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ETHICBOTS

Emerging Technoethics of Human Interaction with Communication, Bionic and Robotic Systems

Coordination Action

Structuring the European Research Area

D4: Analysis of national and international EU regulations and ethical councils opinions related with technologies for the integration of human and artificial entities

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Table of Content

Table of Content....2
Executive Summary....4
Introduction....5
1. Goals....5
2. Topic....5
3. Extent of the Analysis....6
4. On the Structure of the Report....7
A. General Part....9
1. Introduction to Part A....9
2. Definitions....9
2.1 Robots....9
2.2 Autonomous Software Agents....11
2.3 Bionics....13
3. Fundamental Challenges....14
3.1 The Frame of the European Charter of Fundamental Rights....14
3.1.1 “Protection of Human Dignity” as a Fundamental Principle....15
3.1.2 Field of Application and Subjects of Fundamental Rights....15
3.1.3 Legal Restrictions of Fundamental Rights....16
3.1.4 Further Challenges....18
3.2 Regulations for Future Technologies....18
4. Summary of the Essential Results of Part A....19
B. Special Aspects....21
1. Introduction to Part B....21
2. Robots....21
2.1 Responsibility and “Autonomous Robots”....21
2.1.1 Machine Safety....21
2.1.2 Responsibility for Complex Machines....23
2.1.3 Prospect: Roboethics/Machine Ethics....25
2.2 Machines as a Replacement for Humans....26
2.3 Tele-Presence....27
2.4 Special Fields of Use....29
2.4.1 Medicine and Health System....29
2.4.2 Armed Forces....30

2.4.2.1 Bi-Directional Dual-Use 31
2.4.2.2 Robots as Media 32
2.4.3 Entertainment 32
3. Autonomous Software Agents 33
3.1 Data Protection and Surveillance 34
3.2 Filtrating and Blocking 36
3.2.1 Youth Protection and Related Rights to Protection 37
3.2.2 Free Access to Knowledge and Participation in Public Life 39
4. Bionics 40
4.1 EGE Opinion No. 20 41
4.2 Research on Animals and Humans 42
4.3 The Example of “Sex Change“ in German Law 43
5. Summary of the Essential Results of Part B 43
References 45
Annex: Overview of national and international ethical regulations 48

Executive Summary

The subject of this report are existing *ethical regulations* concerning the integration of artificial entities into the human society or the human body. This includes the opinion of the "European Group on Ethics in Science and New Technologies to the European Commission" (EGE). One essential result of subtask T 4.1 is the "fairly detailed overview of national and international ethical regulations" which will be presented in the Annex of this report. The main text offers an analysis of existing regulations. It must thus be emphasized that this report aims primarily at presenting the status quo, since the critical discussion of existing regulations as well as the debate on new regulations or those which should be modified is the subject of subtask T 4.2.

The text consists of a general and a specific part.

In the first section of the general part A we will present at first fundamental challenges and principles which in our opinion are important for all three ways of integrating artificial entities. We also address the problem of how to define "robots", "software agents" aso., since for developing a "proposal of standards and recommendations for EU techno-ethical regulations" (subtask T4.2) the question of what exactly is the subject of these standards and regulations is of essential importance.

In the second section of Part A we introduce the European Charter of Fundamental Rights as the frame which is set for ethical regulations at the European Level. We concentrated on giving the basic thoughts as expressed by the Charter, i. E. by pointing out to the outstanding position given to the term "human dignity". Since the Charter itself gives a number of restrictions (barriers) regarding the fundamental rights as being granted in principle, we also came to the conclusion that the purpose for which a certain technology is used plays an important role for justifying a restriction of fundamental rights. Insofar, the typology of robots, AI systems, implants aso. which is to be developed should take the respective purpose into account.

In Part B we intend to discuss special challenges regarding new technologies or existing regulations: With regards of "robots" we will address the subjects of responsibility (including machine safety and responsibility for complex machines), machines as a replacement for humans, tele-presence, and special fields of use (medicine and health care, warfare applications, and entertainment). In the area of "autonomous software agents" we will deal with data protection and surveillance as well as filtrating and blocking of information by agents. Here we will have a look at youth protection and the free access to knowledge. Finally, we will have a look at the regulations on bionics, where we will focus on the EGE Opinion No. 20 as the central document at the EU level.

One major finding of part B is, while there is still a need for regulations in the field of bionics, a vast number of regulations can be applied with regards to artificial agents (robots and software agents), although there are no regulations dealing explicitly with neither autonomous robots nor autonomous software agents.

Introduction

1. Goals

The subject of this report are existing *ethical regulations* concerning the integration of artificial entities into the human society or the human body. In the context of the Ethicbots project, three kinds of integration are distinguished:

- human softbot integration
- human robot, non-invasive integration, and
- physical, invasive integration.

The report will take up this way of distinguishing and in each chapter will introduce appropriate ethical regulations, while distinguishing between

- international
- European, and
- national regulations

In this context the focus has been put on European regulation measures, as subtask T 4.1 is supposed to serve as the basis for working out a "proposal of standards and recommendations for EU techno-ethical regulations" (subtask T4.2). This includes the opinion of the "European Group on Ethics in Science and New Technologies to the European Commission" (EGE).

One essential result of subtask T 4.1 is the "fairly detailed overview of national and international ethical regulations" which will be presented in the Annex of this report. The main text offers an analysis of existing regulations. Here, most of all the fundamental principles will be worked out as being expressed by existing regulations.

The critical discussion of existing regulations as well as the debate on new regulations or those which should be modified is the subject of subtask T 4.2. It must thus be emphasized that this report aims primarily at presenting the status quo. However, there will be pointing out to possible challenges and obvious gaps, as this report is supposed to provide the stimulating basis for working on subtask T 4.2.

In this report we will use "artificial entities" as a collective term for robots, software agents, as well as artefacts meant for being integrated into the human body, while we use "artificial entities" as a collective term for robots and software agents.

2. Topic

According to JORDANA/LEVI-FAUR (2004: 3), while following BALDWIN ET AL. three "main meanings for the notion of regulation" can be found:

- *Regulations as specific forms of governance:* a set of authoritative rules, often accompanied by some administrative agency, for monitoring and enforcing compliance.
- *Regulation as governance:* in a general sense, that is, the aggregate efforts by state agencies to steer the economy.
- *Regulation in its widest sense:* all mechanisms of social control.

Although in this context the authors explicitly refer to regulations in the field of economy, in our opinion distinguishing between the various possible meanings seems to be of general significance. This is even more true as the separation of economy and technology in the field

of applied ethics may well serve for analysis, but it is also connected to the danger of not appropriately taking into account the actual interaction of economy and technology. Thus, we must take the fact into account that the spread of technologies happens primarily by market mechanisms and also the use of technology always happens under economically defined prevailing conditions. Furthermore, for "institutionalizing technology ethics and economy ethics ... parallel means, structurally similar or the same forms are used to the farthest degree" (LENK/MARING 1998: 241).

In this report we will most of all deal with *regulations in the narrowest meaning (regulations as targeted rules)*. Particularly in respect of *techno-ethical regulations*, however, there must be pointing out to the regulating effect of *mechanisms of social control*. However, for this report we will discuss these *regulations in the widest sense* only there where they are documented e. g. in the form of "codes of ethics" or "codes of good practice".

3. Extent of the Analysis

A particular challenge with doing Subtask T 4 was in the fact that there are only a few regulations dealing explicitly with one of the three ways of integrating artificial entities into human society. They are contrasted by a vast number of regulations which can be applied. Due to this, a restriction of the extent of the analysis was necessary.

