. This category also includes supernatural beings and has the potential to expand to include all types of spirits, monsters and other mythical creatures. The *Agents* facet also includes other living organisms/entities such as plants and trees.
 - Other living organisms were originally located under a separate *Living Entities* facet. The decision was taken to include all living organisms, from people to mythical beings and plants under the one facet as it made more sense to keep all these living entities together. It is also arguable that, in folklore, some plants, trees and other such living entities have the potential to perform actions or have an effect on others.
 - As per its original definition, the *Agents* facet has the potential to expand to cover organisations.
 - The *Agents* facet can also include *Equipment* as per its original definition but as it was decided to include all living entities under *Agents*, different types of equipment were instead placed under the *Objects* facet as they are not living entities.
 - The *Patients* facet in the facet analysis literature was not employed in the pilot thesaurus. The objects of *operations* or *activities* in the pilot thesaurus have been listed either in the *Agents* facet or the *Objects* facet. An additional facet for the recipients of an action only added additional unnecessary complication.

- The *Products* facet contains terms relating to simple things or substances that are formed following an action or process and are produced for sale or consumption. These include food products, animal products, plant products, etc. While there may be some overlap with the *Objects* and *Materials* facets, in the context of the literature, these materials are referenced as products in support of the household so they have been retained as such in the thesaurus.

- The *Actions/Activities* facet as outlined by Aitchison *et al.* (1997) includes processes and operations. This has been revised into two separate facets in the pilot thesaurus:
 - The *Activities* facet primarily contains what are called *operations* in the facet analysis literature. These are external, transitive actions, usually carried out by *Agents*.
 - The *Processes and Phenomena* facet includes natural processes and phenomena. This includes naturally occurring process such as the weather, chemical processes such as fire, biological processes and phenomena such as human behaviour, animal behaviour and diseases. In the context of Irish Folklore, *fire* is considered an object. Nevertheless, *fire* will not sit easily in the *Object* facet and so has been included in the *Processes* facet. It can be used together with other concepts such as *celebrations* or *festivals of the dead*.

- As events are a large and significant aspect of human life and as they have an important role in folklore, a separate *Events* facet was created to outline the different types of events, festivals and rituals that exist or existed in Irish folklore and folk life. This assumes a narrower definition of *event* as a thing that happens and does not include activities, the things that people do, as a type of event. Some questions arose relating to the placement

of the term *meals*. They could be included as either regular events or as part of social activities and *foodways*. The term was eventually placed with *Events* as breakfast, lunch and dinner are things that happen. The term does not refer to the act of eating, which would be located in *foodways*. An associative relationship (RT) was then used to link the two concepts.

- The *Objects* facet contains all inanimate objects including natural objects such as planets and stars, man-made structures, equipment, furnishings, clothing and written documents. Buildings are considered man-made structures in the thesaurus and are placed under the *Objects* facet.
- The *Materials* facet contains basic and constituent substances, both organic and inorganic as well as traditional and supernatural elemental substances, which feature in folklore and folk tales. This includes rocks, wood, and the four elements. This category also includes *fuels*. In the context of contemporary Irish folklore today, this is an acceptable place to put fuels as most are natural substances such as coal and wood. If the term *nuclear fuels* was to be added, this would necessitate a revision of that arrangement.
- The *Attributes and Properties* facet contains terms relating to the properties, qualities or states of things. This includes terms such as hot and cold, productivity or fertility.
- The *Parts* facet contains terms relating to parts of *Agents* and *Objects*. These will include anatomical parts or systems as well as any object components.
- The *Genre/Form* facet contains terms relating to the main genres and forms of folklore found in Ireland and across the world. In the pilot thesaurus, these have been sourced from Alan Dundes, *The study of folklore* and will be expanded to include Carl von Sydow's *Kategorien der Prosa-Volksdichtung*.
- The *Abstract Concepts* facet contains terms relating to abstract concepts, ideas and disciplines, which are not within the scope of the thesaurus but which may be discussed in relation to folklore.

The initial analysis will be followed by further arrangement of the broad groupings into sub-facets and arrays.

Notation and citation order

The facets in the pilot thesaurus of Irish folklore are, in principle, ordered from general to specific. The citation order will be the reverse, from specific to general. The order is evident in the paper version of the thesaurus but is not evident in the online thesaurus as the thesaurus management software organises terms alphabetically. This issue could be solved with the use of notation. However, no notation is included in the pilot thesaurus as this is beyond the scope of the project.

Next stage of the vocabulary analysis

The next stage of the vocabulary analysis involved breaking down the facets into narrower divisions, using node labels to divide the facets into sub-facets or arrays and to organise them according to the characteristics of division. In a full thesaurus, arrays should be expanded as far as practicable to include all possible terms relevant to the subject. This will not be the case in the pilot thesaurus but will be undertaken should the pilot be expanded.

There are no fundamental sub-facets or fundamental arrays, which can be chosen. Instead, the grouping of sub-facets and arrays is determined based on the content and on what is deemed to be a suitable arrangement in the context of the thesaurus. Where possible, it is recommended to follow the principle of general-to-specific in the arrangement of arrays within a facet. The order of sibling concepts within an array is also determined based on the content, for example an array based on chronological time will be best arranged from the earliest to the most recent time rather than alphabetically.

Existing thesauri were consulted for their structure around overlapping content but, following the initial analysis, many of the terms and concepts fell naturally into place. A few examples have been outlined below:

- The *Time* facet was easy to arrange as it fell naturally into sub-facets. These included *divisions of time* and *historical periods*. *Divisions of time* were further divided into sub-facets such as days, months, etc., each containing their own arrays. *Historical periods* were also further divided into named historical periods and periods by historic time (twelfth century, etc.).

Time

<p>Seasons (by name) spring (season) summer autumn winter (by activity) harvest (season)</p>	<p>times of day dawn daytime dusk night-time days of the week Sunday Monday Tuesday Wednesday Thursday Friday Saturday</p>	<p>historical periods (by name) early Irish (pre–1200) prehistory protohistory Early Christian Ireland (400–800) Viking Ireland (800–1169) Norman Ireland (1169–1536) medieval Counter-Reformation (by historic time) twelfth century thirteenth century</p>
---	--	---

Sample of the Time facet divided into sub-facets and by characteristics of division

- The *Place/Space/Environment* facet was further divided into natural landscapes, man-made landscapes and supernatural or legendary places. These could be divided and arranged with more detail in an expanded thesaurus.

Place/Space/Environment		
natural landscapes	man-made landscapes	legendary and spiritual places
swamp	rural landscapes	fairy forts
bogs	pastures	hell
caves	fallow land	purgatory
holes	orchards	
underground passages	gardens	
hills		
woods	urban landscapes	
forests	towns	
	cities	

Sample of the Place/Space/Environment facet divided into sub-facets.

- The *Agents* facet fell naturally into people, animals, other living organisms and supernatural beings following the initial analysis. These were further organised by sub-facets and characteristics of division. People were divided primarily by principles of division, mainly those noted in the *Handbook of Irish folklore*. These include age and occupation. Animals were also organised according to the following characteristics of division: age, species and function. Again, these could be divided and arranged into more detail in an expanded thesaurus.

Agents		
People	Agents	supernatural or legendary beings
(by age)	animals	fairies
children	(by age)	evil spirits
adults	newborn	saints
(by occupation)	young	banshees
smiths	mature	
hunters	(by function)	
farmers	livestock	
shoemakers	poultry	
dressmakers	dairy animals	
	working animals	
	pets	
	pests	
	(by species)	
	mammals	
	birds	
	fish	

Sample of the Agents facet divided into sub-facets and by characteristics of division

The remaining facets were organised in this way, using node labels to organise the sub-facets and arrays. Please see the completed pilot thesaurus for more examples. It is available at <http://apps.dri.ie/motif/>.

PILOT THESAURUS—CREATING RELATIONSHIPS AND ADDING NOTES

Following the creation of the equivalence and hierarchical relationships, the terms were input into the open source thesaurus management software, TemaTres.¹⁴ Once all terms were present in the software, associative relationships were then added.

Many of the associative relationships were recorded throughout the selection and analysis process. Some examples of associative relationships from the pilot thesaurus include:

Type of relationship	Term 1	Term 2
Agents / Activities	fishing RT fishermen RT fishing crews	fishermen RT fishing RT fishing crews
Agents / Activities	supernatural beings RT supernatural practices	supernatural practices RT supernatural beings
Materials / Products	dung RT fuels	fuels RT dung
Materials / Products	fabric RT clothing	clothing RT fabric
Events / Activities	meals RT foodways	foodways RT meals
Processes / Events	bonfires RT festivals of the dead	festivals of the dead RT bonfires
Parts / Objects	oars RT boats	boats RT oars
Parts / Agents	fleeces RT sheep	sheep RT fleeces

Adding notes

The scope notes recorded during the selection and analysis stages were then added into the software. These scope notes were primarily for the top-level facets.

The pilot thesaurus does not contain any notes relating to the history of the term within the thesaurus as this is outside the scope of the pilot. Creation and modification dates were added by the software automatically.

As no notation is included in the pilot thesaurus, no notation was added. This may not be the case for a more complete thesaurus.

¹⁴ <http://www.vocabularyserver.com/>

Step 4: creating hierarchical and associative relationships and adding notes

Once the hierarchical relationships have been created using facet analysis, node labels and arrays, associative relationships can then be added. This is the process recommended by *ISO 25964-1*. The most useful associative relationships are those that exist between hierarchies and these are easier to create when all hierarchies have been inputted into the thesaurus management software (International Organization for Standardization 2011).

As noted in the section on associative relationships, Hedden goes into greater detail on creating associative relationships and outlines the most common types of relationships across hierarchies, including Agents/Processes, Objects/Properties, Parts/Whole, etc. (Hedden 2010a) Depending on the types of fundamental facets used in a thesaurus, the most important relationships may be slightly different.

Multilingual thesauri

IFLA's *Guidelines for multilingual thesauri* and *ISO 25964-1* discuss the three approaches to constructing multilingual thesauri: building a new thesaurus, combining existing thesauri and translating an existing thesaurus. When building a thesaurus from the ground up, the creators may choose to start with one source language or work with more than one language, the source and the target languages from the beginning. When constructing a thesaurus from existing thesauri, the creators may merge existing thesauri or link to existing thesauri. The translation of an existing thesaurus is not considered as part of the IFLA guidelines as the language of the existing thesaurus is treated as the dominant language in this approach. This is not appropriate when constructing multilingual thesauri where all languages should be treated equally (IFLA Working Group on Guidelines for Multilingual Thesauri 2009; International Organization for Standardization 2011). *ISO 25964-1* considers translation a cost-effective approach to the construction of multilingual thesauri but also observes the caveat that the languages are not considered equal in this approach (International Organization for Standardization 2011).

The decision to build a new thesaurus or to combine existing ones will depend on the existing thesauri and resources that are available. Many of the issues encountered in both approaches are similar to those found in monolingual thesauri and they revolve primarily around concepts and terms, equivalence, structure and semantics.

Concepts and terms: As mentioned in a previous section, the rigorous distinction between terms and concepts as found in *ISO 25964-1* adds greater clarity and equality to the construction of multilingual thesauri. This is easily shown in the below diagrams where, previously, the second or target language would have been treated as a subordinate language. This is not true where the distinction between terms and concepts ensures that languages are considered equal in the construction.

