What are classification systems? Why do we need them? How do they fit into our lives? These are just some of the questions I wish to address in this paper. I hope to define what a classification system is and describe what taxonomy is and how it is a classification system. There are different types of classification systems and each type is designed to meet a specific purpose. I will discuss the generic/species and whole-part classification systems. To each system there are a number of advantages and disadvantages that will be discussed and this will help you decide what type of classification system you may wish to use in the future.

First of all let’s start with a definition.

**Classification system:**
A structured organizer used to determine groups based on similar characteristics.

(School Improvement in Maryland
Accessed on the internet 06/09/05)

At the most basic level this is what a classification system is, items that have been compartmentalised or categorised in a particular structure that allows the user of the classification system to see the items in a particular context. We have all recently completed an assignment which asked us to examine various terms in regards to instruments and put them into an organised structure. How we placed those instruments in the hierarchy determines the context and how that instrument is related to others. For example let’s look at the bugle. It is a brass instrument within the general aerophone category. It is directly related to the French horn an account that it has very similar characteristics and is loosely related to the bagpipes by them both being aerophones. The diagram on the following page depicts the hierarchical tree of the aerophones from assignment 1.
This is only one example of a classification system that we have currently been involved in. There are many others that we interact with each day. The most obvious of these is the library system (Dewey Decimal) but there are others such as the building classification at Monash University. It does not matter as to which campus you attend each building has its own categories and the rooms within have their own identification based on that building’s category. These classifications can be seen in our timetables and from the standard notation we can understand which room we should be in at a particular time.

If a classification system is an organised structure as defined above and they are all around us, what is their purpose? I agree with Denise Bruno and Heather Richmond that a classification systems purpose is to allow users like you and me to access information in an efficient and timely manner with the least amount of frustration as possible (The truth about taxonomies. Information Management Journal. Lemexa: Mar/Apr 2003. Vol. 37, Iss. 2: pg. 44).
The example using the aerophones is a pre-determined system, otherwise known as a taxonomy. There are three main features to a taxonomy and they are the Hierarchy of classification, the thesaurus which lists all the terms and the control vocabulary that can be used to search for the information within the system. As mentioned earlier the hierarchy shows the context of each item compared to other items. The thesaurus as Denise Bruno and Heather Richmond state “…is a type of controlled vocabulary that shows the hierarchical (parent – child), associative (related), and related (synonymous) relationships among terms.” (The truth about taxonomies. Information Management Journal. Lemexa: Mar/Apr 2003. Vol. 37, Iss. 2: pg. 44). My understanding of this is the parent – child relationship is the broad term (BT) and narrow term (NT) that we have used within our recent assignments, while the associative is the related term (RT) and the scope notes contain any synonym terms.

The glossary from MOAA’s Coral Reef Data Discovery describes a synonym in taxonomy as “…one of two or more scientific names that are spelled differently, but refer to the same organism” (www6.nos.noaa.gov/coris/glossary.lasso accessed on 07/09/05). This boils down to two names for the same thing. The controlled vocabulary is the chosen terms that will be used in the thesaurus. This vocabulary will be used to search for information on the related topics. Denise Bruno and Heather Richmond call it an indexing language that describes a subject area or information domain. How these terms are developed depends on the needs of the users. Denise Bruno and Heather Richmond call this “User Warrant” (The truth about taxonomies. Information Management Journal. Lemexa: Mar/Apr 2003. Vol. 37, Iss. 2: pg. 44) and the term used by the majority of the users is the term adopted into the vocabulary.

There are some problems with this method. Firstly as time moves on the terms used by the majority of the users may change and unless the thesaurus changes as well then it could be difficult for the users to accurately search for the information they require unless they still know the old terms. As mentioned earlier the purpose of any classification system is to efficiently retrieve information. Because taxonomy is a pre – determined system there could easily be problems including new innovations as they are developed. The Dewey Decimal system is a good example of this problem. Computers and technology related topics were not included into the original Dewey Decimal system and as discussed in the in the IMS2603 lectures incorporating new topics into the system was difficult.
The hierarchical example of aerophone instruments can be referred to as a generic relationship classification system which has the following properties:

Genus/Species: The hierarchy only has one type of relationship between its super and subclasses and that is a “IS-A” relationship. If we look at the aerophone example woodwind “IS – A” type of aerophone. The bugle “IS – A” type of bass instrument.