Against observing existing regulations allowing analogical inferences on the specific subjects of the project one might object that these new technologies might result in a fundamental change regarding our idea of man and of society and that existing regulations must be criticized for being too much "human centred". To this we must say that firstly – as already mentioned under 1.1 – this report is on the status quo and that secondly even those who predict a fundamental change foresee it only for the future. E. g. LEVY (2006: 393-423) argues that we need a new legal branch, "robotic law", to be able to do justice to the changed attitude towards robots which after some decades will be found in almost every household. This development, he states, should be compared to the development of "environmental law" since the late 1960s:

> The environment and its components, the air we breath, our climate, the levels of noise we experience, all lack many of the characteristics that are claimed to be necessary as essential attributes for being human, yet even without these attributes the environment is considered important enough to mankind for us to want to protect it. In the same way robots will, before too long, become as important to mankind that we will grant their race and its individual members the benefits of legal protection, to give them legal rights. (LEVY 2006: 397)

Elsewhere, LEVY asks:

> When robots posses consciousness and feelings, in fact when they possess the full range of personal capacities and potential of human beings, will they have the same rights that most humans do now, such as those listed in the United Nations Declaration of Human Rights of 1948? (LEVY 2006: 394)

Apart from the fact that the above mentioned declaration is valid for *all* and not only for most humans, it cannot be ruled out in principle that the answer is a clear "yes" – under the condition, however, that indeed robots have the above mentioned characteristics. But today this is not the case yet, so that in the context of this report we assume that artificial entities are no individuals and thus not the bearers of appropriate rights. This does neither mean that in legal and ethical respect we could not grant a special status to robots nor that the development of artificial individuals can be ruled out in principle.

However, for the actual moment and the nearer future we do not see the necessity to demand a fundamental change of our conception of legality as early as today, only because

of a possible development. In so far, for this report we will consider only humans to be persons, and only persons to be the bearers of individual rights and obligations. Thus, we choose a human-centred approach (see D2, paragraph 6).

One important criterion for the relevance of a measure of regulation is its topical field, which must explicitly include at least an ethically sensitive item in D1 or D2 and/or a subject of the project (robot, AI, or bionic). The emphasis was placed on fundamental regulations. In the field of the numerous single regulations refering to a fundamental regulation there is thus not striving for completeness. Regarding the subject of machine-safety, this means e. g. that the so called machine guideline (98/336/EG) was included into the list, as it explicitly discusses the fact that people might be endangered by machines as an ethically sensitive item. On the other hand, those single regulations and norms as developing from this were only taken into account if they deal explicitly with the topic of the project. One example for this are the European norm EN 775 (Manipulating industrial robots – Recommendations for safety) and the international norm ISO 10218-1 (Robots for industrial environments – Safety requirements – Part 1: Robot). Even if industrial robots are not in the focus of the Ethicbots project, those safety standards as defined for them may be applied to other fields, such as e. g. service robots. This is particularly true as long as no specific regulations for this field can be found.

In contrast to the usual exclusion of criminal law from the field of regulations, we will discuss existing norms of criminal law at the level of national law, as e. g. in Germany single sections, such as Par. 131 (depiction of violence) or Par. 184 (distribution of pornographical literature), of the German criminal law are immediately relevant for our subject. Example: Par.131 concerns “literature ... depicting cruel or otherwise brutal violence against humans or manlike beings in such a way as to express the glorification or playing down of such violent actions or depicts the cruel or brutal nature of such actions in a way which is a violation of human dignity”. As robots may be seen as “manlike beings” if their appearance is similar to that of a human, this section was included into the list of relevant regulations of the Annex. This section is a subject of the report also because it serves particularly for the protection of underage persons and thus is relevant in respect of the subject of “robots in the children´s room”, which has been identified as an ethically sensitive item already in D1. But it also concerns the use of software agents by young people to gain information, as we will explain in more detail later on.

International and national regulations are consulted particularly if there are (still) no equivalences at the European level. Accordingly, also in this field there is not striving for completeness. Also we did not not include a complete list of the respective national laws which serve for enforcing decisions by the members of the European Community.

4. On the Structure of the Report

The text consists of a general and a specific part as well as of the annex.

In the general part A we will at first discuss fundamental challenges and principles which in our opinion are important for all three ways of integrating artificial entities. Here, both general thoughts on the problem of how to define “robots”, “software agents” aso. are found as well as fundamental explanations on the frame as set by the European Charter of Fundamental Rights.

The particular part B is divided into three paragraphs dealing with one way of integrating artificial entities respectively. In these paragraphs we will deal with single aspects respectively, such as e. g. the challenges by telepresence in the field of robotics or by software agents being a part of surveillance infrastructures. We are conscious of the fact that these single aspects are partly important for all three kinds of integration, but to avoid redundancy we decided to proceed this way. Furthermore, there must be taking into account

that the goal of this report is the identification of relevant regulations. In so far, it is enough to point out to the importance of a certain regulation for one of the three topical fields of the project. However, by way of cross-references in the respective paragraph we will point out to these overlappings.

A. General Part

1. Introduction to Part A

Subject of the general part A of this report are the fundamental challenges and principles which must be taken into account in regard of the three ways of integrating artificial entities.

In the first section we will deal with the challenge of developing an appropriate definition of the subject of the regulations.

In the second section we will at first introduce the frame which is set for ethical regulations at the European level by the European Charter of Fundamental Rights. Then we will shortly discuss the question of from when on the suggested regulations should be valid.

2. Definitions

For developing a "proposal of standards and recommendations for EU techno-ethical regulations" (subtask T4.2) the question of what exactly is the subject of these standards and regulations is of essential importance.

In general, the "Agreement on technical barriers to trade" of the World Trade Organisation, particularly Annex III (Code of Good Practice for the Preparation, Adoption and Application of Standards) must be taken into account for this. Thus it must be emphasized that in the following only a preliminary definition for working in the context of the report is intended.

2.1 Robots

Already in D1 there has been pointing out to the fact that there are only a few binding definitions of the term "robot". Mentioned were the general definition according to ISO/TR 8373 as well as the definition by the World Robotics Report (2006) of the term "service robot" (D1: 40).

A comparable preliminary definition as well as classification of "service robot" was given by the International Federation of Robotics (2005):

> Definition: A robot which operates semi or fully autonomously to perform services useful to the well being of humans and equipment, excluding manufacturing operations. Classification: Servicing humans (personal safeguarding, entertainment etc.), Servicing equipment (maintenance, repair, cleaning etc.), Other performing an autonomous function (surveillance, transport, data acquisition, etc.) and/or service robots that can not be classified in the above two groups. (IFR 2005)

As a distinguishing feature in comparison to other types of robots, the IFR also emphasizes the ability of (semi-)autonomous behaviour as well as the purpose, which must not be in the field of producing goods ("manufacturing operations").

A summarizing definition of "robots" in general is found in MOSER (2004: 40):

> A robot is a mechanic system whose moving functions are appropriate to those of living organisms and/or which combines its moving functions with intelligent functions (capability of judgement, capability of perception, capability of adjustment, capability of learning) and acts according to human will.

In this context he takes into account the classification by the Japanese Robot Association (JARA) which distinguishes five classes of robots:

> Fixed Sequence Robot: tool with a fixed pattern of movements, change of pattern requires much work

> Variable Sequence Robot: similar to the Fixed Sequence Robot, but movements can be altered quickly
> Playback Robot: movement which is simulated by user is stored and repeated arbitrarily
> Numerical Robot: defined operations of stored work information are carried out appropriately
> Intelligent Robot: robot may be sensor-controlled and is able to independently influence on the program run

What makes Moser´s summarizing definitions interesting is that they emphasize the fact that a robot is subject to a human´s will, while at the same time taking the class of "intelligent robots" into account. Nevertheless there is the question if this fact, which for the time being is definitely given as a matter of fact, must be part of the definition. However, the definition is mentioned here because the analogy to the moving functions of living organisms will have to be taken into account for discussing potential danger by robots.

A general definition was also given by CHRISTALLER ET AL: (2001: 19), for which there was consciously giving up on "anthropomorphous features of the performance of robots":

> Robots are sensomotoric machines for the extension of human capability. They consist of mechatronic components, sensors, and computer-based control and steering functions. The complexity of a robot makes it clearly different from other machines, due to bigger number of levels of freedom and the variety and extent of its ways of behaviour.