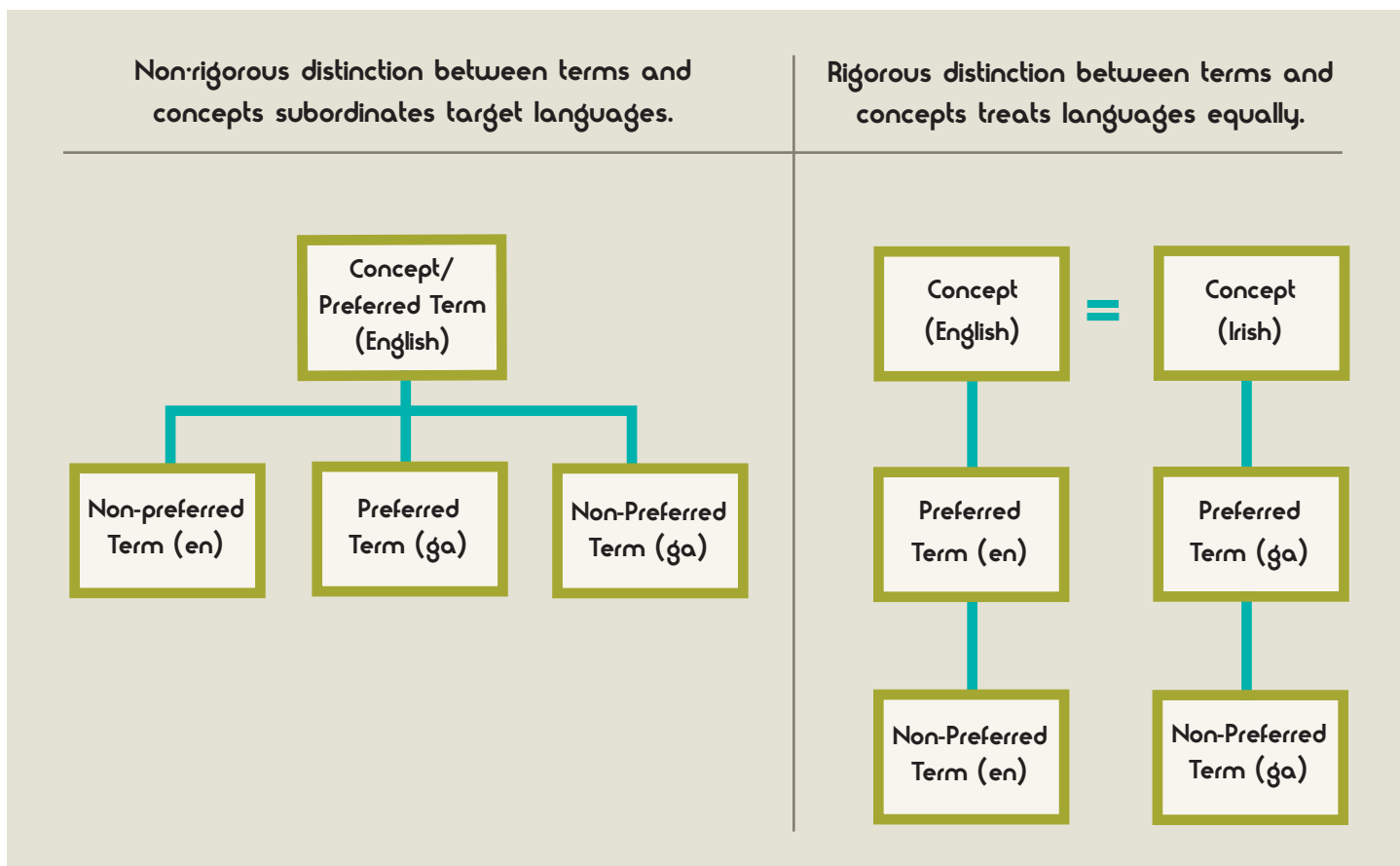


Fig.19. Treatment of languages in a thesaurus.

Equivalence: In a multilingual thesaurus, equivalence relationships exist between concepts across languages but they do not use any explicit relationship terms to express this. In the above diagram, the concept in English and the concept in Irish are considered exactly equivalent, that is both concepts cover the same scope and meaning in both languages. This is not always the case and examples of inexact, partial and non-equivalent concepts will appear when constructing a multilingual thesaurus. Single to multiple equivalencies can also exist between languages.

More examples of equivalencies and how to manage them are given in *ISO 25964-1*, *IFLA's Guidelines for multilingual thesauri*, *Broughton's Essential thesaurus construction* and *Aitchison, Gilchrist and Bawden's Thesaurus construction and use: A practical manual*.¹⁵

¹⁵ For a comprehensive discussion of equivalencies and translation issues, see Nykyri (2010). In practice, translation machines may be used for bulk processing followed by manual post processing by a translator.

Equivalence	Source language	Target language	Note
<p>Exact: Concepts match exactly</p>	en: fishing lore	ga: seanchas iascaireachta	The two concepts have exactly the same meaning in Irish and English
<p>Inexact: Concepts are not exactly identical but very close in meaning</p>	en: historic settlements	fr: site de peuplement	The two concepts can be treated as identical.
<p>Partial: One of the concepts is narrower or broader in scope than the other</p>	de: Wissenschaft	en: science	Wissenschaft is broader in scope than science. Here, a scope note would be needed to define the scope of the concepts. Alternatively, two terms in the target language may be considered (single-to-many equivalence)
<p>Single-to-many: A concept in the source language can only be expressed by two or more concepts in the target language</p>	en: solar heating	fr: chauffage + énergie solaire	Two terms are needed to express the same concept in a different language. Alternatively, the concept in the source language may be split, for example heating + solar energy.
<p>Non-equivalence: There is no equivalent concept in the target language.</p>	ga: céilí	en: ceilidh	The term may be borrowed from the source language or a combined term created in the target language.

Fig. 20. Equivalencies across languages.

Structure: Multilingual thesauri can have symmetrical or non-symmetrical structures across language. However, a completely symmetrical structure will only exist where all concepts are equivalents across the thesauri and there are equal numbers of preferred terms in both languages. This is unlikely in practice given the many different types of equivalences across languages. It is not recommended that a thesaurus force equivalencies for the sake of a symmetrical structure as this would result in the subordination of the target language to the structures of the source language and lead to inexact and illogical relationship structures in the target language. Instead, inexact, partial and other equivalencies should be considered. Non-symmetrical hierarchies may exist across languages depending on the scope and meaning of each concept and the extent of non-exact equivalencies such as the one given above. Here, non-symmetrical associative relationships should also be considered.

Semantics: Similar to a monolingual thesaurus, the selection of terms will depend on the grammatical form preferred in each language. Qualifiers may need to be introduced not only within but also between languages where necessary. The treatment of compound terms will need to be considered and, generally, where a compound term is split in one language, it is also split in the other where practicable. Where inexact, partial and other non-exact equivalencies exist, scope notes should be added.

Mapping thesauri

These guidelines do not intend to address mapping thesauri to other vocabularies in depth. In brief, there are three models by which mapping can be undertaken: the structural unity model where vocabularies are symmetrical, which is an approach suitable for a multilingual thesaurus; the directly linked model where multiple vocabularies are each matched to the other; the hub model, in which one thesaurus acts as the central hub to which all other vocabularies are mapped or which maps to all other vocabularies (or both). Mappings to consider are equivalence, hierarchical and associative mappings. As Hedden notes, equivalence mappings across vocabularies do not just occur between terms that are exactly the same. They can occur between broader and narrower concepts across vocabularies, depending upon the direction of the mapping (Hedden 2010a).

The Marine Metadata Interoperability Project (Graybeal 2011) outlines a number of reasons for wanting to map one vocabulary to another. These include identifying relationships and enhancing the search capabilities of an interface as the vocabularies used are now interoperable that is terms from separate vocabularies are interchangeable and a search for one term will bring up content indexed with the equivalent term from another vocabulary. This is useful if an indexing vocabulary is different to the public search taxonomy, if the vocabulary is to be marketed to both specialised and lay people, and in federated search (Hedden 2010a). Other useful mappings would be the inclusion of search terms or folksonomies into the controlled vocabulary as non-preferred terms.

However, one of the main reasons given for mapping vocabularies is not one that produces immediate value but is instead will have long-term benefits as part of the Semantic Web. If vocabularies are published and mapped in Semantic Web standards, this will allow for better and more effective services as more and more resources are brought into the networked environment. This will be discussed in more detail in the next section.

The Marine Metadata Interoperability Project also outlines a number of tools which can help in the mapping process. These are tables, the Resource Description Framework (RDF) and the Simple Knowledge Organisation System (SKOS), ontologies and concept maps (Graybeal 2011). Hedden provides examples of commercial tools such as WordMap¹⁶ and Synaptica,¹⁷ which can assist with the mapping of vocabularies as part of their other features. If the expertise is available in-house, a custom script can also be developed that will compare the vocabularies (Hedden 2010b).

¹⁶ <http://www.wordmap.com/> (13 December 2013)

¹⁷ <http://www.synaptica.com/> (22 November 2013).

Thesauri and the Semantic Web

Semantic Web technologies have seen considerable uptake in the fields of science, medicine, business, government, IT and eTourism. These technologies are being used to improve search capabilities, the integration of data as well as content management and discovery. Thesauri have been used as tools to improve indexing, search and retrieval for many decades and, given the similarity of purpose, it comes as no surprise that some Linked Data technologies and standards¹⁸ have been developed to support the use of controlled vocabularies such as thesauri. Among the technologies which relate to thesauri are SKOS and ontologies.

Thesauri and SKOS

Simple Knowledge Organisation System (SKOS)¹⁹

SKOS is a data model and vocabulary expressed in the Resource Description Framework Schema (RDFS), the Web Ontology Language (OWL), and Dublin Core Terms designed to make controlled vocabularies such as thesauri, classification schemes, taxonomies and subject heading systems available on the Web with the ability to express hierarchical, associative and other relationships. A database represented in SKOS is the Semantic Web version of a subject authority controlled list or vocabulary where Uniform Resource Identifiers (URIs) are used to provide unique names for the concepts in a thesaurus.²⁰ A number of online thesauri have now been made available as linked data using SKOS. These include the Humanities and Social Science Electronic Thesaurus (HASSET),²¹ AGROVOC²² and others.

The main advantage of representing a thesaurus in SKOS is that the thesaurus will then be available online, in a widely recognised format that can be easily reused by other organisations, institutions and companies in their own applications, retrieval and indexing systems or in any way that they find useful. This level of interoperability between systems and applications is also useful internally if a system migration is to take place, or if a company uses many applications across different platforms. SKOS is a W3C Semantic Web standard, which will ensure interoperability of data and collections as

¹⁸ For more information on linked data, please see Berners-Lee (2006).

¹⁹ <http://www.w3.org/2009/08/skos-reference/skos.html#> (24 November 2013); <http://www.w3.org/TR/skos-reference/skos-xl.html#> (24 November 2013).

²⁰ To ensure stability in the Semantic Web, it is important that URIs don't change—that they are persistent. For more information on URIs, see Berners-Lee (1998).

²¹ <http://data-archive.ac.uk/find/hasset-thesaurus/skos-hasset> (24 November 2013).

²² <http://aims.fao.org/node/16917/> (24 November 2013).

they are brought into a networked environment. Other benefits of publishing and linking authority data include improved search, the potential to enhance discovery systems and integrate data from multiple sources, disambiguation and the addition of extra value through the contextualisation of resources. Many open source and commercial thesaurus management software now support SKOS.

As Clarke and Zeng note, the *ISO 25964* data model was developed at the same time as the SKOS data model and there was good communication between the working groups. Consequently, the models are by and large compatible, ensuring that vocabularies published in SKOS are broadly compliant with *ISO 25964* (Clarke and Zeng 2012). A mapping between the *ISO 25964* data model and the SKOS data model has been developed by the ISO TC46/SC9/WG8 working group for the *ISO 25964* standard about thesauri and Antoine Isaac, co-editor of the SKOS recommendations and MADS-SKOS mappings.²³

Thesauri and ontologies

Ontologies and thesauri have two different purposes. As stated in the introduction, the main function of a thesaurus is to support information retrieval. An ontology aims to structure and represent knowledge about a particular domain and to share this knowledge with others by providing a shared vocabulary for talking about that domain. Gruber originally defined an ontology as an explicit, formal specification of a conceptualisation, where a conceptualisation is 'an abstract, simplified view of the world that we wish to represent for some purpose'. An ontology explicitly defines the entities, and relationships between them, in this conceptualisation (model) of a knowledge domain and expresses these in a formal language that can be read, understood and operated on by computers. The main components of ontologies are classes, sub-classes and their properties, which include relationships and attributes, and the specific instances of these classes and sub-classes (Gruber 1995). As SKOS is used to represent thesauri and other controlled vocabularies on the Semantic Web, ontologies are formally represented using the data models RDFS and OWL.

Ontologies are used where there is a need to express more complex and customised relationships than 'broader than', 'narrower than', 'IsA' or 'IsPartOf'. These can include 'born in', 'located in', 'influenced by', etc. Ontologies are used to make assertions about the entities in a domain, be they people, things or processes in such a way that logical inferences can then be made about them. This allows for more sophisticated and automated search and querying capabilities. Stewart notes that while this is not a huge

²³ <http://www.niso.org/schemas/iso25964/#skos> (24 November 2013).

concern at the moment, both software systems and user demands and expectations are becoming more sophisticated (Stewart 2011). As the Semantic Web moves forward, these advanced capabilities will become more and more necessary and are being used to a limited extent today.

As *ISO 25964-2* points out, thesauri and ontologies can work well together and it gives the example of the Europeana Data Model (EDM)²⁴ which uses ontologies such as the Friend of a Friend (FOAF) ontology and metadata schema such as Dublin Core while recommending specific controlled vocabularies for the content. This combines both inferencing capabilities with the search and information retrieval capabilities of a thesaurus. A thesaurus may also be reengineered into ontology although this is not guaranteed to be effective and a cost benefit analysis should be considered (International Organization for Standardization 2013). In general, the more appropriate approach for thesauri and other controlled vocabularies is to express them formally in SKOS and publish to the Semantic Web.

²⁴ <http://pro.europeana.eu/edm-documentation> (24 November 2013).

