1.   INTRODUCTION

When speaking about computers and ethics everybody quotes James Moor:

"computer ethics is the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology." (Moor 1985)

Without mentioning specific ethical issues, Moor insisted that computer ethics must involve technology and substantial scientific and technological evaluation. In his perspective it is difficult to make a clear distinction between computer ethics and computers and society issues. Other influential authors were Deborah Johnson (Johnson 1985; 1994; 2001) and Joseph Weizenbaum. The latter explicitly touched upon the question of ethics, indicating the types of research that he would not undertake, except after careful consideration and with defined limits (Weizenbaum 1976). Similar preoccupation was noted in the ACM Computing Classification Systems under 'Computing Profession' - but the word ethics does not appear explicitly before 1991. Amongst curriculum proposals, an ACM/JEEE-CS Task Force in 1991 proposed a specific module on 'Social, Ethical, and Professional Issues' covering topics like the historical and social context of computing, responsibilities of the computing professional, and intellectual property rights (ACM/JJEEE-CS 1990). Other modules have been added in the 2001 ACM/JEEE-CS proposal (ACM/IEEE-CS 2001).

In this paper, I will initially consider the most recent proposals of curricula, which are the structure that specialists find suitable for the field of *Ethics of computing* (my preferred term). I will then confront, from experience that we have in EFIP since 1988, theory and practice, and derive recommendations for defining the most urgent ethical issues in computing today, and those considered worthy of a specific educational programme. I will outline the main themes that appear in textbooks and reflect current thinking. IFJP is an academic and professional body and my reflection will be mostly at that level.

2.   RECENT STRUCTURED PROPOSALS IN CURRICULA FOR COMPUTER SCIENTISTS

The widely publicised report 'Consequences of Computing: A Framework for Teaching the Social and Ethical Impact of Computing[1] tries to link the topics of ethical analysis and the levels of social analysis (ImpactCS 1996).

The proposal exhibits certain weaknesses - the heterogeneity of some categories in the levels of social and the unclear distinction between responsibility and ethical issues (Berleur 1996). Nevertheless, their grid, which is proposed for different technologies such as Electronic Communication, Medical Technology and Artificial Intelligence, helps teachers and students remain open-minded about the main issues associated with specific uses of ICT. It allows the mapping of Levels of Social Analysis (individuals, communities and groups, organisations, cultures, instiutional sectors, nations and global) against a range of Topics of Ethical Analysis (responsibilities and ethical issues). The main idea is that in discussing problems people may acquire desirable social and ethical skills. However, the ethical issues which are covered: individual and professional responsibilities, and more specifically quality of life, use of power, risks and reliability, property rights, privacy, equity and access, honesty and deception, are in a way privileged. I recognise that most of those issues have an ethical content, but I do not know why those categories were chosen and not others.

Table I. Social and professional issues

ITEM	TOPIC	HOURS
SP1	History of computing	1
SP2	Social context of computing	3
SP3	Methods and tools of analysis	2
SP4	Professional and ethical responsibilities	3
SP5	Risks/liabilities of computer-based systems	2
SP6	Intellectual property	3
SP7	Privacy and civil liberties	2
SP8	Computer crime	
SP9	Economic issues in computing	
SP10	Philosophical frameworks	

In 'Computing Curricula 2001', the Social and Professional Issues identified in 1991 have been considerably expanded, although they represent only 16 of the 280 core hours (ACM/DEEE-CS 2001). They are shown in Table 1. Even the last three categories, although very important, are elective hours.

These two curriculum examples illustrate the convergence of opinion about the key topics associated with the ethics of computing: professional and ethical responsibilities, risks and liabilities (and reliability), intellectual property, and privacy and civil liberties.

To complement this overview, Table 2 illustrates the topics covered in eleven Handbooks since 1985, Moor's publication date (Johnson 1985; 1995; 2001), (Ermann 1990), (Kallman 1993), (Forester 1994), (Oz 1994), (Johnson-Nissenbaum 1995), (Kizza 1998), (Spinello 2000), (Langford 2000).

Table 2. Books on ethics of computing

TOPIC	Included in HANDBOOKS
Privacy and security	10
Theory	9
Software ownership, Copyright, IPR	8
Liabilities (Defective programs)	7
Codes and Professional ethics	7
Legal issues	5
Computer crime	4
Hacking, Viruses	4
Power, Democracy	4
Quality of worklife	3
Justice (distribution of work) - Employment, Third World, AI	3
Whistle blowing	2
AI, Expert systems	2
Networked world	2
Free speech, Control of content	2
Internet Governance and regulation	1
Quality of personal life	1
Strategic Defence Initiative (SDI)	1
Risks of computing	1
Pornography	1
Encryption	1
Netiquette	1
Digital divide	1

If we consider the top categories, which appear in more than half of these books, it is obvious that the ethical issues which are perceived today as the most important may be summarised as follows (Table 3):

Table 3. Quoted ethical concerns

Broad Issue	Specific issue
Classical	Privacy
Classical	Risks and security
Classical	Intellectual property rights
Classical	Responsibility, reliability and liability in designing information systems or software
Classical	Professional codes of ethics or of conduct
Classical	Computer crime
Recent Internet-related	Equity of access
Recent Internet-related	Digital divide
Recent Internet-related	Pornography
Recent Internet-related	Netiquette