This definition is different from e. g. the above mentioned IFR definition of service robots in so far as the complexity of the machine but not its autonomy is emphasized. Similar to MOSER, however, also by this definition we find a clear reference to man, whose capabilities are extended.

Another definition, which is also relevant for this report, is given in the context of the "Common Military List of the European Union" (2007/197/CFSP). There, a robot is defined as:

> A manipulation mechanism, which may be of the continuous path or of the point-to-point variety, may use sensors, and has all the following characteristics:
> a. Is multifunctional;
> b. Is capable of positioning or orienting material, parts, tools or special devices through variable movements in three dimensional space;
> c. Incorporates three or more closed or open loop servo-devices which may include stepping motors; and
> d. Has 'user-accessible programmability' by means of the teach/playback method or by means of an electronic computer which may be a programmable logic controller, i.e., without mechanical intervention.

Excluded are a. o.:

> 1. Manipulation mechanisms which are only manually/ teleoperator controllable;
> 2. Fixed sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. … ;
> 3. Mechanically controlled variable sequence manipulation mechanisms which are automated moving devices, operating according to mechanically fixed programmed motions. …;

Due to these criteria of exclusion we may ask if in this sense that class of "Fixed Sequence Robots" as mentioned by the JAR can be defined at all as "robot". To answer this question, surely the context of of Document 2007/197/CFSP would have to be taken into account, whose definitions, afterall, serve for export control of technologies which potentially might be used militarily. Here, surely a strict definition was prefered, which does not hinder the export of industrial machines. Nevertheless, this is reminiscent to the classical definition according to the VDI guideline 2860 (1990) which, according to CHRISTALLER ET AL. (2001: 19), was mostly adopted for the international ISO standard 8373 (1994). The VDI definition says:

> A robot is a free and re-programmable multifunctional manipulator with at least three independent axles, to move materials, parts, tools, or special machines on programmed, variable tracks to accomplish various tasks. (quot. after CHRISTALLER ET AL. 2001, p. 18)

As a summary we may state that that all mentioned definitions emphasize the mechanical nature of robots, thus understanding them to be machines being able to act in the world. Although there are obvious efforts to draw a line between classical industrial robots and new types, such as e. g. service robots, the difficulties with drawing a clear line without reaching back to anthropomorphous features such as “autonomy” or “intelligence” are obvious.

In the following we will particularly follow the suggestion by CHRISTALLER ET AL. (2001) and emphasize that complexity is the typical characteristic of those robots which are the subject of this project. This results in the predictability of their behaviour to be a particular challenge.

If in the following there is speaking of “autonomous robots”, this means complex machines which are supposed to be able to solve tasks delegated to them mostly independently (i. e. without further intervention by man).

Following the IRF, machines which are not primarily used in the field of industrial production are called “service robots”, in the context of which particularly “autonomous service robots” according to the “Description of Work” (p. 9) are of interest.

Nevertheless, we must also point out to the fact that these are preliminary definitions and that working out a definition and classification of robots is an essential challenge for the reasonable design of regulation measures.

2.2 Autonomous Software Agents

At first, the “Description of Work” (Annex I, Contract 017759) speaks of “human softbot integration” (p. 6). Later, the topical field is explained as “intelligent information and communication systems” (p. 10). For those examples as being dealt with in D1, “AI systems for communication and information” (p.21) is used as a title, in the context of which there is then distinguishing between “AI systems for web surfing and edutainment” (p. 23), “multi-agent decision making” (p. 33), and “learning AI systems and robots” (p. 35). Nevertheless, discussing the examples of D1 starts with the “definition of an intelligent software agent” (p. 21). For D2, the comprehensive term “artificial intelligence” (paragraph 4.3.1) is chosen, which can surely be justified by the examples given there, whereas for “Introduction” (p. 10) there is reaching back again to the expression “softbots” which is at first used for the “Description of Work”.

The different ways of defining the topical field in the context of the three essential documents of the Ethicbots project shows that although the initially used name “softbots” seems to be intuitively reasonable (particularly in analogy to “robots”), the examples for “AI systems for communication and information” cannot always be grasped in analogy to robots, if refered to practical work. This is due to two reasons:

a) Expressions such as “softbots” or “autonomous software agents” implicate individual actors to which an action which they carry out as individuals may be attributed. “Softbot X searches the Internet” must then be understood in analogy to the sentence: “Robot dog Y fetches the ball.” In both cases, an action (“searching the Internet”, “fetching the ball”) is attributed to an individual carrying it out. Such a view emphasizes the subject nature of the agent carrying out the action, i. e. being humans we tend to perceiving such a system as “an independent being with its own will and freedom of action” (SCHOLTZ 2005). To perceive a system as being of “subject nature”, it must – rightly so or not – be identified as an individual “being”. However, not every autonomous software system has an identity in this sense.

b) Instead, expressions such as “intelligent information and communication systems” or “AI systems for communication and information” emphasize the system nature, in the context of which “system” may be understood to be a composit unity, made of different parts. As systems can be distinguished from other systems and entities, also they have an identity, but in many cases it is not perceived as being of subject nature. This may still be the case with complex software systems such as e. g. search machines, to which an identity is attributed (e. g. “Google”). But is it justified to describe those complex systems as individual agents which today are discussed by keywords such as “ambient intelligence”, “ubiquitous computing”, or “augmented reality”? Here, two problems become apparent: on the one hand, complex systems may again consist of (complex) sub-systems which may be described as “autonomous agents”. On the other hand, agents as interfaces between such systems and their users may contribute to users tending to equate the system with the agent which from the technological point of view is only a subsystem of the whole. In the context of the project this raises questions such as the following ones: must an autonomous robot as a whole be considered an “agent” or the interface of a “software system”?. How could “smart embedded agents” be distinguished from those systems to which they are an interface (example: brain-computer-interfaces, see D1, p. 22)? aso.

Despite these difficulties with drawing a line, due to pragmatic reasons in the context of the report we decided for placing the emphasis on “autonomous software agents”. On the one hand, there is already a lively debate on the consequences of complex systems according to the paradigm of “ubiquitous computing” and comparable approaches, on the other hand this way we follow the direction already taken by D1 and D2.

Thus, following D1 an “autonomous software agent” is understood to be a “software agent which is capable of exhibiting some form of intelligent behaviour”. In this context the situatedness of an agent counts as a distinguishing feature towards other software systems, in the context of which here most of all those systems are of interest to which tasks can be delegated:

> Delegacy is a central concept for the development of agent or multi-agent systems and technologies. Intelligent agents can engage in extensive planning and inferencing activities, and therefore the relationship of trust between agents and their human or artificial users becomes crucial, especially when complex operations are performed by the agent before any human observer is in the position to understand or react. (D1: 21)

Already FRANKLIN/GRAESSER (1996) supported a similar view, who in the field of „computational agents“ (in contrast to „biological“ and „robotic agents“) distinguish “software agents” from “artificial life agents”. In our opinion, however, the latter differentiation does not seem to be of great significance for our report, so that by “autonomous software agents” we mean that sub-class of “agents” which is called “computational agents” by FRANKLIN/GRAESSER (1996).

The technological point of view towards single agents as sub-systems of complex systems, e. g. in the context of “ubiquitous computing”, will be taken into account in so far as we will ask about the effects of such agents for more complex systems. This concerns e. g. the potential change of the WWW by the increasing spread of “semantic web” technologies.

As another distinguishing feature towards “robotic agents” we set that software agents in the above mentioned sense must primarily be understood to be “information and communication systems”. Different from robots, they thus extend only those human skills which deal with handling information.

Of course, mixed forms may be imagined, where software agents use robots to interact with the physical world, e. g. to collect information. Such mixed forms, however, will not play any essential role for this report.

In analogy to the challenges which occurred with defining “robots” we must finally state that a binding definition of “autonomous software agent” is still lacking:

> There is no general agreement on a definition of the word ‘agent’, just as there is no consensus within the artificial intelligence community on a definition of the term ‘artificial intelligence’. In general, one can define an agent as a piece of software and/or hardware capable of acting in order to accomplish a task on behalf of its user. A definition close to present-day reality is that of Ted Selker from the IBM Almaden Research Center:
> ‘An agent is a software thing that knows how to do things that you could probably do yourself if you had the time’.