Conclusion

These guidelines were produced to provide a comprehensive introduction to and advice on how to construct thesauri following international standards and best practice. A pilot thesaurus on Irish folklore was constructed as an illustrative example and proof of concept for the guidelines. Thesauri are valuable tools for search and retrieval and the above document covers the basics of thesaurus construction from planning the thesaurus through a discussion of the basic elements of a thesaurus and a detailed description of the process of facet analysis as employed throughout the pilot.

The idea for the project arose following the *Digital archiving in Ireland: National survey of the humanities and social sciences* DRI report, which identified a number of problematic areas in the indexing of Irish-language names, both personal names and place names, as well a large number of either custom-made vocabularies or international vocabularies adapted for use with Irish content (O'Carroll and Webb 2012). It is hoped that these guidelines have offered advice on how to bridge this vocabulary gap and ensure that information professionals have the advice they need to improve their own data procedures by adhering to international standards and best practices.

The guidelines and pilot thesaurus have now been reviewed, completed and published online with accompanying documentation.²⁵ By providing guidelines and a usable pilot example, the project team hopes to encourage the use of the guidelines in Ireland and elsewhere. Future work following on from the MoTIF project includes the creation of a more comprehensive thesaurus of Irish folklore. The work on this has begun with a widening scope of vocabulary resources as well as consultation with subject experts in the area of Irish folklore.

Other potential work could include mapping the comprehensive thesaurus to other vocabularies as well as the development of a multilingual thesaurus in both English and Irish.

Much work has gone into the development of the SKOS, a Semantic Web specification designed to support the use of thesauri, taxonomies and controlled vocabularies on the Web (World Wide Web Consortium 2012) Many prominent thesauri such as *HASSET* and *AGROVOC* are now published as linked data^{26 27} while The Getty Institute has plans

²⁵ <http://apps.dri.ie/motif/> (24 November 2013).

²⁶ <http://data-archive.ac.uk/find/hasset-thesaurus/skos-hasset> (24 November 2013).

²⁷ <http://aims.fao.org/standards/agrovoc/linked-open-data> (24 November 2013).

to publish all their vocabularies to the LOD cloud (Harpring n.d.). A logical step for any thesaurus would be its representation in SKOS and publication to the Linked Data cloud. Publishing the thesaurus of Irish folklore, in a widely recognised format that can be easily reused by other organisations, institutions and companies in their own applications, retrieval and indexing systems, provides the greatest potential for reuse among cultural heritage institutions both in Ireland and abroad into the future.

Bibliography

- Aitchison, J., Gilchrist, A. and Bawden, D. 1997 *Thesaurus construction and use : a practical manual*, 3rd edn. London. Aslib.
- Berners-Lee, T. 1998. Hypertext style: cool URIs don't change, available at: <http://www.w3.org/Provider/Style/URI> (last accessed 22 November 2013).
- Berners-Lee, T. 2006 Linked data design issues, available at: <http://www.w3.org/DesignIssues/LinkedData> (22 November 2013).
- Broughton, V. 2006a *Essential thesaurus construction*. London. Facet Publishing.
- Broughton, V. 2006b The need for a faceted classification as the basis of all methods of information retrieval. *Aslib Proceedings: New Information Perspectives*, 58(1/2), 49–72, (doi:10.1108/00012530610648671).
- Clarke, S. and Zeng, M. 2012 From ISO 2788 to ISO 25964: the evolution of thesaurus standards towards interoperability and data modeling. *Information Standards Quarterly* 24(1), 20–26.
- Doane, M. 2011. Taxonomy governance checklist: a short guide to helping companies create and manage a taxonomy. Term Management, LLC, available at: <http://termmanagement.files.wordpress.com/2011/07/termmanagementllc-taxonomygovernancechecklist.pdf> (22 November 2013).
- Dundes, A. (ed.) 1965 *The study of folklore*. London. Prentice Hall.
- Folklore of Ireland Society. 2012 *Béaloides: the journal of the Folklore of Ireland Society*.
- Garshol, L.M. 2004. Metadata? Thesauri? Taxonomies? Topic maps! *Ontopia*, available at: <http://www.ontopia.net/topicmaps/materials/tm-vs-thesauri.html> (24 July 2013).
- Gilchrist, A. 2003 Thesauri, taxonomies and ontologies—an etymological note. *Journal of Documentation* 59(1), 7–18 (doi:10.1108/00220410310457984).
- Graybeal, J. 2011 Mapping among controlled vocabularies. *The MMI Guides: Navigating the World of Marine Metadata*, available at: <https://marinemetadata.org/guides/vocabs/cvchooseimplement/cvmap> (23 September 2013).
- Gruber, T.R. 1995 Towards principles for the design of ontologies used for knowledge sharing. *International Journal of Human-Computer Studies* 43(5-6), 907–28 (doi:<http://dx.doi.org/10.1006/ijhc.1995.1081>).
- Harpring, P. 2009 *Art & Architecture Thesaurus: an in-depth look at the AAT*, revised version June 2009, available at: http://www.getty.edu/research/tools/vocabularies/aat_in_depth.pdf (22 November 2013).

- Harpring, P. n.d. *Getty vocabularies and linked data*, revised version 17 June 2013, available at http://www.getty.edu/research/tools/vocabularies/Linked_Data_Getty_Vocabularies.pdf (22 November 2013)
- Hedden, H. 2010a *The accidental taxonomist*. Medford, New Jersey. Information Today, Inc.
- Hedden, H. 2010b *Combining controlled vocabularies*, available at: <http://www.hedden-information.com/Combining%20Controlled%20Vocabularies.pdf> (22 November 2013)
- Hjørland, B. 2013 Facet analysis: the logical approach to knowledge organization, *Information Processing & Management* 49(2), 545–57 (doi:<http://dx.doi.org/10.1016/j.ipm.2012.10.001>).
- IFLA Working Group on Guidelines for Multilingual Thesauri. 2009 *Guidelines for multilingual thesauri*. The Hague. International Federation of Library Associations and Institutions. Available at: <http://archive.ifla.org/VII/s29/pubs/Profrep115.pdf> (22 November 2013).
- International Organization for Standardization 2011 ISO 25964-1:2011, information and documentation. Thesauri and interoperability with other vocabularies. Part 1: thesauri for information retrieval. Geneva. International Organization for Standardization.
- International Organization for Standardization 2013 ISO 25964-2:2013, information and documentation. Thesauri and interoperability with other vocabularies. Part 2: interoperability with other vocabularies. Geneva. International Organization for Standardization.
- La Barre, K. 2012 Traditions of facet theory, or a garden of forking paths. In *Facets of knowledge organization : proceedings of the ISKO UK Second Biennial Conference, 4th-5th July, 2011, London*, pp. 95–105. Bingley, UK. Emerald.
- Leise, F. and Fast, K. 2002 What is a controlled vocabulary? *Boxes and Arrows*, available at <http://boxesandarrows.com/what-is-a-controlled-vocabulary/> (22 November 2013).
- Nykyri, S. 2010 *Equivalence and translation strategies in multilingual thesaurus construction*. Åbo. Åbo Akademi University Press, available at: http://www.doria.fi/bitstream/handle/10024/59432/nykyri_susanna.pdf?sequence=3 (22 November 2013)
- Ó Súilleabháin, S. 1942 *A handbook of Irish folklore*. Dublin. Educational Company of Ireland Ltd for the Folklore of Ireland Society.
- O’Carroll, A. and Webb, S. 2012 Digital archiving in Ireland: national survey of the humanities and social sciences. Maynooth. National University of Ireland.
- Pidcock, W. 2003 What are the differences between a vocabulary, a taxonomy, a thesaurus, an ontology, and a meta-model? *Metamodel.com*, available at: <http://web.archive.org/web/20050114010349/http://www.metamodel.com/article.php?story=20030115211223271> (23 July 2013).

Stewart, D.L. 2011 Building enterprise taxonomies: a controlled vocabulary primer, 2nd edn. Lexington, KY. Mokita Press.

Taxonomies & Controlled Vocabularies Special Interest Group of the American Society for Indexing. n.d. About taxonomies & controlled vocabularies, available at: <http://www.taxonomies-sig.org/about.htm> (24 July 2013).

Will, L. 2013 Rigorous facet analysis as the basis for constructing knowledge organisation systems (KOS) of all kinds. In *Knowledge organisation—pushing the boundaries*, ISKO UK biennial conference, 8-9 July 2013, London. International Society for Knowledge Organisation.

World Wide Web Consortium 2012 SKOS Simple Knowledge Organization System, available at <http://www.w3.org/2004/02/skos/> (22 October 2013).

Appendices

Appendix I: Initial list of terms

abstinence	butchering	cow-houses
ailments	cabbages	cows
air (element)	calves	crews
air (gas)	candles	crop rotation
alcoholic beverages	care of livestock	crustaceans
alcoholic drinks	Catholic	currachs
alliance	cats	dairy animals
amulets	cattle	dawn
animal behaviour	cattle lore	daytime
animal lore	cereals	deer
appetite	charms (object)	digging
asses	charms (verbal art)	diseases
associations	chickens	divination
autumn	children	dogs
baking	clay	domestic animals
banshees	cleanliness	domestic birds
barley	cloth	domestic hygiene
beef	cloth manufacture	donkeys
bees	clouds	drainage
beverages	coal	dress
bewitchment	cocks	dressmaking
blindness	coffee	drifters (fishing boats)
bog-deal splinters	cold	drills
bogs	complaints	drinking
bonfires	condiments	drinks
bracelet	cooking	drought (weather)
bread	corn stacks	dry
breeding	corn stands	ducks
buildings	cots	dung
bulls	Counter-Reformation	dusk

dying (cloth)	fodder	hay
early Irish (pre-1200)	folk art	hearths
earth (element)	folk belief	hell
earth (soil)	folk costume	hens
east	folk dance	herb-books
eating	folk drama	herding
eggs	folk medicine	hills
elf-shot	folk music	holy wells
embroidery	folk poetry	honey
epitaphs	folk religion	horses
evil eye	folk songs	hot
evil spirits	folk speech	household economics
eye-ailments	folk tales	household fires
fabric	food preservation	household vessels
fairies	foods	households
fairy forts	forests	houses
fairy people	four elements	hunger
fairy tales	fowling	hunting
farm implements	foxes	hurling
farmers	Friday	hygiene
fasting	frost	insects
Feast of St Martin	fruit	irrigation
feathers	fungi	jennets
fertilisation (agricultural)	fur	jokes
fertilisers	game	kinship
fertility	gardens	knitting
fire (element)	geese	knives
fire-fuel	goats	lacemaking
fireplaces	grace	lakes
fire-seed	grace at meals	lambs
fishermen	habits of animals	lamps
fishing	hair	land rotation
fishing crews	hair-cutting	landmarks (natural features)
fishing lore	hard-udder/blast	landmarks (structures)
flax	hares	lanterns
fleece	harvest (season)	laying
floors	harvesting	leather
flowering plants	hatching	

legends	north	proverbs
licences	oars	purgatory
livestock	oats	quilting
local cuisine	occupations	rabbits
local foods	oil lights	rain
looms	onions	rain lore
lore of animals	oral epics	raising the wind
lore of cattle	orchards	rays
lore of food	other celestial objects	remedies
lowering the wind	other growths	ricks
luxury products	other heavenly bodies	rickstands
management of livestock	other types of fuel	ridges
manures	outhouses	ring-forts
masonry	pastures	rites
mature	peculiarities of animals	rituals
May Day	pelts	rivers
meals	permits	rocks
meat	personal hygiene	roosters
medieval	pests	root vegetables
milk	pets	root-crops
milk disorders	pig farming	ropes
milking	piggeries	rudders
milling	pigs	rushlights
modern boats	pike	rye
molluscs	plaice	saints
Monday	planets	salmon
monuments	plants	Saturday
mountains	ploughing	sayings
mules	poaching	seals
mythical places	pollock	seeds
mythology	porpoises	seine-boats
myths	post-Tridentine Catholicism	seiners
nesting	potatoes	shaving
nets	poultry	sheep
newborn	powder	shrubs
night fires	prayers	signs (portents)
night-time	productivity	skies
noise	prophecies	skin

slings	taboos	washing
smithing	tabus	water (element)
smiths	tailors	water (liquid)
snares	tails	waves
snow	tea	Wednesday
snuff	teasing	weeds
solar folklore	textiles	wells
solar system	table for meals, the	wells with special powers
sole	thirst	west
sources (water)	thirteenth century	wheat
south	threshing	whiting
spades	Thursday	wickerwork
spiders	tides	wild birds
spinning	tobacco	wind lore
spring (season)	trades	winds
springs (water)	traditional music	winnowing
St Stephen's Day	traditions	winter
stars	traps	witchcraft
stones	trawlers	wolves
storms/high winds	treatment (cloth)	wood (fuel)
straw	trees	woods
streams	trout	wool (fibre)
summer	Tuesday	wool (yarn)
Sunday	turf	working animals
sunfish	turkeys	worms
superstition	twelfth century	young
swamp	vegetables	
tables	vernacular architecture	

