Facets: a fruitful notion in many domains

This special issue of "Axiomathes" is devoted to a technique originally developed within library science: *facet analysis*. During discussions with Roberto Poli, it was realized that facet analysis shares interesting features with analytical methods in several other fields, including philosophy, psychology, linguistics, and computer science. For these reasons, in an interdisciplinary spirit, we believe that facet analysis is a relevant topic for the scope of this journal. It is hoped that readers will be persuaded by this after examining the present contributions.

Facet analysis has a historical, even legendary, birthdate: it was conceived by the Indian librarian Shiyali Ramamrita Ranganathan in 1925, while he was studying at University College London (a key place for library classification research still today). The circumstances under which this happened, and Ranganathan's relations with English scholars, are reconstructed in Clare Beghtol's paper.

Ranganthan's revolutionary idea was that the subject of a document, like "prevention of rice diseases in Madras in the dry season" to take his classical example, can be expressed by analyzing it into its *facets* (rice, diseases, prevention, Madras, dry season), translating each of them into a separate notation, and reassembling notations according to the standard citation order of their categories. This procedure is called *analytico-synthetic*. It is considered the alternative to the older *enumerative* systems, where any possible subject must be listed in the

schedules, which therefore tend to become extremely long (the Library of Congress Classification consists of 42 printed volumes).

The first expansion in facet analysis applications occurred when Ranganathan's techniques, first conceived for a general scheme of knowledge, were applied by the members of the Classification Research Group (CRG) to the more specific domains of special libraries and documentation services, such as education, canning, or music. We are honoured to publish a new paper by one of those pioneers in facet analysis, Brian Vickery, whose work is fundamental for modern applications.

Vickery and other CRG members also extended Ranganathan's original set of five categories to which a facet can belong (Personality, Matter, Energy, Space, and Time) up to about thirteen. The identity and nature of these *fundamental categories* are among the most interesting aspects of facet analysis from the ontological point of view: Ingetraut Dahlberg's paper relates them to Aristotle's categories and illustrates their application in her Information Coding Classification, while Claudio Gnoli's paper considers them in the light of the ontological perspective of levels of reality.

Another extension of facet theory is that from bibliographic classifications (which are symbolic systems using a notation) to the verbal indexing systems known as *controlled vocabularies* such as thesauri and subject heading lists. Among the main implementations of this are Eric Coates's British Technology Index, Jean Aitchison's Thesaurofacet, focused on engineering terms, and the Getty Art and Architecture Thesaurus. Vanda Broughton, another leading author in facet analysis, discusses how the main general faceted system of today, the Bliss Classification 2nd edition, edited by her and Jack Mills, can act as a source for building faceted thesauri, and which obstacles remain to be passed in order to achieve this. Application of faceted thesauri to the digital search environments is then illustrated by Douglas Tudhope and Ceri Binding.

Work on verbal systems also progressed in the Indian school initiated by Ranganathan. This produced the POPSI indexing system by Ganesh Bhattacharyya, who also suggested the interesting notion of *classaurus*, a system performing functions of both classifications and thesauri (see Broughton's paper); its application to the online search environment has been explored by Devadason (1985). The English school of verbal faceted systems, centred on Derek Austin's PRECIS, has later developments in Italy, where the Gruppo di Ricerca sull'Indicizzazione per Soggetto is applying facet analysis, in the form of a "scheme of roles", to the revision of the national subject heading list: Alberto Cheti and Federica Paradisi's paper deals with the notion of facets in this context.

Authors working with verbal systems have found that facet analysis can be related to syntactic concepts in linguistics, like that of *deep cases* in Fillmore's (1968) case grammar: a facet plays a function in subject strings very similar to that played by cases or prepositions in languages, which in turn can be related to cognitive processes (Hutchins 1975; Cheti 1990). It can be remarked here that the PRECIS indexing system also drew on Chomsky's generative grammar.

Other analogies have been noticed in the social sciences, where Guttman even adopted the same term *facet* without being aware of Ranganathan's work (Beghtol 1995). Szostak's (2003) recent proposal of analyzing human science theories according to five dimensions goes in a similar direction. One can conclude that facets are a natural way of analyzing and organizing any kind of concepts: for example, an evolution from enumerative to faceted classifications parallel to that of bibliographic tools can be observed in musicology, where faceted alternatives to the classical Hornbostel-Sachs system of musical instruments have been proposed by Dräger (1947) and Hood (1971).

The applications which are currently receiving most attention are those connected with the huge growth of computer science. Aida Slavić's paper explains how faceted

classifications should be coded in digital formats in order to be exploited in their full potential. In the contemporary context of intensive research and applications concerning information, facets are arousing the interest of database analists, software classifiers (Prieto-Díaz 1991), and graphical interface designers (Hearst 2006). Uta Priss's paper reviews a number of computer science structures sharing several aspects, though unfortunately not terminology, with facets.

Knowledge managers and information architects now seem to be discovering facets again in information science, as La Barre's (2006) reviews have shown. Readers must be aware that these interpretations of facets are often more generic and loose than those of the original English school, as they usually don't make use of fundamental categories, citation order, nor notation. This is probably influenced by the "light" version in which facet analysis has been received in Northern America, as exemplified in the search for "a simplified model for facet analysis" (Spiteri 1998) and in the Faceted Application of Subject Terminology project of the Library of Congress, where what is called "facets" are just Topic, Space, and Time.

Of more substantial theoretical interest appears to be the crossbreeding of facet analysis with ontologies for knowledge representation (see section 4.3 in Tudhope and Binding's paper). In ontological terms, facets can be a way to specify and manage relations between concepts. One such application is being developed in the General Formal Ontology project at Leipzig University (Heller and Herre 2004), where facets are a component of a composite system also based on ontological categories and levels of reality. This looks like a promising direction for effectively joining the experience gained in applications with more general theoretical issues.

Facet analysis is the object of a vast amount of literature. To offer only some essential references, an excellent starting point is A.C. Foskett's (1996) book on subject indexing tools,

including faceted classification techniques. An audio-plus-slides introduction to facet analysis is made available online by Broughton (2007). The first original sources are the writings of Ranganathan, of which the major theoretical work is "Prolegomena to library classification" (Ranganathan 1967): although being a trove of important ideas, it does not make flowing reading, being structured into many numbered small sections which progressively construct a very technical terminology. The Classification Research Group programmatically stated its subscription to Ranganathan's principles (CRG 1957), recently revived by Broughton (2006) in a paper having significantly the same title. The first methodological book on applying facets to special schemes was produced by Vickery (1960). Three CRG members then wrote complementary monographs on the classification of the natural sciences (Vickery 1975), of the social sciences (Foskett 1963), and of the humanities (Langridge 1976), which are good references on their ideas and methods. Two more CRG members are authors of probably the best manuals of bibliographic classification (Mills 1960) and of verbal subject indexing (Coates 1960) from a faceted perspective. A recent extensive, well-documented bibliography on facet analysis is that by La Barre (2006, pp. 278-306); others have been compiled by Hong (2005) and Denton (2003): the latter is focused on applications to the Web.

This special issue aims to be a further contribution and update on a subject which, despite being more than eighty years old, continues its resurgence in many forms and new applications. I am profoundly grateful to all the authors for enthusiastically accepting our invitation to contribute to it, and wish that their papers attract more people to the study and use of this powerful notion.

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guest editor

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