This statement by BORKING/VAN ECK/SIEPEL (1999: 6) seems to be still valid in so far.

2.3 Bionics

Under “bionics”, the “Description of Work” (p. 6) files the application examples of “prosthesis”, “enhancement of human sensorimotor capabilities”, and “ICT implants”, while in the following “producing a reliable, long term brain-computer interface” is mentioned as “the main area of technological interest”. In D1, also “bionic experiments on animals” are given. In D2, most of all “Brain-Machine Interfaces” (4.3.31) and “Medical Robotics and Prosthetics” (4.3.3.2) are discussed.

As emphasized already in paragraph 6.2 of D2, “bionics” require an approach different from other kinds of integration: “Robots and softbots are artefacts which are external to the human body, while implants involve by definition invasive forms of integration with the human body. Thus, the focus of the ethical evaluation of implants concerns the human body and related bio-political issues.” The question of what “bionics” are can be answered easily, in so far as they are either applications of robotics being directly integrated into the human body or “ICT implants”. However, in the case of applications from the field of “robotics” the above mentioned difficulties with defining are passed on, whereas “ICT implants”, while following EGE Opinion No. 20 (Ethical Aspects of ICT Implants in the Human Body) can be defined and divided as follows:

> ICT devices: Devices using information and communication technologies usually based on silicon chip technology.
> …
> Passive ICT implants: ICT implants in the human body that rely on an external electromagnetic field for their operation … .
> Online ICT implants: ICT implants that rely for their operation on an (“online”) connection to an external computer or which can be interrogated (“online”) by an external computer … .
> Offline ICT implants: ICT implants that operate independently of external ICT devices … .
> (EGE 2005: 6)

A combination of ICT implant and the application of robotics may also be imagined, e. g. an ICT implant may be used for controlling an artificial limb.

The term “implant” originates from the field of medicine. They may be understood to be a subclass of prostheses (CHRISTEN 2003: 230). Prostheses are

> … artefacts serving as replacements of parts of the human body. ... “Replacement” may refer both to the kind (cosmetic prostheses such as glass eyes) and function (functional prostheses) ... ... Endoprostheses are prostheses being implanted into the body, such as e. g. an artificial hip joint. If the function is in the fore, there is often speaking of implants ... (CHRISTEN 2003: 229)

In this sense “implants” are endoprostheses which may most of all serve as a functional replacement.

Rightly so, CHRISTEN also points out to the difference between “prostheses” and “tools”, while suggesting to reserve the term “additive prosthesis” for future technological developments (p. 231), in order of saving “the possibility to distinguish conceptually between the biologically set possibilities of the human body and its extended serviceability which is due to human creativity” (p. 230). Most of all he aims at a strict definition of “cyborgs” which in his opinion should be characterized by additive prostheses “which offer new possibilities of intervening with its environment to the human body” (p. 240). This again is meant as a contradiction to a “repairing intervention” with the human body, by way of which man does not become a cyborg. In literature, often the term “enhancements” is found for “additive prostheses”, in the context of which particularly the so called “radical enhancements” are debated (GESANG 2005). In this context “radical enhancements” mean artefacts which increase the performance of a human body beyond the degree which might be achieved without invasive intervention by education or training. Currently, the debate focuses most of all on improving human characteristics (GESANG 2005: 376-377).

The difficulty with defining “bionics” is most of all due to distinguishing “implants” from “enhancements”, as the latter is less based on the applied technology but on the purpose of the intervention. To make this clear by a definitely simplifying example: an implant X may be able to increase man´s IQ by 20%. For the victim of an accident, having lost exactly this percentage of IQ, implant X might be used in the context of a repairing intervention as an implant in the above mentioned sense. When using it for an unscathed human, however, there must be speaking of “enhancement”. The problem of drawing a line becomes even clearer if we assume that the accident reduced the victim´s IQ only by 10%, so that after the intervention his/her intellectual capabilities go beyond their previous state.

In the context of this report we will thus follow the difference between “implants for health purposes” and “implants for non-medical purposes” as suggested by EGE (2005) and give up on distinguishing “implants” from “enhancements”. For this decision we will have to give reasons in paragraph 3.1.3.

3. Fundamental Challenges

In this section we will at first introduce the frame which is set for ethical regulations at the European level by the European Charter of Fundamental Rights. Then we will shortly pursue the question of from when on the suggested regulations should be valid.

3.1 The Frame of the European Charter of Fundamental Rights

For thoughts on techno-ethical regulations, at the European level the “Charter of Fundamental Rights of the European Union” 2000 is the appropriate frame.

Due to the Charter’s essential position, it is not surprising that already in D1 and D2 single paragraphs and fundamental principles of the Charter have been dealt with. Thus, in paragraph 2.1 of D1 and 3.1 of D2 paragraphs 1, 3, 6, 8, 25, and 26 are mentioned as „articles of the EU Charter of Fundamental Rights … [concerning] the protection or promotion of human rights that may be affected in various ways by robotic, bionic, and Artificial Intelligence systems for Information Access”. This is followed in paragraph 3.2 by general thoughts on the essential terms “liberty, dignity, identity, responsibility”. Single paragraphs of D2, such as 5.2 (Methodological suggestions from bioethics) can furthermore be interpreted as a criticism of the common interpretation of the Charter, when e. g. in respect of the WHO definition there is asking: „If health is no longer mere absence of illness, and is rather a subjective state of welfare, is the broad therapy/enhancement distinction still relevant from a moral point of view?“

As thus in the context of the project some essential points of reference as well as possible objections against the common interpretation of the Charter have been mentioned, in the following we may concentrate on shortly giving the basic thoughts as expressed by the Charter.

3.1.1 "Protection of Human Dignity" as a Fundamental Principle

By the preamble to the "Charter of Fundamental Rights of the European Union" guiding thoughts are expressed which – according to RENGELING/SCZCEKALLA (2004: 13f) in their extended monograph which is fundamental for this paragraph – "should not be underestimated for the interpretation of the Charter´s fundamental rights and for the way of understanding them." One essential statement by the preamble is that „the Union is founded on the indivisible, universal values of human dignity, freedom, equality and solidarity". The essential position of human dignity is then emphasized again by Par. 1. In this context, the "Explanations" to Par. 1 of the Charter emphasize, while refering to the "Universal Declaration of Human Rights" (1948), that human dignity "constitutes the real basis of fundamental rights" (CHARTE 4473/00: 3, see RENGELING/SZCZEKALLA 2004: 323ff).

The outstanding position thus given to the term "human dignity" in the context of the Charter of Fundamental Rights of the European Union makes it improbable that accepting robots as "artificial humans" or software agents as "artificial individuals" will happen without considerable resistance. This is also true given the difficulties with giving reason to man´s special position without reaching back to theological reason-giving, as sketched in paragraph 3.2.2 of D2.

From the fundamental importance of human dignity for the Charter there particularly concludes that for the time being giving reasons to the rights and duties of artificial entities can happen only indirectly, if at all.

However, following RENGELING/SZCZEKALLA (2004: 324) there must be pointing out to the fact that the different regulations and practices regarding problem fields (such as prenatal and pre-implantation diagnostics, abortion, and euthanasia) in the single member states show that within the EU the obligation to protect human dignity is interpreted differently. This leeway may be supposed to be taken into account for experiments and products from the field of bionics. However, according to RENGELING/SZCZEKALLA this does not mean at all that interpretation is always left to the member states, as shown e. g. by a look at the ban on torture (Par. 4 of the Charter).

3.1.2 Field of Application and Subjects of Fundamental Rights

RENGELING/SZCZEKALLA (2004: 137) emphasize that "according to general opinion ... fundamental rights [serve] most of all for protecting the citizen from interventions by acts by the authoritative power [here: authorities and institutions of the Community] (keyword: fundamental rights as defensive rights against public power). Thus, guaranteeing common fundamental rights is about restricting the authoritative power of all Community authorities and institutions in the fields of legislation, execution (administration), and dispensation of justice." In Par. 51 of the Charter it says: "The provisions of this Charter are addressed to the institutions and bodies of the Union with due regard for the principle of subsidiarity and to the Member States only when they are implementing Union law."