Appendix II: Stage 1 facet analysis

Genre/Form	taboos	Tuesday
animal lore	traditional music	twelfth century
belief	traditions	Wednesday
charms (verbal arts)	verbal arts	winter
epitaphs	vernacular architecture	
fairy tales	wind lore	Place / Space /
fishing lore		Environment
folk art	Abstract Entities	pastures
folk belief	and Concepts	bogs
folk costume	religion	fairy forts
folk dance	Catholicism	forests
folk drama	economics	gardens
folk medicine	household economics	hell
folk music	noise	lakes
folk poetry	post-Tridentine Catholicism	landmarks
folk religion	sound	landscapes
folk songs		mountains
folk speech	Time	orchards
folk tales	autumn	purgatory
food lore	Counter-Reformation	rivers
Irish folklore	dawn	springs
jokes	daytime	swamps
legends	dusk	
material culture	early Irish (pre-1200)	Products
music	Friday	alcoholic drinks
mythology	harvest (season)	barley
myths	medieval	beef
oral epics	Monday	bread
prayers	night-time	cabbages
prophecies	Saturday	cereals
proverbs	spring (season)	coffee
rain lore	summer	condiments
signs (portents)	Sunday	drinks
solar folklore	thirteenth century	dung
superstition	Thursday	eggs

fodder
fruits
honey
leather
linen
local foods
luxury products
meat
medical products
milk
oats
onions
pelts
plant products
potatoes
remedies
root vegetables
rye
snuff
tea
textiles
tobacco
vegetables
wheat
wool (yarn)

Activities

abstinence
agriculture
amusements
baking
breeding
butchering
carding
cooking
crop rotation
digging
divination

domestic hygiene
drainage
drinking
eating
embroidery
evil eye
fasting
fertilisation
fishing
food preservation
fowling
gambling
game hunting
hair-cutting
harvesting
herding
hunting
hurling
irrigation
knitting
lacemaking
lowering the wind
magic tricks
masonry
milking
milling
needlework
personal hygiene
pig farming
ploughing
poaching
prayers at meals
quilting
raising the wind
shaving
smithing
spinning
table for meals

teasing
threshing
washing
wickerwork
winnowing
witchcraft

Processes and Phenomena

animal diseases
appetite
blindness
bonfires
breeding
clouds
diseases
drought (weather)
elf-shot
eye ailments
fire
frost
hard udder
hatching
high winds
household fires
hunger
laying
milk disorders
nesting
night fires
rain
snow
storms
thirst
tides
unnatural phenomena
waves
winds

Events

All Soul's Day
breakfast
carnivals
dinner
Easter
exhibitions
Feast of St Martin
festivals of the dead
Halloween
May Day
meals
rites
rituals
saints' days
Samhain
Shrove Tuesday
St Stephen's Day
wedding feasts

Agents

adults
amphibians
animals
banshees
bees
bulls
calves
cats
cattle
chickens
children
cocks
cows
crustaceans
dairy animals
deer
dogs

domestic animals
domestic birds
donkeys
ducks
evil spirits
fairies
farmers
fish
fishermen
fishing crews
flax (plant)
foxes
freshwater fish
fungi
game
geese
goats
hares
hens
horses
households
hungry grass
insects
jennets
lambs
livestock
mature animals
medicinal plants
molluscs
mules
newborn animals
people
pests
pets
pigs
pike
plaice
plants

pollock
porpoises
poultry
rabbits
rays
reptiles
rodents
saints
salmon
saltwater fish
seals
sheep
shrubs
smiths
sole
spiders
sunfish
tailors
trees
trout
turkeys
weeds
whiting
wild animals
wild birds
wolves
worms

Objects

amulets
animal housing
bog-deal splinters
bracelets
buildings
candles
charms (objects)
clothing
corn stacks

cots
cow-houses
cups
currachs
dresses
drifters (fishing boats)
drills
farming equipment
fettors
fishing boats
herb books
holy wells
houses
kilts
knives (utensils)
knives (weapons)
landmarks (man-made structures)
lanterns
licenses
looms
modern boats
monuments
muzzles
nets
oil lights
outhouses
permits
piggeries
pitchers
planets
plates
powder
ridges
ringforts
ropes
rushlights
seiners

shebeens
skies
slings
snares
solar system
spades
spancels
stars
tables
traps
trawlers
utensils
vessels
wells
wells with special powers

Materials

air (element)
air (gas)
clay
coal
earth (element)
earth (soil)
fertilisers
fire (element)
fire-seed
fuels
hay
rocks
seeds
straw
turf
water (element)
water (liquid)
wood (fuel)

Attributes and Properties

Catholic
dry
east
fertility
north
productivity
south
west

Parts and Components

feathers
fireplaces
fleece
floors
fur
hair
hearths
oars
rudders
skin
tails
wool (fibres)

Appendix III: Pilot thesaurus of Irish folklore alphabetical display

abstinence

TT: Activities

BT: food consumption

accessories

TT: Objects

BT: clothing and accessories

NT: amulets

NT: bracelets

NT: charms (objects)

adults

TT: Agents

BT: people

agricultural structures

TT: Objects

BT: man-made structures

NT: corn stacks

NT: ridges

agriculture

TT: Activities

RT: farmers

BT: economic activities

NT: animal husbandry

NT: crop cultivation

NT: land management

ailments

USE: diseases

air (element)

TT: Materials

BT: classical elements

air (gas)

TT: Materials

BT: inorganic materials

alcoholic beverages

USE: alcoholic drinks

alcoholic drinks

TT: Products

BT: drinks

UF: alcoholic beverages

All Soul's Day

TT: Events

BT: feast days and religious holidays

amphibians

TT: Agents

BT: animals

amulets

TT: Objects

BT: accessories

amusements

TT: Activities

BT: entertainment and recreational activities

NT: magic tricks

animal behaviour

USE: animal processes and behaviour

animal control equipment

TT: Objects

RT: animals

BT: equipment

NT: fetters

NT: muzzles (equipment)

NT: spancels

animal diseases

TT: Processes and Phenomena

RT: animals

BT: diseases

NT: eye ailments

NT: milk disorders

animal foodstuffs

- TT:** Products
- RT:** animals
- BT:** food products
- NT:** fodder

animal housing

- TT:** Objects
- RT:** animals
- BT:** farm buildings
- NT:** cow-houses
- NT:** piggeries

animal husbandry

- TT:** Activities
- RT:** animals
- BT:** agriculture
- UF:** *care of animals*
- UF:** *management of animals*

animal lore

- TT:** Genre
- RT:** animals
- BT:** Genre
- UF:** *animals, lore of*
- UF:** *lore of animals*

animal processes and behaviour

- TT:** Processes and Phenomena
- RT:** animals
- BT:** biological processes
- UF:** animal behaviour
- UF:** *habits of animals*
- UF:** *peculiarities of animal*

animal products

- TT:** Products
- RT:** animals
- BT:** Products
- NT:** dairy products
- NT:** hides and skins
- NT:** hive products
- NT:** meat

animals

- TT:** Agents
- RT:** animal control equipment
- RT:** animal foodstuffs
- RT:** animal housing
- RT:** animal husbandry
- RT:** animal lore
- RT:** animal processes and behaviour
- RT:** animal products
- RT:** animal diseases
- BT:** Agents

animals, lore of

- USE:** animal lore

appetite

- TT:** Processes and Phenomena
- BT:** biological processes

Arabian folklore

- TT:** Genre

asses

- USE:** donkeys

autumn

- TT:** Time
- RT:** harvest festivals
- RT:** harvesting
- BT:** seasons

baking

- TT:** Activities
- BT:** food production
- RT:** bread

banshees

- TT:** Agents
- BT:** supernatural and
legendary beings

barley

- TT:** Products
- BT:** cereals

beef

- TT:** Products
- RT:** cattle
- BT:** meat

bees
TT: Agents
RT: honey
RT: hive products
BT: insects

belief
TT: Genre
RT: religion
BT: Genre
NT: folk belief
NT: folk religion
NT: mythology

beverages
USE: drinks

bewitchment
USE: witchcraft

biological processes
TT: Processes and Phenomena
BT: Processes and Phenomena
NT: human processes and behaviour
NT: animal processes and behaviour
NT: diseases
NT: appetite
NT: hunger
NT: thirst

biological properties
TT: Attributes and Properties
BT: Attributes and Properties
NT: fertility

birds
TT: Agents
BT: animals
NT: chickens
NT: ducks
NT: geese
NT: turkeys

blast (milk disorder)
USE: milk disorders

blindness
TT: Processes and Phenomena
BT: eye ailments

boat parts
TT: Parts and Components
RT: fishing boats
BT: object components
NT: oars
NT: rudders

bog-deal splinters
TT: Objects
BT: lighting equipment

bogs
TT: Place/Space/Environment
BT: geographical features

bonfires
TT: Processes and Phenomena
BT: fire

bracelets
TT: Objects
BT: accessories

bread
TT: Products
RT: bread
BT: food products

breakfast
TT: Events
BT: meals

breeding (animal husbandry)
TT: Activities
BT: animal husbandry

breeding (process)
TT: Processes and Phenomena
BT: biological processes
NT: hatching
NT: laying
NT: nesting

building and decorative crafts

TT: Activities

BT: trades and crafts

NT: masonry

NT: smithing

NT: wickerwork

building components

TT: Parts and Components

RT: buildings

BT: object components

NT: fireplaces

NT: floors

NT: hearths

buildings

TT: Objects

RT: building components

BT: man-made structures

NT: farm buildings

NT: fortifications

NT: residential buildings

bulls

TT: Agents

BT: cattle

butchering

TT: Activities

RT: animal products

BT: food production

cabbages

TT: Products

BT: vegetables

calves

TT: Agents

BT: cattle

candles

TT: Objects

RT: household equipment

BT: lighting equipment

cardinal points

TT: Attributes and Properties

BT: positional attributes

UF: *points of the compass*

carding

TT: Activities

BT: textiles and leather crafts

care of animals

USE: animal husbandry

carnivals

TT: Events

BT: entertainment and recreational
events

carnivores

TT: Agents

BT: mammals

NT: cats

NT: dogs

NT: foxes

NT: wolves

catching animals

TT: Activities

BT: economic activities

NT: fishing

NT: hunting

Catholic

TT: Attributes and Properties

RT: Catholicism

BT: religious attributes

Catholic Reformation

USE: Counter-Reformation

Catholic Revival

USE: Counter-Reformation

Catholicism

TT: Abstract Entities and
Concepts

RT: Catholic

BT: religion

NT: post-Tridentine Catholicism

cats
TT: Agents
BT: carnivores

cattle
TT: Agents
RT: animal products
BT: hoofed mammals
NT: bulls
NT: calves
NT: cows

celebratory events
TT: Events
BT: Events
NT: wedding feasts

celestial objects
TT: Objects
BT: natural objects

cereals
TT: Products
BT: plant products
NT: barley
NT: oats
NT: rye
NT: wheat

ceremonial events
TT: Events
BT: Events
NT: rites
NT: rituals

charms (objects)
TT: Objects
RT: charms (verbal arts)
BT: accessories

charms (verbal arts)
TT: Genre
RT: charms (objects)
BT: verbal arts

chemical processes
TT: Processes and Phenomena
BT: Processes and Phenomena
NT: fire

chickens
TT: Agents
BT: birds
NT: cocks
NT: hens

children
TT: Agents
BT: people

classical elements
TT: Materials
BT: Materials
UF: four elements
NT: air (element)
NT: earth (element)
NT: fire (element)
NT: water (element)

clay
TT: Materials
BT: earth (soil)

cleaning and hygiene practices
TT: Activities
BT: social activities
NT: hair-cutting
NT: shaving
NT: washing

cloth
USE: textiles

clothing
TT: Objects
RT: textiles
BT: clothing and accessories
NT: dresses
NT: kilts

clothing and accessories

TT: Objects

BT: Objects

NT: accessories

NT: clothing

clouds

TT: Processes and Phenomena

BT: naturally occurring phenomena

coal

TT: Materials

BT: fuels

cocks

TT: Agents

BT: chickens

UF: *roosters*

coffee

TT: Products

BT: drinks

complaints (sickness)