Inclusiveness: The top class such as aerophone includes all the subclasses while the brass class only includes the brass instruments like the bugle which is also included in the general super class of aerophone.

Inheritance: The attributes of a class will be inherited by its subclasses. In the aerophone example the super class aerophone uses vibrating air to create the sound in the instrument. Each of the instances of the instruments such as the bagpipes, oboe or French horn have all inherited this attribute.

Transivity: Each subclass is not only a member of their immediate super class but for each super class above it along the hierarchy. The bagpipes are a member of the free reed superclass above it and is also a member of the Reed, Woodwinds and aerophone superclasses above that.

Rules of association and distinction: Each instance or entity in a given class are alike in a particular way and are different from the instances in subclasses in a particular way. An example of this is that Reed Woodwinds and Edge Woodwinds are related because they are part of the woodwind superclass but differ from the subclass instances either by the specific way the reeds are used such as free reed or the specific number of reeds, or that each subclass is a particular instance of its super class.

Mutual Exclusivity: An Instance can only belong to one class. The bugle can only belong to the brass class.

It is with this last property that problems may occur. For instance the saxophone utilises a reed in the mouth piece but is made of brass. Should it be classified under
woodwinds or brass? This type of system finds it difficult to cater for items that tend to slip between the categories or can belong to more than one. It then becomes the responsibility of a person to make the decision of which category it will reside in.

For further reading about these properties please see *The truth about taxonomies.* (Information Management Journal. Lemexa: Mar/Apr 2003. Vol. 37, Iss. 2: pg. 44) it is from this article that the above list came from.

The other type of taxonomy I wish to discuss is the whole - part relationship model. This particular model takes an item and breaks it down into its particular components. The following example is taken from *The truth about taxonomies* (Information Management Journal. Lemexa: Mar/Apr 2003. Vol. 37, Iss. 2: pg. 44).

![Automobile example](image)

*Figure 2: Automobile example*

The main difference between the whole – part relationship and the generic relationship is that there is no inheritance from the superclass to the subclasses. The engine block is not a type of automobile or the Upholstery is not a type of interior. Also it can not be assumed that the piston and valves share many attributes just because they are subclasses to the same superclass. The only attribute that we can be certain of is that they are both part of the engine block. This type of system has a more flexibility because it does not have to follow the same strict rules as the generic relationship model.
Which taxonomy system is better? To answer this question depends on the purpose of the classification system and the data you are trying to capture. For instance if I was trying to capture data on notebook computers and their components then it would make sense to use the whole – part classification system. Otherwise if I was to try and categorise the two hundred or more Sci-fi and Fantasy fiction novels I have then it would probably be better to use the generic relationship system. Some general rules that should be followed when developing a classification system are:

- Determine the purpose and scope of the system
- Gather information from all areas that will be affected by the system. For a business this could be the frontline workers all the way up to upper management.
- Define the terms that will be used. These terms will need to make sense to the people who will be using the system other wise they could become frustrated and not use the system.
- Try to ensure that there is some facility for expansion. Find a way to allow future developments to be entered
- Incorporate efficient use of system resources to ensure quick response times. Users do not want to be sitting idle waiting for the system to respond.

This article has discussed what a classification system is and how the idea of taxonomy fits into this concept. Which type of classification system you may need depends on the purpose and the type of data gathered. Once these two items are known then the choice of generic vs. whole-part relationship can be made. Classification systems are a large part of our lives and quite often we don’t realise that we have used one. Throughout this article I have concentrated on pre-determined systems but there is another type classification system which incorporates Folksonomies. For further information on Folksonomies please see the other articles on classification systems.