The question of in how far the Charter is binding for the member states as well as for third parties counts among "the most difficult ones at all of the Community´s protection of fundamental rights" (ibid. p. 133). However, it is important to emphasize that "in some cases no subjective rights are defined to which individuals may refer immediately but that only basic principles are given which authorities of the Community or of single states may be confronted with when executing their relevant legislative or executive competences" (ibid. p. 187). In our

opinion this must be taken into account e. g. for Par. 13 (Freedom of the arts and sciences), while the explanations expressively emphasize that Par. 1 of the Charter forms a barrier for "academic freedom" (CHARTE 4473/00: 15; see RENGELING/SCZCEKALLA (2004: 592).

But the Charter of Fundamental Rights deserves our interest not only from the legal point of view but according to the preamble it must also be read as a document expressing the signatories´ conviction that „in the light of changes in society, social progress and scientific and technological developments" it is necessary to support the fundamental rights "by making those rights more visible in a Charter." As already explained, at first the Charter obliges only the "institutions and bodies of the Union" (Par. 51). From this there concludes e. g. the obligation of the Ethicbots project to observe and respect the Charter, according to "*Council Decision 1513/2002/EC of 27 June 2002 concerning the sixth framework programme of the European Community for research, technological development and demonstration activities, contributing to the establishment of the European Research Area and to innovation (2002 to 2006)*" as well as Annex 1 of this document (Description of Work, p. 21).

As the "framework programme" is suggested by the Commission and jointly decided by "Council and Parliament", the fact that this decision is tied to the Charter is set by the fact that it is made by bodies and institutions of the EU and that accordingly also the participants in the programme are obliged to observe the Charter. This may also explain why – despite the above mentioned differing practices of the member states and of Par. 13 of the Charter – certain fields of research (e. g. human cloning for reproductive purposes) are excluded from the programme. Due to this, we will later have to pursue the question if there are similar restrictions, particularly for the research field of bionics, or if they are to be expected.

The "Charter of Fundamental Rights of the European Union" as well as the guiding principles included in it are thus the frame for the development of the recommendations to the EU in Subtask 4.2.

Recently, respect of fundamental rights in the field of research has been confirmed also by the signatories of the Code of Conduct for the Recruitment of Researchers" in the context of the "European Charter for Researchers" (Commission Recommendation from 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers). There (p. 10) it says:

> Researchers, as well as employers and funders, who adhere to this Charter will also be respecting the fundamental rights and observe the principles recognised by the Charter of Fundamental Rights of the European Union.

This is remakable in so far as this way also institutions and private third parties (researchers, employers, funders) commit themselves to observe the fundamental rights and principles of the EU´s Charter of Fundamental Rights. The "Charter for Researchers" has meanwhile been signed by more than 70 institutions from 18 nations (Austria, Belgium, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Lithuania, Norway, Poland, Romania, Slovak Republic, Spain, and Switzerland) as well as by the international EIROforum.

3.1.3 Legal Restrictions of Fundamental Rights

The Charter itself gives a number of restrictions (barriers) regarding the fundamental rights as being granted in principle. As already mentioned, the explanations on Par. 13 (Freedom of the Arts and Sciences) emphasize expressively that Par. 1 (Human Dignity) is such a barrier for "academic freedom". Also Par. 3 (Right to the Integrity of the Person) gives explicit restrictions and prohibitions in the context of scientific research. Just the same, Par. 5 of the "Convention on Human Rights and Biomedicine" (1997) says as a restriction:

> Scientific research in the field of biology and medicine shall be carried out freely, subject to the provisions of this Convention and the other legal provisions ensuring the protection of the human being.

Nevertheless, together with the EGE we may emphasize: “The ethical notion of the inviolability of the human body should not be understood as a barrier against the advancement of science and technology but as a barrier against its possible misuse” (EGE 2005: 31).

The right to inviolability of the human body – just as other fundamental rights – may be restricted by rights of equal or higher rank, in the context of which, however, the fact that the obligation of “informed consent of the person” is mentioned should not be understood to mean that an individual is allowed to agree with every kind of intervention. E. g. in the “Report of the European Group on Ethics in Science and New Technologies on the Charter of Fundamental Rights Related to Technological Intervention” it says: „The Group recalls that consent is not sufficient, as other rights also have to be considered.“

That same report points out also to the fact that Par. 3 must be formulated in such a way as to take the fact into account that an „increasing number of persons who are not ill and who participate in scientific experimentation, for example healthy volunteers taking part in clinical trials.” The fundamental right to the inviolability of the human body may thus be restricted not only for threapeutical but also for certain scientific purposes. However, this restriction must be justified in any case, experiments on healthy humans – according to Par. 16 of the “convention on Human Rights and Biomedicine” (1997) – being only allowed as an exception if „the research entails only minimal risk and minimal burden for the individual concerned“ und research promises “[a] significant improvement in the scientific understanding of the individual's condition, disease or disorder” and gives as its objective “[the] attainment of results capable of conferring benefit to the person concerned or to other persons in the same age category or afflicted with the same disease or disorder or having the same condition.” Thus, also the Convention assumes that research serves the physical and mental well-being of humans, afterall.

Insofar, the EGE with its Opinion No. 20 follows this direction when distinguishing most of all between “implants for health purposes” and “implants for non-medical purposes” because in respect of a legal restriction of the fundamental right to the inviolability of the human body the purpose of the intervention plays a decisive role for the necessary justification. The EGE´s recommendations on “implants for non-medical purposes” are appropriately restrictive: „The EGE makes the general point that non-medical applications of ICT implants are a potential threat to human dignity and democratic society. Therefore, such applications should respect in all circumstances the principles of informed consent and proportionality …” (p. 32).

The EU´s existing regulations leave only little leeway insofar, particularly for “implants for non-medical purposes”. At the same time there must be pointing out to the fact that for the latter at EU level there are no special regulations for the time being, so that e. g. the „EGE recommends that the European Commission should launch legislative initiatives in these areas of ICT implant applications“ (EGE 2005: 35).

That what has extendedly been explained here on a possible restriction of Par. 3 of the Charter of Fundamental Rights is of course also true for other fundamental rights as named there, e. g. for Par. 8 (Protection of Personal Data).

Generally, as a conclusion we must emphasize that the purpose for which a certain technology is used plays an important role for justifying a restriction of fundamental rights. Insofar, the typology of robots, KI systems, implants aso. which is to be developed should take the respective purpose into account.

3.1.4 Further Challenges

As the focus of the project is on the three ways of integrating artificial entities into human society or the human body, we will also focus on the direct interaction of man and machine as well as on its influence on human social existence for this report. Just due to this we would like to shortly point out to two further challenges.

E. g. we must observe that the integration of artificial entities into human society may influence on the legal position of animals. For example, in the future the question might be raised if “robo rights” have more weight than “animal rights”. Here, at the European level there must be pointing out a . o. to the “Declaration on the Protection of Animals” (1992) as well as to the Amsterdam Protocol (1997).

Furthermore, according to Par. 17 of the Charter, for developing the appropriate technologies the principle that the EU strives for a high level of environmental protection and improvement of the quality of life must be taken into account.

3.2 Regulations for Future Technologies

In the course of the debate on the necessity and possibility to regulate the development and use of future technologies various authors stated and still state that this is a useless undertaking. E. g. Rodney BROOKS (2002: 63) writes in respect of integrating artificial entities into the human body:

> People may just say no, we do not want it. On the other hand, the technologies are almost here already, and for those that are ill and rich, there will be real desires to use them. There will be many leaky places throughout the world where regulations and enforcements of regulations for these sorts of technologies will not be a high priority. These technologies will flourish.