USE: diseases

condiments

TT: Products

BT: food products

cooking

TT: Activities

BT: food consumption

corn stacks

TT: Objects

BT: agricultural structures

UF: corn stands

UF: ricks

UF: rickstands

corn stands

USE: corn stacks

cots

TT: Objects

BT: traditional boats

Counter Reformation

USE: Counter-Reformation

Counter-Reformation

TT: Time

RT: post-Tridentine Catholicism

BT: historical periods

UF: *Catholic Reformation*

UF: *Catholic Revival*

UF: *Counter Reformation*

cow houses

USE: cow-houses

cow-houses

TT: Objects

BT: animal housing

UF: *cow houses*

cows

TT: Agents

RT: milk

BT: cattle

craft equipment

TT: Objects

RT: textiles and leather crafts

BT: equipment

NT: looms

crews

TT: Agents

BT: people

NT: fishing crews

crop cultivation

TT: Activities

RT: plant products

RT: crop rotation

BT: agriculture

crop rotation

TT: Activities

RT: plant products

RT: crop cultivation

BT: land management

UF: land rotation

crops
USE: plant products

crustaceans
TT: Agents
BT: invertebrates

cups
TT: Objects
BT: vessels

currachs
TT: Objects
BT: traditional boats

cursed plants
TT: Agents
BT: plants

dairy animals
TT: Agents
RT: milk disorders
RT: dairy products
BT: animals

dairy products
TT: Products
RT: dairy animals
BT: animal products

dawn
TT: Time
BT: times of the day

days of the week
TT: Time
BT: Time
NT: Friday
NT: Monday
NT: Saturday
NT: Sunday
NT: Thursday
NT: Tuesday
NT: Wednesday

daytime
TT: Time
BT: times of the day

deer
TT: Agents
BT: hoofed mammals

digging
TT: Activities
RT: spades
BT: crop cultivation

dinner
TT: Events
BT: meals

disciplines
TT: Abstract Entities and Concepts
BT: Abstract Entities and Concepts
NT: economics
NT: physics
NT: religion

diseases
TT: Processes and Phenomena
BT: biological processes
UF: *ailments*
UF: *complaints (sickness)*
NT: animal diseases
NT: supernatural diseases

divination
TT: Activities
BT: supernatural practices

dogs
TT: Agents
BT: carnivores

domestic animals
TT: Agents
BT: animals

domestic birds
TT: Agents
BT: animals

donkeys
TT: Agents
RT: horses
RT: mules

BT: hoofed mammals
UF: asses

drainage
TT: Activities
BT: land management

dresses
TT: Objects
BT: clothing

drifters (fishing boats)
TT: Objects
BT: traditional boats

drills
TT: Objects
BT: general equipment

drinking
TT: Activities
RT: drinks
BT: food consumption

drinks
TT: Products
RT: drinking
BT: food products
UF: *beverages*
NT: alcoholic drinks
NT: coffee
NT: tea

drought (weather)
TT: Processes and Phenomena
BT: naturally occurring phenomena

dry
TT: Attributes and Properties
BT: physical attributes

ducks
TT: Agents
BT: birds

dung
TT: Products
RT: fertilisers
BT: waste products
UF: *manure*

dusk
TT: Time
BT: times of the day

early Irish (pre-1200)
TT: Time
BT: historical periods

earth (element)
TT: Materials
BT: classical elements

earth (soil)
TT: Materials
BT: inorganic
NT: clay

east
TT: Attributes and Properties
BT: cardinal points

Easter
TT: Events
BT: feast days and religious holidays

eating
TT: Activities
BT: food consumption

economic activities
TT: Activities
BT: Activities
UF: *employment*
UF: *work*
NT: agriculture
NT: catching animals
NT: trades and crafts

economic properties
TT: Attributes and Properties
BT: Attributes and Properties
NT: productivity

economics
TT: Abstract Entities and Concepts
BT: disciplines
NT: household economics

eggs
TT: Products

RT: hens
BT: dairy products
elf-shot
TT: Processes and Phenomena
BT: supernatural diseases
embroidery
TT: Activities
BT: needlework
employment
USE: economic activities
entertainment and recreational activities
TT: Activities
RT: entertainment and recreational
events
BT: social activities
NT: amusements
NT: gambling
NT: hurling
entertainment and recreational events
TT: Events
RT: entertainment and recreational
activities
BT: social activities
NT: carnivals
NT: exhibitions
epitaphs
TT: Genre
BT: folk poetry
equipment
TT: Objects
BT: Objects
NT: animal control equipment
NT: craft equipment
NT: farming equipment
NT: fishing equipment
NT: general equipment
NT: household equipment
NT: hunting equipment
NT: lighting equipment
NT: weapons
evil eye
TT: Activities
BT: supernatural practices
evil spirits
TT: Agents
BT: supernatural and legendary
beings
exhibitions
TT: Events
BT: entertainment and recreational
events
eye ailments
TT: Processes and Phenomena
BT: animal diseases
UF: *eye disease*
NT: blindness
eye disease
USE: eye ailments
fabric
USE: textiles
fairies
TT: Agents
BT: supernatural and legendary
beings
UF: *fairy people*
fairy forts
TT: Place/Space/Environment
BT: legendary and spiritual places
fairy people
USE: fairies
fairy tales
TT: Genre
BT: narratives
farm buildings
TT: Objects
RT: farmers
BT: buildings
NT: animal housing
NT: outhouses

- farmers
- TT:** Agents
 - RT:** agriculture
 - RT:** farm buildings
 - RT:** farming equipment
 - BT:** people
- farming equipment
- TT:** Objects
 - RT:** farmers
 - BT:** equipment
- fasting
- TT:** Activities
 - BT:** food consumption
- feast days and religious holidays
- TT:** Events
 - BT:** Events
 - NT:** All Soul's Day
 - NT:** Easter
 - NT:** Halloween
 - NT:** Shrove Tuesday
 - NT:** saints' days
- Feast of St Martin
- TT:** Events
 - BT:** saints' days
- feathers
- TT:** Parts and Components
 - BT:** parts of the body
- fertilisation (agricultural)
- TT:** activities
 - RT:** fertilisers
 - BT:** land management
- fertilisers
- TT:** Materials
 - RT:** dung
 - RT:** fertilisation (agricultural)
 - BT:** Materials
- fertility
- TT:** Attributes and Properties
 - BT:** biological properties
- festivals of the dead
- TT:** Events
 - RT:** Halloween
 - RT:** Samhain
 - BT:** Events
- fetters
- TT:** Objects
 - BT:** animal control equipment
- fibre products
- TT:** Products
 - BT:** Products
 - NT:** textiles
 - NT:** wool (yarn)
- fire
- TT:** Processes and Phenomena
 - BT:** chemical processes
 - NT:** bonfires
 - NT:** household fires
 - NT:** night fires
- fire (element)
- TT:** Materials
 - BT:** classical elements
- fire-fuel*
- USE:** fire-seed
- fire-seed
- TT:** Materials
 - RT:** plant materials
 - BT:** fuels
 - UF:** *fire-fuel*
- fireplaces
- TT:** Parts and Components
 - BT:** building components
- fish
- TT:** Agents
 - BT:** animals
 - NT:** freshwater fish
 - NT:** saltwater fish
- fishermen
- TT:** Agents

- RT:** fishing
RT: fishing equipment
RT: fishing lore
BT: people
- fishing
TT: Activities
RT: fishermen
RT: fishing equipment
RT: fishing lore
BT: catching animals
- fishing boats
TT: Objects
RT: boat parts
BT: fishing equipment
NT: modern boats
NT: traditional boats
- fishing crews
TT: Agents
BT: crews
- fishing equipment
TT: Objects
RT: fishermen
RT: fishing
RT: fishing lore
BT: equipment
NT: fishing boats
- fishing lore
TT: Genre
RT: fishermen
RT: fishing
RT: fishing equipment
BT: Genre
- flax (plant)
TT: Agents
RT: linen
BT: flowering plants
- fleece
TT: Parts and Components
BT: parts of the body
- floors
TT: Parts and Components
BT: building components
- flowering plants
TT: Agents
BT: plants
NT: flax (plant)
- fodder
TT: Products
BT: animal foodstuffs
- folk art
TT: Genre
BT: material culture
- folk belief
TT: Genre
BT: belief
NT: prophecies
NT: signs (portents)
NT: superstition
NT: taboos
- folk costume
TT: Genre
BT: material culture
- folk dance
TT: Genre
BT: other genres and forms
- folk drama
TT: Genre
BT: narratives
- folk medicine
TT: Genre
BT: other genres and forms
- folk music
TT: Genre
BT: music
- folk poetry
TT: Genre
BT: narratives
NT: epitaphs
NT: oral epics

folk religion

TT: Genre

BT: belief

folk songs

TT: Genre

BT: music

folk speech

TT: Genre

BT: verbal arts

folk tales

TT: Genre

BT: narratives

food consumption

TT: Activities

BT: foodways

NT: abstinence

NT: cooking

NT: drinking

NT: eating

NT: fasting

food lore

TT: Genre

RT: food products

RT: plant products

RT: foodways

BT: Genre

UF: *food, lore of*

UF: *lore of food*

food preparation

TT: Activities

BT: foodways

food preservation

TT: Activities

BT: foodways

UF: *food, preservation of*

UF: *preservation of food*

food production

TT: Activities

BT: trades and crafts

NT: baking

NT: butchering

food products

TT: Products

RT: food lore

BT: Products

NT: animal foodstuffs

NT: drinks

NT: foodstuffs

food rituals and practices

TT: Activities

BT: foodways

NT: prayers at meals

NT: table for meals

food, lore of

USE: food lore

food, preservation of

USE: food preservation

foodstuffs

TT: Products

BT: food products

foodways

TT: Activities

RT: food lore

BT: social activities

NT: food consumption

NT: food preparation

NT: food preservation

NT: food rituals and practices

forests

TT: Place/Space/Environment

RT: trees

BT: geographical features

UF: *woods*

fortifications

TT: Objects

BT: buildings

NT: ringforts

four elements

USE: classical elements

fowling

TT: Activities

BT: hunting

foxes	TT: Agents BT: carnivores	gambling	TT: Activities BT: entertainment and recreational activities
freshwater fish	TT: Agents BT: fish NT: pike NT: salmon NT: sunfish NT: trout	game	TT: Agents BT: (by function)
Friday	TT: Time BT: days of the week	game hunting	TT: Activities BT: hunting
frost	TT: Processes and Phenomena BT: naturally occurring phenomena	gardens	TT: Place/Space/Environment BT: man-made landscapes
fruits	TT: Products RT: orchards BT: plant products	geese	TT: Agents BT: birds
fuels	TT: Materials BT: Materials NT: coal NT: fire-seed NT: turf NT: wood (fuel)	general equipment	TT: Objects BT: equipment NT: drills NT: nets NT: powder NT: ropes NT: slings NT: spades
fungi	TT: Agents BT: other living organisms	geographical features	TT: Place/Space/Environment BT: Place/Space/Environment
fur	TT: Parts and Components BT: parts of the body	goats	TT: Agents RT: milk BT: hoofed mammals
furnishings	TT: Objects BT: Objects NT: household furnishings and decorations	<i>grace (prayers)</i>	USE: prayers
		<i>habits of animals</i>	USE: animal processes and behaviour
		hair	TT: Parts and Components BT: parts of the body

hair-cutting
TT: Activities
BT: cleaning and hygiene practices

Halloween
TT: Events
RT: festivals of the dead
RT: Samhain
BT: feast days and religious

holidays

hard udder
TT: Processes and Phenomena
BT: milk disorders

hares
TT: Agents
BT: hares and rabbits

hares and rabbits
TT: Agents
BT: mammals
NT: hares
NT: rabbits

harvest (season)
TT: Time
RT: harvest festivals
RT: harvesting
BT: seasons

harvest festivals
TT: Events
RT: Autumn
RT: harvest (season)
RT: harvesting
BT: Events
NT: Samhain

harvesting
TT: Activities
RT: Autumn
RT: harvest (season)
RT: harvest festivals
BT: crop cultivation

hatching
TT: Processes and Phenomena
BT: breeding (process)

hay
TT: Materials
BT: plant materials

hearths
TT: Parts and Components
BT: building components

hell
TT: Place/Space/Environment
BT: legendary and spiritual

places

hens
TT: Agents
RT: eggs
BT: chickens

herb books
TT: Objects
BT: written communications

herding
TT: Activities
BT: animal husbandry

hides and skins
TT: Products
BT: animal products
NT: leather
NT: pelts

high winds
TT: Processes and Phenomena
BT: storms

hills
USE: mountains

historical and commemorative structures
TT: Objects
BT: man-made structures
NT: monuments

historical periods

TT: Time

BT: Time

hive products

TT: Products

RT: bees

BT: animal products

NT: honey

Hollywood folklore

TT: Genre

BT: Genre

holy wells

TT: Objects

BT: wells with special powers

honey

TT: Products

RT: bees

BT: hive products

hoofed mammals

TT: Agents

BT: mammals

horses

TT: Agents

RT: donkeys

RT: mules

BT: hoofed mammals

household economics

TT: Abstract Entities and
Concepts

RT: households

BT: economics

household equipment

TT: Objects

RT: households

RT: houses

BT: equipment

NT: utensils

NT: vessels

household fires

TT: Processes and Phenomena

RT: households

RT: houses

BT: fire

household furnishings and decorations

TT: Objects

RT: households

RT: houses

BT: furnishings

NT: tables

households

TT: Agents

RT: houses

RT: household economics

RT: household equipment

RT: household fires

RT: household furnishings
and decorations

BT: people

houses

TT: Objects

RT: households

RT: household equipment

RT: household fires

RT: household furnishings
and decorations

BT: residential buildings

human processes and behaviour

TT: Processes and Phenomena

BT: biological processes

hunger

TT: Processes and Phenomena

BT: biological processes

hungry grass

TT: Agents

BT: cursed plants

hunting

- TT:** Activities
- RT:** hunting equipment
- BT:** catching animals
- NT:** fowling
- NT:** game hunting
- NT:** poaching

hunting equipment

- TT:** Objects
- RT:** hunting
- BT:** equipment
- NT:** snares
- NT:** traps

hurling

- TT:** Activities
- BT:** entertainment and recreational activities

inorganic materials

- TT:** Materials
- BT:** Materials
- NT:** air (gas)
- NT:** earth (soil)
- NT:** rocks
- NT:** water (liquid)

insects

- TT:** Agents
- BT:** invertebrates
- NT:** bees

invertebrates

- TT:** Agents
- BT:** animals
- NT:** crustaceans
- NT:** insects
- NT:** molluscs
- NT:** spiders
- NT:** worms

