Chapter 9
Knowledge Building and Computer Tools

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ABSTRACT
The possibility of having free and open access to data, information, books, and conference papers allows each person to improve his/her comprehension and personal beliefs, so that he/she can embark on a social process of interaction with other people and with shared scientific and technological knowledge. This chapter describes some essential components of a knowledge-building environment based on open and free access to data. The internet-based knowledge-building environment also allows access to books, articles, and any publications that transform data into knowledge. The primary objective of the proposed knowledge-building environment is to document, store, and share all data and methods, making them available for review by other scientists or men of learning, who can then verify and reproduce the results.

INTRODUCTION
The diffusion of knowledge through books and use of the printing press, as well as the expansion of mass education through schools and universities, has accompanied the history of human evolution from the Renaissance to the present day. The current spread of new technologies and the emergence of the internet as a public network are carving out fresh opportunities to widen public knowledge and improve human life. In modern society, technologically-mediated information is constantly growing and permeates all aspects of civil society.

The link between Scientia (knowledge in Latin) and society has been cause for debate since the beginning of human civilisation. Socrates declared that he moved philosophy from heaven to earth. The 18th century saw the rise of reportage in The Spectator, a daily publication founded by Joseph Addison, as well as the so-called Living Room Philosophy, followed by Voltaire’s Philosophie pour les Dames and Sade’s Philosophie dans le boudoir. At the end of the 19th century, in Vienna, a journalistic presentation of information became popular that led Kraus (1909) to state: The making of a journalist: no ideas and the ability to express them. In 1976, the United States sociologist Daniel

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Bell (1976) introduced the notion of “information society” in his book *The Coming of Post-Industrial Society*, where he stated that the main axis of the new world society would be theoretical knowledge and he warned that knowledge-based services would be transformed into the central structure of a new economy and of an information-led society, where ideologies would become superfluous.

The present situation is very well represented by the opening stanza of T.S. Eliot’s (1934) Choruses from “The Rock”:

*Where is the wisdom we have Lost in knowledge?*
*Where the knowledge we have Lost in information?*

The question we should ask ourselves is: do we need to progress towards an information society or to a knowledge-based society? In the real world, information is disjointed and often deflected by commercial or political interests. They become social barriers that limit the possibility to move from *Scientia* towards an enhancement of cooperation, openness, and links to a knowledge-based society.

There is a virtuous circle in the scientific community that transforms data into information then into knowledge. This circle should be opened to move from fundamental to applied knowledge for a direct social benefit. The level of scientific literacy in the general public and the interest of young people in science should be raised, in order to usher in a new Renaissance that is not only restricted to a few privileged sectors of society, but expanded to society as a whole.

Knowledge is at the base of improvements in society and the economy. Knowledge-sharing (including information, skills, expertise) makes a group, an organisation and society as a whole more competitive. The spread of the internet and new communication technologies has provided opportunities to support ‘communities of practice’ (Lave and Wenger, 1991), i.e. groups of people with a common interest in specific fields. Knowledge management is driven by the need (inter alia) to make knowledge content available for new development cycles and for the supply of products and services to different communities. In any given community, easier access to knowledge can decrease the learning curve of new comers and prevent the ‘re-invention of the wheel’, spawning new ideas for products and services.

Public engagement with science has become an almost obligatory passage point for science policy in Europe, even if its substantive forms and meaning still need development (Mejlgaard et al., 2012). A key issue for knowledge is innovation. The European Union has purposely tied its vision of scientific research to one of economic competitiveness through continuous technological innovation. In what is now called the “knowledge age,” the health and wealth of societies depends increasingly on their ability to innovate.

UNESCO (2005), linked the concept of knowledge society to the Universal Declaration of Human Rights that includes: freedom of information, media pluralism, academic freedom, right to education, the right “to freely participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits” (Article 27, paragraph 1, of the Universal Declaration of Human Rights).

The general public, not just a specialised elite, needs to work creatively with knowledge. From a scientific and technological point of view, the knowledge society presents many challenges, as it requires the use of new technologies, including informatics, and the ability to use research results in a new and constructive manner.

This paper describes a simple knowledge-building environment that includes access to data and information residing in different information systems.

**BACKGROUND: KNOWLEDGE BUILDING ENVIRONMENT**

Knowledge Building may be defined as the production and continuous improvement of ideas of
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