By help of that same argument, however, we might just as well argue in favour of giving up on regulating drugs, weapons aso. But most of all it misses the status quo because as we have already seen there is already a number of regulations which concern the subject of our project or may be applied to it. Even if no new regulations should be joined, there is the question if the existing regulations are restricting possible developments too much. It must be added that for single fields – the example of “implants for non-medical use” has already been mentioned – there are no specific regulations for the time being, which might result in insecurity in the field of research and development. Insofar it must be stated at first that there is need for action already in respect of existing regulations. This will also become clear by the examples and single regulations we will discuss in part B of this report.

But in the following we like to assume that given new challenges also new regulations will have to be developed or that at least we will have to examine in how far existing regulations may be applied to new phenomena such as “autonomous service robots”. As already emphasized in our introduction, for this report we will focus most of all on current developments and the near future. However, here we would like to recommend to take long-term and maybe fundamental changes into account, insofar as there is looking for a possibility to control the development of e. g. “autonomous service robots” in such a way that their positive potential can be used.

The first demand in this respect is the one of a long-term solution which will provide the necessary legal security for being able to develop new technologies which are appropriate to the formulated standards. The second demand is that regulations must be flexible enough to include a leeway for possible but unforeseeable developments. In this context there should be thinking about e. g. – to stay with the example of “autonomous robots” – if maybe a kind of meta-regulation was reasonable, which might establish a body of self-control for

developers and producers which within a fixed frame may decide by itself which steps must be made to make a responsible development possible.

Also in the case of bionics this might be a possible way, in the context of which, however, given the existing barriers at first the question of research would have to be answered before the marketing of products is started.

The idea of meta-regulations would then also be in Accordance with the "European Charter for Researchers" where there is the demand for researchers and research institutions:

> Researchers should adhere to the recognised ethical practices and fundamental ethical principles appropriate to their discipline(s) as well as to ethical standards as documented in the different national, sectoral or institutional Codes of Ethics.

Insofar, one important step would be in developing a "Code of Ethics" being appropriate to each field and its institutionalization.

4. Summary of the Essential Results of Part A

In the first section of part A we presented preliminary definitions for working in the context of the report. We also stressed that for developing a "proposal of standards and recommendations for EU techno-ethical regulations" (subtask T4.2) the question of what exactly is the subject of these standards and regulations is of essential importance.

With regards to "robots" we suggested to work with the definition provided by CHRISTALLER ET AL. (2001):

> Robots are sensomotoric machines for the extension of human capability. They consist of mechatronic components, sensors, and computer-based control and steering functions. The complexity of a robot makes it clearly different from other machines, due to bigger number of levels of freedom and the variety and extent of its ways of behaviour.

We also emphasized that *complexity* is the typical characteristic of those robots which are the subject of this project. If in the following there is speaking of "autonomous robots", this means complex machines which are supposed to be able to solve tasks delegated to them mostly independently (i. e. without further intervention by man). Following the IRF, machines which are not primarily used in the field of industrial production are called "service robots". Nevertheless, we must also point out to the fact that these are preliminary definitions and that working out a definition and classification of robots is an essential challenge for the reasonable design of regulation measures.

With regard to "autonomous software agents" we were following the definition presented in D1: thus, an "autonomous software agent" is understood to be a "software agent which is capable of exhibiting some form of intelligent behaviour" and stressed "delegacy" as a central concept for the development of such agents. We further pointed to the difficulties of drawing the line between "autonomous software agents" and other complex information and communication system. Since there is already a lively debate on the consequences of complex systems according to the paradigm of "ubiquitous computing" and comparable approaches, we chose to focus on "autonomous software agents" (or "softbots") in a narrow sense.

"Bionics" was defined as either applications of robotics being directly integrated into the human body or "ICT implants" as defined by the EGE (2005). The difficulty with defining "bionics" is most of all due to distinguishing "implants" from "enhancements", as the latter is less based on the applied technology but on the purpose of the intervention. In the context of this report we will thus follow the difference between "implants for health purposes" and

“implants for non-medical purposes” as suggested by EGE and give up on distinguishing “implants” from “enhancements”.

In the second section of Part A we introduced the European Charter of Fundamental Rights as the frame which is set for ethical regulations at the European Level. We concentrated on giving the basic thoughts as expressed by the Charter, since single articles of the Charter have been already discussed in D1 and D2 of the project.

We started this section by pointing out to the outstanding position given to the term “human dignity” in the Charter, which makes it improbable that accepting robots as “artificial humans” or software agents as “artificial individuals” will happen without considerable resistance. We moved to the question, who is the subject of the Charter. We first pointed to the fact that the provisions of the Charter institutions and bodies of the Union and to the Member States only when they are implementing Union law. But due to additional documents like the “European Charter for Researchers” also institutions and private third parties (researchers, employers, funders) commit themselves to observe the fundamental rights and principles of the EU’s Charter of Fundamental Rights. Since the Charter itself gives a number of restrictions (barriers) regarding the fundamental rights as being granted in principle, we also came to the conclusion that the purpose for which a certain technology is used plays an important role for justifying a restriction of fundamental rights. Insofar, the typology of robots, AI systems, implants aso. which is to be developed should take the respective purpose into account. However, concerning “implants for non-medical purposes” the EU´s existing regulations leave only little leeway.

Finally, we presented an argument that there is need for action already in respect of existing regulations, even if no new regulations should be joined. It must be added that for single fields – the example of “implants for non-medical use” has already been mentioned – there are no specific regulations for the time being, which might result in insecurity in the field of research and development. Here, we recommend to take long-term and maybe fundamental changes into account, insofar as there is looking for a possibility to control the development of e. g. “autonomous service robots” in such a way that their positive potential can be used. The first demand in this respect is the one of a long-term solution which will provide the necessary legal security for being able to develop new technologies which are appropriate to the formulated standards. The second demand is that regulations must be flexible enough to include a leeway for possible but unforeseeable developments.

B. Special Aspects

1. Introduction to Part B

In Part B we intend to discuss special challenges regarding new technologies or existing regulations.

With regards of “robots” we will address the subjects of responsibility (including machine safety and responsibility for complex machines), machines as a replacement for humans, tele-presence, and special fields of use (medicine and health care, warfare applications, and entertainment).

In the area of “autonomous software agents” we will deal with data protection and surveillance as well as filtrating and blocking of information by agents. Here we will have a look at youth protection and the free access to knowledge.

Finally, we will discuss the regulations on bionics, where we will focus on the EGE Opinion No. 20 as the central document at the EU level. We will also have a look at the regulations concerning scientific research on animals and humans and at the example of “sex change“ in German law. As for operations aiming at changing external sex organs there is partly the use of active implants, in our opinion this law seems to be relevant for our project.

We will summarize some of our findings at the end of this section. But we would like to remind the readers at this point that the main objective of this report is the fairly detailed overview of national and international ethical regulations presented in the annex. Also, again, we would like to emphasize that this report aims primarily at presenting the status quo, since the critical discussion of existing regulations as well as the debate on new regulations or those which should be modified is the subject of subtask T 4.2.

2. Robots

In Part 1, while following CHRISTALLER et al., we defined robots as complex, sensomotoric machines for the extension of the human capability to act. For service robots it is typical to not being used primarily in the field of (industrial) production but to provide services. Accordingly, in the following we will focus on the extension of the human capability to act as well as on the new fields of application apart from industrial production.

Furthermore, in Part A we defined “autonomous machines” functionally by the principle of delegation. In respect of these machines, the problem of responsibility for in principle unpredictable acting will be discussed.

2.1 Responsibility and “Autonomous Robots”

This paragraph consists of two parts: at first we will generally discuss the guidelines on machine safety, to then investigate the more particular aspect of responsibility for more complex machines.

According to our explanations in Introduction, paragraph 1.3, we will not discuss the possibility and necessity of “robo rights” or “civil rights for robots” here. However, under the keyword “roboethics” we will sketch to which extent the positive potential might or should be used for the self-control of “(semi)autonomous robots”.