Irish folklore

- TT:** Genre
- BT:** Genre

irrigation

- TT:** Activities
- BT:** land management

jennets

- TT:** Agents
- BT:** hoofed mammals

jokes

- TT:** Genre
- BT:** verbal arts

kilts

- TT:** Objects
- BT:** clothing

knitting

- TT:** Activities
- BT:** textiles and leather crafts

knives (utensils)

- TT:** Objects
- RT:** knives (weapons)
- BT:** utensils

knives (weapons)

- TT:** Objects
- RT:** knives (utensils)
- BT:** weapons

lacemaking

- TT:** Activities
- BT:** needlework

lakes

- TT:** Place/Space/Environment
- BT:** geographical features

lambs

- TT:** Agents
- BT:** sheep

lamps

- USE:** lanterns

land management

- TT:** Activities
- BT:** agriculture
- NT:** crop rotation
- NT:** drainage

NT: fertilisation (agricultural)
BT: irrigation
land rotation
USE: crop rotation
landmarks (geographical features)
TT: Place/Space/Environment
RT: landmarks (man-made structures)
BT: geographical features
landmarks (man-made structures)
TT: Objects
RT: landmarks (geographical features)
BT: man-made structures
landscapes
TT: Place/Space/Environment
BT: Place/Space/Environment
NT: man-made landscapes
NT: natural landscapes
lanterns
TT: Objects
BT: lighting equipment
UF: *lamps*
laying
TT: Processes and Phenomena
BT: breeding (process)
leather
TT: Products
BT: hides and skins
legendary and spiritual places
TT: Place/Space/Environment
BT: Place/Space/Environment
UF: *mythical places*
NT: fairy forts
NT: hell
NT: purgatory
legends
TT: Genre
RT: myths
BT: narratives
licenses
TT: Objects
BT: written communications
lighting equipment
TT: Objects
BT: equipment
linen
TT: Products
RT: flax (plant)
BT: textiles
livestock
TT: Agents
BT: animals
local cuisine
USE: local foods
local foods
TT: Products
BT: food products
UF: *local cuisine*
looms
TT: Objects
BT: craft equipment
lore of animals
USE: animal lore
lore of food
USE: food lore
lowering the wind
TT: Activities
BT: weather manipulation
luxury products
TT: Products
BT: Products
NT: snuff
NT: tobacco
magic tricks
TT: Activities
BT: amusements
mammals
TT: Agents
BT: animals

NT: carnivores
NT: hares and rabbits
NT: hoofed mammals
NT: marine mammals
NT: rodents

man-made landscapes
TT: Place/Space/Environment
BT: landscapes
NT: gardens
NT: orchards
NT: pastures

man-made structures
TT: Objects
BT: Objects
NT: agricultural structures
NT: buildings
NT: historical and commemorative structures
NT: landmarks (man-made structures)
NT: water management structures

management of animals
USE: animal husbandry

manure
USE: dung

marine mammals
TT: Agents
BT: mammals
NT: porpoises
NT: seals

masonry
TT: Activities
BT: building and decorative crafts

material culture
TT: Genre
BT: Genre
NT: folk art
NT: folk costume
NT: vernacular architecture

mature animals
TT: Agents
BT: animals

May Day
TT: Events
BT: springtime festivals

meals
TT: Events
BT: regular events
NT: breakfast
NT: dinner

meat
TT: Products
BT: animal products
NT: beef

medical products
TT: Products
BT: Products
NT: remedies

medicinal plants
TT: Agents
BT: plants

medieval
TT: Time
BT: historical periods

memorials
USE: monuments

milk
TT: Products
RT: cows
RT: goats
BT: dairy products

milk disorders
TT: Processes and Phenomena
RT: dairy animals
BT: animal diseases
UF: *blast (milk disorder)*
NT: hard udder

- milking
TT: Activities
BT: animal husbandry
- milling
TT: Activities
BT: textiles and leather crafts
- modern boats
TT: Objects
BT: fishing boats
NT: trawlers
- molluscs
TT: Agents
BT: invertebrates
- Monday
TT: Time
BT: days of the week
- monuments
TT: Objects
BT: historical and commemorative structures
UF: *memorials*
- mountains
TT: Place/Space/Environment
BT: geographical features
UF: *hills*
- mules
TT: Agents
RT: donkeys
RT: horses
BT: hoofed mammals
- music
TT: Genre
RT: sound
BT: Genre
NT: folk music
NT: folk songs
NT: traditional music
- muzzles (equipment)
TT: Objects
BT: animal control equipment
- mythical places*
USE: legendary and spiritual places
- mythology
TT: Genre
RT: myths
BT: belief
- myths
TT: Genre
RT: legends
RT: mythology
BT: narratives
- narratives
TT: Genre
BT: Genre
NT: fairy tales
NT: folk drama
NT: folk poetry
NT: folk tales
NT: legends
NT: myths
- natural landscapes
TT: Place/Space/Environment
BT: landscapes
- natural objects
TT: Objects
BT: Objects
NT: celestial objects
- naturally occurring phenomena
TT: Processes and Phenomena
BT: Processes and Phenomena
NT: clouds
NT: drought (weather)
NT: frost
NT: precipitation
NT: storms

NT: tides
NT: waves
NT: winds

needlework
TT: Activities
BT: textiles and leather crafts
NT: embroidery
NT: lacemaking
NT: quilting

nesting
TT: Processes and Phenomena
BT: breeding (process)

nets
TT: Objects
BT: general equipment

newborn animals
TT: Agents
BT: animals

night fires
TT: Processes and Phenomena
BT: fire

night-time
TT: Time
BT: times of the day

noise
TT: Abstract Entities and Concepts
BT: sound

north
TT: Attributes and Properties
BT: cardinal points

oars
TT: Parts and Components
BT: boat parts

oats
TT: Products
BT: cereals

object components
TT: Parts and Components
BT: Parts and Components

NT: boat parts
NT: building components

occupations
USE: trades and crafts

oil lights
TT: Objects
BT: lighting equipment

onions
TT: Products
BT: root vegetables

oral epics
TT: Genre
BT: folk poetry

orchards
TT: Place/Space/Landscape
RT: fruits
BT: man-made landscapes

organic
TT: Materials
BT: Materials
NT: plant materials

other genres and forms
TT: Genre
BT: Genre
NT: folk dance
NT: folk medicine
NT: traditions

other living organisms
TT: Agents
BT: Agents
NT: fungi
NT: plants

outhouses
TT: Objects
BT: farm buildings

parts of the body
TT: Parts and components
BT: Parts and components

pastures
TT: Place/space/landscape
BT: man-made landscapes

peculiarities of animals
USE: animal processes and behaviour

pelts
TT: Products
BT: hides and skins

people
TT: Agents
BT: Agents

permits
TT: Objects
BT: written communications

pests
TT: Agents
BT: animals

pets
TT: Agents
BT: animals

physical attributes
TT: Attributes and Properties
BT: Attributes and Properties
NT: dry

physics
TT: Abstract Entities and Concepts
BT: disciplines
NT: sound

pig farming
TT: Activities
BT: animal husbandry

piggeries
TT: Objects
BT: animal housing

pigs
TT: Agents
BT: hoofed mammals

pike
TT: Agents
BT: freshwater fish

pitchers
TT: Objects
BT: vessels

plaice
TT: Agents
BT: saltwater fish

planets
TT: Objects
BT: celestial objects

plant materials
TT: Materials
RT: fire-seed
BT: organic
NT: hay
NT: seeds
NT: straw

plant products
TT: Products
RT: food lore
BT: Products
NT: cereals
NT: fruits
NT: vegetables

plants
TT: Agents
BT: other living organisms

plates
TT: Objects
BT: utensils

ploughing
TT: Activities
BT: crop cultivation

poaching
TT: Activities
BT: hunting

points of the compass

USE: cardinal points

pollock

TT: Agents

BT: saltwater fish

porpoises

TT: Agents

BT: marine mammals

positional attributes

TT: Attributes and Properties

BT: Attributes and Properties

NT: cardinal points

post-Tridentine Catholicism

TT: Abstract Entities and Concepts

RT: Counter-Reformation

BT: Catholicism

potatoes

TT: Products

BT: root vegetables

poultry

TT: Agents

BT: animals

powder

TT: Objects

BT: general equipment

prayers

TT: Genre

BT: verbal arts

UF: *grace (prayers)*

prayers at meals

TT: Activities

BT: food rituals and practices

precipitation

TT: Processes and Phenomena

BT: naturally occurring phenomena

NT: rain

NT: snow

preservation of food

USE: food preservation

productivity

TT: Attributes and Properties

BT: economic properties

prophecies

TT: Genre

BT: folk belief

proverbs

TT: Genre

BT: verbal arts

UF: *sayings*

purgatory

TT: Place/Space/Landscape

BT: legendary and spiritual places

quilting

TT: Activities

BT: needlework

rabbits

TT: Agents

BT: hares and rabbits

rain

TT: Processes and Phenomena

RT: rain lore

BT: precipitation

rain lore

TT: Genre

RT: rain

BT: weather lore

raising the wind

TT: Activities

BT: weather manipulation

rays

TT: Agents

BT: saltwater fish

recreational buildings

TT: Objects

BT: buildings

regular events
TT: Events
BT: Events
NT: meals

religion
TT: Abstract Entities and Concepts
RT: belief
BT: disciplines
NT: Catholicism

religious attributes
TT: Attributes and Properties
BT: Attributes and Properties
NT: Catholic

remedies
TT: Products
BT: medical products

reptiles
TT: Agents
BT: animals

residential buildings
TT: Objects
BT: buildings
NT: houses

ricks
USE: corn stacks

rickstands
USE: corn stacks

ridges
TT: Objects
BT: agricultural structures

ring-forts
USE: ringforts

ringforts
TT: Objects
BT: fortifications
UF: *ring-forts*

rites
TT: Events
BT: ceremonial events

rituals
TT: Events
BT: ceremonial events

rivers
TT: Place/Space/Environment
BT: geographical features
UF: *streams*

rocks
TT: Materials
BT: inorganic materials
UF: *stones*

rodents
TT: Agents
BT: mammals

roosters
USE: cocks

root crops
USE: root vegetables

root vegetables
TT: Products
BT: vegetables
UF: *root crops*
UF: *root-crops*
NT: onions
NT: potatoes

root-crops
USE: root vegetables

ropes
TT: Objects
BT: general equipment

rudders
TT: Parts and Components
BT: boat parts

rushlights
TT: Objects
BT: lighting equipment

rye
TT: Products
BT: cereals

- saints
TT: Agents
BT: supernatural and legendary beings
- saints' days
TT: Events
BT: feast days and religious holidays
NT: Feast of St Martin
NT: St Stephen's Day
- salmon
TT: Agents
BT: freshwater fish
- saltwater fish
TT: Agents
BT: fish
NT: plaice
NT: pollock
NT: rays
NT: sole
NT: whiting
- Samhain
TT: Events
RT: festivals of the dead
RT: Halloween
BT: harvest festivals
- Saturday
TT: Time
BT: days of the week
- sayings*
USE: proverbs
- seals
TT: Agents
BT: marine mammals
- seasons
TT: Time
BT: Time
- seeds
TT: Materials
BT: plant materials
- seine boats*
USE: seiners
- seine-boats*
USE: seiners
- seiners
TT: Objects
BT: traditional boats
UF: *seine boats*
UF: *seine-boats*
- shaving
TT: Activities
BT: cleaning and hygiene practices
- shebeens
TT: Objects
BT: recreational buildings
- sheep
TT: Agents
BT: hoofed mammals
NT: lambs
- Shrove Tuesday
TT: Events
BT: feast days and religious holidays
- shrubs
TT: Agents
BT: woody plants
- signs (portents)
TT: Genre
BT: folk belief
- skies
TT: Objects
BT: celestial objects
- skin
TT: Parts and Components
BT: parts of the body
- slings
TT: Objects
BT: general equipment
- smithing
TT: Activities