2.1.1 Machine Safety

In general, for robots the guidelines on product liability and production safety are valid, particularly

- Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (85/374/EEC), and
- Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety

Given the member states´ obligations to achieve a high level of consumer protection, expressed in the EU´s Charter of Fundamental Rights (Par. 38), we may expect that the use of machines which might endanger humans, animals, or the environment is strictly limited.

However, in the field of man-machine interaction the regulations on occupational safety are particularly instructive, most of all the

- Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)

Directive 2006/42/EC must be implemented at the national level by the member states by December 29th, 2009, and replaces

- Directive 98/37/EC of the European Parliament and the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery

In contrast to Directive 98/37/EC, the new Directive 2006/42/EC does no longer exclude "medical devices" in the sense of

- Council Directive 93/42/EEC of 14 June 1993 concerning medical devices

from the field of application. Directive 93/42/EEC as well as further regulations on the use in the field of medicine will have to be discussed under 2.4.1 (Medicine).

In this paragraph we will at first focus on the basic demands resulting from Directive 2006/42/EC for the non-physical integration of artificial entities into human society.

At first we must state that already CHRISTALLER ET AL. (2001: 164) stated that in respect of the protection of employees "a new approach [is] necessary because existing regulations of safety institutions areimpractical or unnecessary. Man is not supposed to get in touch with the machine (the robot), or only if there are special protection measures. However, in some cases this impossible". If we refer this criticism to paragraph 1.3 of the appendix to Directive 98/37/EC, we must state that the new version of this paragraph in Directive 2006/42/EC pursues an analogous approach. In so far we must further ask if the existing regulations are appropriate for "mixed-human-machine-teams".

Without further discussing single regulations here (see e. g. GRÄF 2004), which result from the two mentioned directives, we must point out to two aspects which are emphasized both by the old and the new directive and which in the following are of importance for our report:

1) the principles of safety integration (Annex I, 1.2.2.), and

2) the extensive obligations to inform.

Annex I, 1.2.2, Directive 2006/42/RC, it says:

> Machinery must be designed and constructed so that it is fitted for its function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof.

Thus, there is demanding that machines must be designed and constructed in such a way that they will not be a risk to people. If we refer this obligation to avoid or minimize risks to Par. 3 of the "Charter of Fundamental Rights of the EU" (Right to Freedom from Bodily Harm),

we must ask if the integration of this protection into the design and construction of machines should not be demanded also for other fundamental rights, such as the protection of privacy (Par. 7). This will have to be examined in paragraph 3.1.

Furthermore, already in the paragraph on *principles of safety integration* the importance of appropriate information about remaining risks which must be named by the operating instructions is emphasized in paragraph c. Then, paragraph 1.7.4 of Appendix 1 determines that

> All machinery must be accompanied by instructions in the official Community language or languages of the Member State in which it is placed on the market and/or put into service.

The directive includes detailed instructions also for writing the operating instruction. However, obligations to inform are not restricted to the operating instructions but they concern also an appropriate design of the man-machine interface. Furthermore, for machines being worked by "non-professional operators" the "level of general education" (1.7.4.1) must be observed.

Obligations to inform are also of essential importance in

- Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC)

E. g. "provision of information and training" counts among the there-mentioned "general obligations on employers" (Par. 6) which are described in more detail by Par. 10 (worker information) and Par. 12 (training of workers).

Both Directive 2006/42/EC, pointing out to the "level of general education", and the obligation to inform as named there and by Directive 89/391/EEC show that dealing with robots outside the workplace also requires an appropriate level of education. Although it might still be valid that robots, being highly complex machines, cannot be understood by the "common citizen" (CHRISTALLER et al. 2001: 147), we must ask in how far education measures aso. may help citizens with developing an appropriate behaviour towards robots (but also software agents). On the other hand, there must be demanding that robots supply people with sufficient information to make e. g. their behaviour foreseeable. (ibid.: 145).

2.1.2 Responsibility for Complex Machines

Already in part A of the report we explained that we will not pursue the question if artificial agents must be considered persons and thus bearers of individual responsibility. But still, due to the complexity of robots and software agents, there is the question of to whom the responsibility for the consequences of the use of artificial agents must be attributed. Is it possible at all to take over the responsibility for the use of machines which are capable of learning, whose behaviour in practice cannot be foreseen (otherwise they would not be capable of learning)?

The topos of being responsible for the development and marketing of products must be taken seriously also because it plays a crucial role for the way professionals see themselves. This becomes obvious e. g. by a look at the relevant "Codes of Ethics" of big professional associations which are organized at the national level but in fact are international.

An outstanding example of this is provided by the "Code of Ethics" of the Institute of Electrical and Electronics Engineers (IEEE) with 370,000 members in 160 countries. It starts with this self-obligation:

> We, the members of the IEEE, … do hereby commit ourselves to the highest ethical and professional conduct and agree:
> 1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, … .

Another example is the “Code of Ethics” of the Association for Computing Machinery (ACM), where in Section 1, Paragraph 1, there is emphasizing:

> When designing or implementing systems, computing professionals must attempt to ensure that the products of their efforts will be used *in socially responsible ways*, will meet social needs, and will avoid harmful effects to health and welfare. (italics by the authors)

Accordingly, the idea that in the case of highly complex machines, such as robots, the responsibility for the product can no longer be attributed to developers and producers means a break of the way professionals see themselves. Here, there is expressively pointing out to the significance of the “Codes of Ethics” of such organizations as tools in the context of regulation efforts.

Also, principally it cannot be accepted that the responsibility for the possible misbehaviour of a machine should *not* (at least partly) be attributed to developers or producers. Although, while following FLORID/SANDERS 2001), there may be claiming that from the point of view of most users already a simple webbot appears as an autonomous entity and that due to this morally illegitimate behaviour may be attributed to it, the fact that something appears as an “autonomous object” in the eyes of many people because they are not able to explain its observed behaviour cannot be the basis for not attributing the responsibility for a damage case to producer, provider, or user. In practice it may be difficult to exactly attribute responsibility, and we know cases when attribution seems do be doubtful; but still it is not an alternative to give up on attributing responsibility, particularly in case of dangerous and risky products. Much more, there is the question of in which way responsibility must be taken over and by whom.

Here, we like to remind to the possibility of meta-regulation. If anybody or anything should suffer from damage caused by a robot which is capable to learn, while following CHRISTALLER et al. (2001: 149) there must be demanding that at first the burden of adducing evidence must be with the robot´s keeper, who must prove his innocence. E. g. somebody may be considered innocent who acted according to the producer´s operating regulation. In this case the producer would have to be held responsible for the damage.

Furthermore, developers and producers of robots could accept their responsibility by contributing to analysing the behaviour of a robot in a damage case and, if necessary, by developing possibilities to exclude such damage cases in the future. This could happen by e. g. creating an appropriate institution. Here, for example the possibility to supply robots with a “black box” which could then be checked by this institution, as already suggested in D1 (p. 129), might be discussed.

In this context there must be taking into account that damage is not caused only by direct influence by the robot but also indirectly. E. g. according to German law the keepers of dogs are also responsible for road accidents if they did not act according to their obligatory supervision and the dog´s behaviour caused irritation with road users. It seems to be plausible to proceed analogously in the case of robots. Even such irritating behaviour could be discussed e. g. by an appropriate group of experts – and this should be done particularly if despite appropriate behaviour the robot which is capable of learning could not be controlled to the necessary degree by its owner.

By the way, CHRISTALLER et al. (2001: 144) had at first doubted the liability of animal keepers. As meanwhile the national regulations concerning dogs have become much more detailed, in the context of our discussion the latter should definitely taken into account – in the context of which there must be pointing out to the fact that the relevant regulation should not be to the animal´s disadvantage.

Futhermore, the example of indirectly causing road accidents shows how important it is for citizens to know about possible (mis)behaviour of robots, to make them able to react appropriately to artificial entities.

2.1.3 Prospect: Roboethics/Machine Ethics

While using the terms “roboethics” or “machine ethics” there is currently discussing how the potential of (future) robots or software agents and observing ethical norms could become part of their self-control and -steering.