RT: smiths
BT: building and decorative crafts
smiths
TT: Agents
RT: smithing
BT: people
snares
TT: Objects
BT: hunting equipment
snow
TT: Processes and Phenomena
BT: precipitation
snuff
TT: Products
BT: luxury products
social activities
TT: Activities
BT: Activities
NT: cleaning and hygiene practices
NT: entertainment and recreational activities
NT: foodways
solar folklore
TT: Genre
BT: Genre
solar system
TT: Objects
BT: celestial objects
sole
TT: Agents
BT: saltwater fish
sound
TT: Abstract Entities and Concepts
RT: music
BT: physics
NT: noise
sources (water)
USE: springs (water)

south
TT: Attributes and Properties
BT: cardinal points
spades
TT: Objects
RT: digging
BT: general equipment
spancels
TT: Objects
BT: animal control equipment
spiders
TT: Agents
BT: invertebrates
spinning
TT: Activities
BT: textiles and leather crafts
spring (season)
TT: Time
RT: springtime festivals
BT: seasons
springs (water)
TT: Place/Space/Environment
RT: wells
BT: geographical features
UF: *sources (water)*
springtime festivals
TT: Events
RT: spring (season)
BT: Events
NT: May Day
St Stephen's Day
TT: Events
BT: saints' days
stars
TT: Objects
BT: celestial objects
stones
USE: rocks

storms
TT: Processes and Phenomena
BT: naturally occurring phenomena
NT: high winds

straw
TT: Materials
BT: plant materials

streams
USE: rivers

summer
TT: Time
BT: seasons

Sunday
TT: Time
BT: days of the week

sunfish
TT: Agents
BT: freshwater fish

supernatural and legendary beings
TT: Agents
RT: supernatural practices
BT: Agents
NT: banshees
NT: evil spirits
NT: fairies
NT: saints

supernatural diseases
TT: Processes and Phenomena
RT: supernatural practices
BT: diseases
NT: elf-shot

supernatural practices
TT: Activities
RT: supernatural and legendary beings
RT: supernatural diseases
BT: Activities
NT: divination
NT: evil eye

NT: weather manipulation
NT: witchcraft

superstition
TT: Genre
BT: folk belief

swamps
TT: Place/Space/Environment
BT: geographical features

tables
TT: Objects
BT: household furnishings and decorations

taboos
TT: Genres
BT: folk belief
UF: tabus

tabus
USE: taboos

tailors
TT: Agents
BT: people

tails
TT: Parts and Components
BT: parts of the body

tea
TT: Products
BT: drinks

teasing
TT: Activities
BT: textiles and leather crafts

textile manufacturing
TT: Activities
BT: textiles and leather crafts

textiles
TT: Products
RT: clothing
BT: fibre products
UF: *cloth*
UF: *fabric*

NT: linen
 textiles and leather crafts
TT: Activities
RT: craft equipment
BT: trades and crafts
NT: carding
NT: knitting
NT: milling
NT: needlework
NT: spinning
NT: teasing
NT: textile manufacturing
 table for meals
TT: Activities
BT: food rituals and practices
 thermal attributes
TT: Attributes and Properties
BT: Attributes and Properties
 thirst
TT: Processes and Phenomena
BT: biological processes
 thirteenth century
TT: Time
BT: historical periods
 threshing
TT: Activities
BT: crop cultivation
 Thursday
TT: Time
BT: days of the week
 tides
TT: Processes and Phenomena
BT: naturally occurring phenomena
 times of the day
TT: Time
BT: Time
NT: dawn
NT: daytime
NT: dusk
NT: night-time
 tobacco
TT: Products
BT: luxury products
 trades and crafts
TT: Activities
BT: economic activities
UF: *occupations*
NT: building and decorative crafts
NT: food production
NT: textiles and leather crafts
 traditional boats
TT: Objects
BT: fishing boats
NT: cots
NT: currachs
NT: drifters (fishing boats)
NT: seiners
 traditional music
TT: Genre
BT: music
 traditions
TT: Genre
BT: other genres and forms
 traps
TT: Objects
BT: hunting equipment
 trawlers
TT: Objects
BT: modern boats
 trees
TT: Agents
RT: forests
RT: wood (fuel)
BT: woody plants
 trout
TT: Agents
BT: freshwater fish
 Tuesday
TT: Time
BT: days of the week

turf
TT: Materials
BT: fuels

turkeys
TT: Agents
BT: birds

twelfth century
TT: Time
BT: historical periods

unnatural phenomena
TT: Processes and Phenomena
BT: Processes and Phenomena

utensils
TT: Objects
BT: household equipment
NT: knives (utensils)
NT: plates

vegetables
TT: Products
BT: plant products
NT: cabbages
NT: root vegetables

verbal arts
TT: Genre
BT: Genre
NT: charms (verbal arts)
NT: folk speech
NT: jokes
NT: prayers
NT: proverbs

vernacular architecture
TT: Genre
BT: material culture

vessels
TT: Objects
BT: household equipment
NT: cups
NT: pitchers

washing
TT: Activities
BT: cleaning and hygiene practices

waste products
TT: Products
BT: Products
NT: dung

water (element)
TT: Materials
BT: classical elements

water (liquid)
TT: Materials
BT: inorganic

water management structures
TT: Objects
BT: man-made structures
NT: wells

waves
TT: Processes and Phenomena
BT: naturally occurring phenomena

weapons
TT: Objects
BT: equipment
NT: knives (weapons)

weather lore
TT: Genre
RT: weather manipulation
BT: Genre
NT: rain lore
NT: wind lore

weather manipulation
TT: Activities
RT: weather lore
BT: supernatural practices
NT: lowering the wind
NT: raising the wind

wedding feasts
TT: Events
BT: celebratory events

Wednesday
TT: Time
BT: days of the week

weeds
TT: Agents
BT: plants

wells
TT: Objects
BT: water management structures
NT: wells with special powers

wells with special powers
TT: Objects
BT: wells
NT: holy wells

west
TT: Attributes and Properties
BT: cardinal points

wheat
TT: Products
BT: cereals

whiting
TT: Agents
BT: saltwater fish

wickerwork
TT: Activities
BT: building and decorative crafts

wild animals
TT: Agents
BT: animals

wild birds
TT: Agents
BT: animals

wind lore
TT: Genre
BT: weather lore

winds
TT: Processes and Phenomena
BT: naturally occurring phenomena

winnowing
TT: Activities
BT: crop cultivation

winter
TT: Time
BT: season

witchcraft
TT: Activities

BT: supernatural practices
UF: *bewitchment*

wolves
TT: Agents
BT: carnivores

wood (fuel)
TT: Materials
RT: trees
BT: fuels

woods
USE: forests

woody plants
TT: Agents
BT: plants
NT: shrubs
NT: trees

wool (fibres)
TT: Parts and Components
RT: wool (yarn)
BT: parts of the body

wool (yarn)
TT: Products
RT: wool (fibres)
BT: fibre products

work
USE: economic activities

working animals
TT: Agents
BT: animals

worms
TT: Agents
BT: invertebrates

written communications
TT: Objects
BT: Objects
NT: herb books
NT: licenses
NT: permits

young animals
TT: Agents
BT: animals

Appendix IV:

Pilot thesaurus of Irish folklore hierarchical display

Genre

.	NT1	belief
.	.	NT2 folk belief
.	.	. NT3 prophecies
.	.	. NT3 signs (portents)
.	.	. NT3 superstition
.	.	. NT3 taboos
.	.	NT2 folk religion
.	.	NT2 mythology
.	NT1	material culture
.	.	NT2 folk art
.	.	NT2 folk costume
.	.	NT2 vernacular architecture
.	NT1	music
.	.	NT2 folk music
.	.	NT2 folk songs
.	.	NT2 traditional music
.	NT1	narratives
.	.	NT2 fairy tales
.	.	NT2 folk drama
.	.	NT2 folk poetry
.	.	. NT3 epitaphs
.	.	. NT3 oral epics
.	.	NT2 folk tales
.	.	NT2 legends
.	.	NT2 myths
.	NT1	verbal arts
.	.	NT2 charms (verbal arts)
.	.	NT2 folk speech
.	.	NT2 jokes
.	.	NT2 prayers
.	.	NT2 proverbs
.	NT1	other genres and forms
.	.	NT2 folk dance
.	.	NT2 folk medicine
.	.	NT2 traditions

(genre by location)

- . NT1 Arabian folklore
- . NT1 Hollywood folklore
- . NT1 Irish folklore

(genre by subject)

- . NT1 animal lore
- . NT1 fishing lore
- . NT1 food lore
- . NT1 solar folklore
- . NT1 weather lore
- . . NT2 rain lore
- . . NT2 wind lore

Abstract Entities and Concepts

- . NT1 disciplines
- . . NT2 economics
- . . . NT3 household economics
- . . NT2 physics
- . . . NT3 sound
- NT4 noise
- . . NT2 religion
- . . . NT3 Catholicism
- NT4 post-Tridentine Catholicism

Time

- . NT1 days of the week
- . . NT2 Friday
- . . NT2 Monday
- . . NT2 Saturday
- . . NT2 Sunday
- . . NT2 Thursday
- . . NT2 Tuesday
- . . NT2 Wednesday
- . NT1 historical periods
- . . *(historical periods by historic time)*
- . . NT2 thirteenth century
- . . NT2 twelfth century
- . . *(historical periods by name)*
- . . NT2 Counter-Reformation

- . . NT2 early Irish (pre-1200)
- . . NT2 medieval
- . NT1 seasons
 - . . *(seasons by activity)*
 - . . NT2 harvest (season)
 - . . *(seasons by name)*
 - . . NT2 autumn
 - . . NT2 spring (season)
 - . . NT2 summer
 - . . NT2 winter
- . NT1 times of the day
 - . . NT2 dawn
 - . . NT2 daytime
 - . . NT2 dusk
 - . . NT2 night-time

Place/Space/Environment

- . NT1 geographical features
 - . . *(geographical features by function)*
 - . . NT2 landmarks (geographical features)
 - . . *(geographical features by type)*
 - . . NT2 bogs
 - . . NT2 forests
 - . . NT2 lakes
 - . . NT2 mountains
 - . . NT2 rivers
 - . . NT2 springs (water)
 - . . NT2 swamps
- . NT1 landscapes
 - . . NT2 man-made landscapes
 - . . . NT3 gardens
 - . . . NT3 orchards
 - . . . NT3 pastures
 - . . NT2 natural landscapes
- . NT1 legendary and spiritual places
 - . . NT2 fairy forts
 - . . NT2 hell
 - . . NT2 purgatory

Products

.	NT1	animal products
.	.	NT2 dairy products
.	.	. NT3 eggs
.	.	. NT3 milk
.	.	NT2 hides and skins
.	.	. NT3 leather
.	.	. NT3 pelts
.	.	NT2 hive products
.	.	. NT3 honey
.	.	NT2 meat
.	.	. NT3 beef
.	NT1	crops
.	.	NT2 cereals
.	.	. NT3 barley
.	.	. NT3 oats
.	.	. NT3 rye
.	.	. NT3 wheat
.	.	NT2 fruits
.	.	NT2 vegetables
.	.	. NT3 cabbages
.	.	. NT3 root vegetables
.	.	. . NT4 onions
.	.	. . NT4 potatoes
.	NT1	fibre products
.	.	NT2 textiles
.	.	. NT3 linen
.	.	NT2 wool (yarn)
.	NT1	food products
.	.	NT2 animal foodstuffs
.	.	. NT3 fodder
.	.	NT2 drinks
.	.	. NT3 alcoholic drinks
.	.	. NT3 coffee
.	.	. NT3 tea
.	.	NT2 foodstuffs
.	.	. <i>(foodstuffs by function)</i>
.	.	. NT3 condiments

.	.	.	<i>(foodstuffs by location)</i>
.	.	.	NT3 international foods
.	.	.	NT3 local foods
.	.	.	<i>(foodstuffs by name)</i>
.	.	.	NT3 bread
.	NT1	.	luxury products
.	.	.	NT2 snuff
.	.	.	NT2 tobacco
.	NT1	.	medical products
.	.	.	NT2 remedies
.	NT1	.	waste products
.	.	.	NT2 dung

Activities

.	NT1	.	economic activities
.	.	.	NT2 catching animals
.	.	.	NT3 fishing
.	.	.	NT3 hunting
.	.	.	NT4 fowling
.	.	.	NT4 game hunting
.	.	.	NT4 poaching
.	.	NT2	agriculture
.	.	.	NT3 animal husbandry
.	.	.	(animal husbandry by type of animal)
.	.	.	NT4 pig farming
.	.	.	(by type of procedure)
.	.	.	NT4 breeding (animal husbandry)
.	.	.	NT4 herding
.	.	.	NT4 milking
.	.	.	NT3 crop cultivation
.	.	.	NT4 digging
.	.	.	NT4 harvesting
.	.	.	NT4 ploughing
.	.	.	NT4 threshing
.	.	.	NT4 winnowing
.	.	.	NT3 land management
.	.	.	NT4 crop rotation
.	.	.	NT4 drainage
.	.	.	NT4 fertilisation (agricultural)
.	.	.	NT4 irrigation

.	.	NT2	trades and crafts
.	.	.	NT3 building and decorative crafts
.	.	.	. NT4 masonry
.	.	.	. NT4 smithing
.	.	.	. NT4 wickerwork
.	.	.	NT3 food production
.	.	.	. NT4 baking
.	.	.	. NT4 butchering
.	.	.	NT3 textiles and leather crafts
.	.	.	. NT4 carding
.	.	.	. NT4 knitting
.	.	.	. NT4 milling
.	.	.	. NT4 needlework
.	.	.	. . NT5 embroidery
.	.	.	. . NT5 lacemaking
.	.	.	. . NT5 quilting
.	.	.	. NT4 spinning
.	.	.	. NT4 teasing
.	.	.	. NT4 textile manufacturing
.	NT1		social activities
.	.	NT2	cleaning and hygiene practices
.	.	.	NT3 hair-cutting
.	.	.	NT3 shaving
.	.	.	NT3 washing
.	.	NT2	entertainment and recreational activities
.	.	.	NT3 amusements
.	.	.	. NT4 magic tricks
.	.	.	NT3 gambling
.	.	.	NT3 hurling
.	.	NT2	foodways
.	.	.	NT3 food consumption
.	.	.	. NT4 abstinence
.	.	.	. NT4 cooking
.	.	.	. NT4 drinking
.	.	.	. NT4 eating
.	.	.	. NT4 fasting
.	.	.	NT3 food preparation
.	.	.	NT3 food preservation
.	.	.	NT3 food rituals and practices

- NT4 prayers at meals
- NT4 table for meals
- . NT1 supernatural practices
 - . . NT2 divination
 - . . NT2 evil eye
 - . . NT2 weather manipulation
 - . . . NT3 lowering the wind
 - . . . NT3 raising the wind
 - . . NT2 witchcraft

Processes and Phenomena

- . NT1 biological processes and behaviour
 - . . NT2 breeding (process)
 - . . . NT3 hatching
 - . . . NT3 laying
 - . . . NT3 nesting
 - . . NT2 appetite
 - . . NT2 hunger
 - . . NT2 thirst
 - . . NT2 animal processes and behaviour
 - . . NT2 human processes and behaviour
 - . . NT2 diseases
 - . . . NT3 animal diseases
 - NT4 eye ailments
 - NT5 blindness
 - NT4 milk disorders
 - NT5 hard udder
- . NT1 chemical processes
 - . . NT2 fire
 - . . . NT3 bonfires
 - . . . NT3 household fires
 - . . . NT3 night fires
 - . . NT2 supernatural diseases
 - . . . NT3 elf-shot
- . NT1 naturally occurring phenomena
 - . . NT2 clouds
 - . . NT2 drought (weather)
 - . . NT2 frost
 - . . NT2 precipitation

- . . . NT3 rain
- . . . NT3 snow
- . . NT2 storms
- . . NT2 tides
- . . NT2 waves
- . . NT2 winds
- . NT1 unnatural phenomena

Events

(events by function)

- . NT1 celebratory events
 - . NT2 wedding feasts
- . NT1 ceremonial events
 - . NT2 rites
 - . NT2 rituals
- . NT1 entertainment and recreational events
 - . NT2 carnivals
 - . NT2 exhibitions
- . NT1 regular events
 - . NT2 meals
 - . NT3 breakfast
 - . NT3 dinner

(events by time of year)

- . NT1 harvest festivals
 - . NT2 Samhain
- . NT1 springtime festivals
 - . NT2 May Day

(events by type)

- . NT1 feast days and religious holidays
 - . NT2 All Soul's Day
 - . NT2 Easter
 - . NT2 Halloween
 - . NT2 Shrove Tuesday
 - . NT2 saints' days
 - . NT3 Feast of St Martin
 - . NT3 St Stephen's Day
- . NT1 festivals of the dead

Agents

.	NT1	people
.	.	<i>(people by age)</i>
.	.	NT2 adults
.	.	NT2 children
.	.	<i>(people by occupation)</i>
.	.	NT2 farmers
.	.	NT2 fishermen
.	.	NT2 smiths
.	.	NT2 tailors
.	.	<i>(people by social grouping)</i>
.	.	NT2 crews
.	.	. NT3 fishing crews
.	.	NT2 households
.	NT1	animals
.	.	<i>(animals by age)</i>
.	.	NT2 mature animals
.	.	NT2 newborn animals
.	.	NT2 young animals
.	.	<i>(animals by degree of domestication)</i>
.	.	NT2 domestic animals
.	.	NT2 domestic birds
.	.	NT2 wild animals
.	.	NT2 wild birds
.	.	<i>(animals by function)</i>
.	.	NT2 dairy animals
.	.	NT2 game
.	.	NT2 livestock
.	.	NT2 pests
.	.	NT2 pets
.	.	NT2 poultry
.	.	NT2 working animals
.	.	<i>(animals by species)</i>
.	.	NT2 amphibians
.	.	NT2 birds
.	.	. NT3 chickens
.	.	. . NT4 cocks
.	.	. . NT4 hens

.	.	.	NT3	ducks
.	.	.	NT3	geese
.	.	.	NT3	turkeys
.	.	NT2	fish	
.	.	.	NT3	freshwater fish
.	.	.	NT4	pike
.	.	.	NT4	salmon
.	.	.	NT4	sunfish
.	.	.	NT4	trout
.	.	.	NT3	saltwater fish
.	.	.	NT4	plaice
.	.	.	NT4	pollock
.	.	.	NT4	rays
.	.	.	NT4	sole
.	.	.	NT4	whiting
.	.	.	NT3	invertebrates
.	.	.	NT4	crustaceans
.	.	.	NT4	insects
.	.	.	NT5	bees
.	.	.	NT4	molluscs
.	.	.	NT4	spiders
.	.	.	NT4	worms
.	.	NT2	mammals	
.	.	.	NT3	carnivores
.	.	.	NT4	cats
.	.	.	NT4	dogs
.	.	.	NT4	foxes
.	.	.	NT4	wolves
.	.	.	NT3	hares and rabbits
.	.	.	NT4	hares
.	.	.	NT4	rabbits
.	.	.	NT3	hoofed mammals
.	.	.	NT4	cattle
.	.	.	NT5	bulls
.	.	.	NT5	calves
.	.	.	NT5	cows
.	.	.	NT4	deer
.	.	.	NT4	donkeys

.	.	.	.	NT4	goats
.	.	.	.	NT4	horses
.	.	.	.	NT4	jennets
.	.	.	.	NT4	mules
.	.	.	.	NT4	pigs
.	.	.	.	NT4	sheep
.	.	.	.	NT5	lambs
.	.	.	NT3	marine mammals	
.	.	.	.	NT4	porpoises
.	.	.	.	NT4	seals
.	.	.	NT3	rodents	
.	.	NT2	reptiles		
.	NT1	other living organisms			
.	.	NT2	fungi		
.	.	NT2	plants		
.	.	.	<i>(plants by function)</i>		
.	.	.	NT3	medicinal plants	
.	.	.	NT3	weeds	
.	.	.	<i>(plants by type)</i>		
.	.	.	NT3	flowering plants	
.	.	.	.	NT4	flax (plant)
.	.	.	NT3	woody plants	
.	.	.	.	NT4	shrubs
.	.	.	.	NT4	trees
.	.	.	<i>(plants by effect)</i>		
.	.	.	NT3	cursed plants	
.	.	.	.	NT4	hungry grass
.	NT1	supernatural and legendary beings			
.	.	NT2	banshees		
.	.	NT2	evil spirits		
.	.	NT2	fairies		
.	.	NT2	saints		

Objects

.	NT1	natural objects			
.	.	NT2	celestial objects		
.	.	.	<i>(celestial objects by grouping)</i>		
.	.	.	NT3	solar system	

.	.	.	<i>(celestial objects by type)</i>
.	.	.	NT3 planets
.	.	.	NT3 skies
.	.	.	NT3 stars
.	NT1	.	man-made structures
.	.	NT2	agricultural structures
.	.	.	NT3 corn stacks
.	.	.	NT3 ridges
.	.	NT2	buildings
.	.	.	NT3 farm buildings
.	.	.	NT4 animal housing
.	.	.	NT5 cow-houses
.	.	.	NT5 piggeries
.	.	.	NT4 outhouses
.	.	.	NT3 fortifications
.	.	.	NT4 ringforts
.	.	.	NT3 residential buildings
.	.	.	NT4 houses
.	.	.	NT3 recreational buildings
.	.	.	NT4 shebeens
.	.	NT2	historical and commemorative structures
.	.	.	NT3 monuments
.	.	NT2	landmarks (man-made structures)
.	.	NT2	water management structures
.	.	.	NT3 wells
.	.	.	NT4 wells with special powers
.	.	.	NT5 holy wells
.	NT1	.	equipment
.	.	NT2	animal control equipment
.	.	.	NT3 fetters
.	.	.	NT3 muzzles (equipment)
.	.	.	NT3 spancels
.	.	NT2	craft equipment
.	.	.	NT3 looms
.	.	NT2	farming equipment
.	.	NT2	fishing equipment
.	.	.	NT3 fishing boats
.	.	.	NT4 modern boats
.	.	.	NT5 trawlers

.	.	.	.	NT4	traditional boats
.	.	.	.	NT5	cots
.	.	.	.	NT5	currachs
.	.	.	.	NT5	drifters (fishing boats)
.	.	.	.	NT5	seiners
.	.	NT2			household equipment
.	.	.	NT3		utensils
.	.	.	.	NT4	knives (utensils)
.	.	.	.	NT4	plates
.	.	.	NT3		vessels
.	.	.	.	NT4	cups
.	.	.	.	NT4	pitchers
.	.	NT2			hunting equipment
.	.	.	NT3		snares
.	.	.	NT3		traps
.	.	NT2			lighting equipment
.	.	.	NT3		bog-deal splinters
.	.	.	NT3		candles
.	.	.	NT3		lanterns
.	.	.	NT3		oil lights
.	.	.	NT3		rushlights
.	.	NT2			weapons
.	.	.	NT3		knives (weapons)
.	.	NT2			general equipment
.	.	.	NT3		drills
.	.	.	NT3		nets
.	.	.	NT3		powder
.	.	.	NT3		ropes
.	.	.	NT3		slings
.	.	.	NT3		spades
.	NT1				clothing and accessories
.	.	NT2			accessories
.	.	.	NT3		amulets
.	.	.	NT3		bracelets
.	.	.	NT3		charms (objects)
.	.	NT2			clothing
.	.	.	NT3		dresses
.	.	.	NT3		kilts

- . NT1 furnishings
 - . NT2 household furnishings and decorations
 - . NT3 tables
- . NT1 written communications
 - . NT2 herb books
 - . NT2 licenses
 - . NT2 permits

Materials

- . NT1 inorganic materials
 - . NT2 air (gas)
 - . NT2 earth (soil)
 - . NT3 clay
 - . NT2 rocks
 - . NT2 water (liquid)
- . NT1 organic materials
 - . NT2 plant materials
 - . NT3 hay
 - . NT3 seeds
 - . NT3 straw
- . NT1 classical elements
 - . NT2 air (element)
 - . NT2 earth (element)
 - . NT2 fire (element)
 - . NT2 water (element)

(materials by function)

- . NT1 fertilisers
 - . NT2 fuels
 - . NT3 coal
 - . NT3 fire-seed
 - . NT3 turf
 - . NT3 wood (fuel)

Attributes and Properties

- . NT1 biological properties
 - . NT2 fertility
- . NT1 economic properties
 - . NT2 productivity

- . NT1 physical attributes
 - . . NT2 dry
- . NT1 positional attributes
 - . . NT2 cardinal points
 - . . . NT3 east
 - . . . NT3 north
 - . . . NT3 south
 - . . . NT3 west
- . NT1 religious attributes
 - . . NT2 Catholic
- . NT1 thermal attributes

Parts and Components

- . NT1 object components
 - . . NT2 boat parts
 - . . . NT3 oars
 - . . . NT3 rudders
 - . . NT2 building components
 - . . . NT3 fireplaces
 - . . . NT3 floors
 - . . . NT3 hearths
- . NT1 parts of the body
 - . . NT2 feathers
 - . . NT2 fleece
 - . . NT2 fur
 - . . NT2 hair
 - . . NT2 skin
 - . . NT2 tails
 - . . NT2 wool (fibres)