As a completion of what was said under 2.1.3 such thoughts are outspokenly important because they remind us to the fact that future technologies are not only a source of danger but can also contribute to preventing or reducing damage.

Unfortuntely this possibility is partly discussed by very spectacular cases. E. g. ALLEN/WALLACH/SMIT in their essay “Why Machine Ethics?” (2006) start as follows:

> A runaway trolly is approaching a fork in the tracks. If the trolley runs on its current track, it will kill a work crew of five. If the driver steers the train down the other branch, the trolley will kill a lone worker. If you were the driving the trolley, what would you do? What would a computer or robot do? (ALLEN/WALLACH/SMIT 2006: 12)

However, this dramatic example is badly chosen for discussing “ethical regulations”: much more, here there must be demanding that every possible step must be taken to prevent the described situation. E. g. the German constitutional court by its decision from February 15th, 2006, declared Par. 14 Sect. 3 of the German Air Security Act a violation of the constitution. This paragraph was supposed to allow “to shoot down an airplane by immediate use of weapons if it shall be used against the lives of humans” (1BvR 357/05). This, the constitutional court said, was not according to the Right to Life (Par. 2. Basic Law) if “people on board not being involved in the deed are concerned” (ibid.).

This verdict is interesting for our context because the constitutional court expressively refers to Section 1, Paragraph 1 of the German Basic Law (“Man´s dignity is inviolable. Every state power must respect and protect it”), which is topically equivalent to Par. 1 of the “Charter of the Fudamental Rights of the EU”. Accordingly, the reasons for judgement say that the state must not question the human status of crew and passengers. Authorization to shoot the airplane down

disregards those concerned, who are subjects of their own dignity and own inalienable rights. By using their death as a means to save others they are made objects and at the same time they are deprived of their rights; by the state one-sidedly deciding about their lives the passengers of the airplane, who, being victims, are themselves in need of protection, are denied the value which man has just by himself. (1BvR 357/05, par. 124)

Analogously we may conclude that there can be no legal regulation which determines in principle that the few may be made victims for the many of the trolley example (or vice versa).

This does not mean that the potential for self-control should not be used to oblige autonomous systems to a behaviour which is concurrent with norms, even more if this serves the safety of individuals. Even if one might intuitively agree with the statement that grave decisions should only made by humans, we must not overlook that in legal practie this is not always seen. E. g. as early as in 1975 and 1981 US courts decided that a pilot who gives up on reaching back to the auto-pilot in a crisis situation may be considered to act negligently (FREITAS 1985).

Thus, the question is in how far regulations may contribute to opening up a leeway for using the potential on the one hand without on the other hand opening the door to over-hastily delegating responsibility to artificial agents. Here, definitely at first there must be

emphasizing that the development of appropriate agents needs further inter-disciplinary research work, which can be supported by appropriate research policy insofar and as long as this approach promises success. For this there must be taking into account that the possibility to use agents for enforcing legal norms should not be judged on uncritically in certain fields, as we will see by the examples in paragraph 3. It is advisable, however, to distinguish the legally conform behaviour of agents from the problem of appropriate norm setting.

2.2 Machines as a Replacement for Humans

Even if here robots are at first discussed as an extension of the human ability to act, robots can also replace single humans.

Also from the point of view of human rights, replacing humans by robots cannot always be rejected. One prominent example of this are robots which in the United Emirates and other countries are now used as jockeys for camel races instead of children. This development was positively emphasized e. g. by the "Concluding observations: Qatar" of the "Committee on the Rights of the Child" of the United Nations in the

- Consideration of Reports submitted by States Parties under Article 12 (1) of the optional Protocol to the Convention on the Rights of the Child on the Sale of Children, Child Prostitution and Child Pornography (CRC/C/OPSC/QAT/CO/1) (2 June 2006):

  > The Committee welcomes … the State party's investments in the development of robot jockeys and its efforts to promote the use of these robots instead of child jockeys.

Thus in this case, replacing humans by robots served the goals of the

- Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography (2000), and thus the
- Convention on the Rights of the Child (1989)

of the United Nations. Surely, also other cases can be imagined when child labour and trade can be avoided by the use of robots. Just the same, robots can do work which would not be acceptable for human workers, e. g. because of health hazards connected to it.

However, to stay with this example, we must observe that in the case of robot jockeys at first „Law No. 22 of 23 May 2005 on Banning the Employment, Training and Participation of Children in Camel Racing in Quatar" was passed. This step was supported by the possibility to replace children by robots. However – from the legal point of view – not every kind of replacement would be unproblematic, e. g. in the case of child prostitution, as Par. 2 of the „Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography" defines „child pornography" as follows:

> Child pornography means any representation, by whatever means, of a child engaged in real or simulated explicit sexual activities or any representation of the sexual parts of a child for primarily sexual purposes.

Thus, robots looking like children and serving sexual purposes might definitely be included into the prohibition of child pornography in the context of the "Optional Protocol". We will return to this aspect under 2.4.3 (Entertainment).

The example of robot jockeys shows also that replacing humans by machines – even in this case, which afterall must be jugded on positively – results in high costs which in this case were due to supporting the children and their families (see LI 2006). In general, it cannot be ruled out that also in the future humans may lose their jobs due to the use of robots – in the context of which we must here rather imagine workers with a low level of qualification.

Although there is also the opinion that e. g. the use of industrial robots must be considered an alternative to moving production to foreign countries and that in so far it secures jobs in the previous countries of production (see the statements by Jean-Francois Germain in: ICHBIAH 2005: 247), this is only true from a restricted, local point of view which places more value on jobs in one´s own country than in other countries. In so far, the effects of the increasing use of robots in the world of work (particularly in respect of opening up new fields of action for service robots) cannot be judged on only by looking at those countries where these robots are used. There must also be asking about the effects on other countries.

In this context we must also take into account that we may definitely argue that that work which may be delegated to agents does not count among what is considered imparting meaning by humans. One may even argue that robots could take over most of all inhumane work. However, we must be careful with legitimating human work to be replaced by machines by pointing out to the inhumane nature of a certain kind of work. In this case, a "robotic divide" between rich and poor countries would not only mean that in some countries certain tasks are taken over by robots but that – according to this way of argumenting – workers in other countries are expected to do inhumane work.

2.3 Tele-Presence

Those effects on other countries as mentioned in the last paragraph of the previous chapter must be taken into account when talking about the possibilities of tele-presence, which counts among the most remarkable extensions of human possibilities of action.

Here, tele-presence means the possibility to act within the world by help of agents, although the person who controls the agent (direct tele-presence) or on whose behalf the agent acts (indirect tele-presence) is not at the place. The reasons for man not to be at the place may vary: e. g. the environment in which the agent is acting may be hostile to life and not accessible for humans. Examples for this are found in space travel or deep sea research, but also in the fields of nuclear technology or war. But tele-presence may also serve for making it possible for certain humans to work there where they themselves do not want to or cannot be. Also here a wide spectre can be imagined which includes both the expert´s tele-presence, whose skills and knowledge are made useful at a far-away place e. g. in the field of tele-medicine, and tele-work which is done at far-away places for low wages by help of hightech. E. g. BROOKS (2005) describes the possibility to create jobs in countries with a low level of wages by help of appropriate service robots. Tele-presence may come along with xenophobia if this technology is used for staying away from people. Thus, also here in respect of a possible "robotic divide" between rich and poor countries, but also between the rich and the poor within one society, there must be asking if this does not result in establishing societal developments which are lamented elsewhere.

From the legal point of view, the possibility of tele-presence is particularly interesting, as the human actor may be in another country than the tool he uses – accordingly, at the place where the robot is used other legal regulations may be valid than at the place where the control unit is. Also, e. g. in the field of tele-medicine, it may be imagined that the use of the robot happens in another country whose laws allow operations which are allowed neither in the patient´s nor in the physician´s home country (DICKENS/COOK 2006: 74-75). This challenge was emphasized e. g. by the

- World Medical Association Statement on Accountability, Responsibilities and Ethical Guidelines in the Practice of Telemedicine. Adopted by the 51st World Medical Assembly Tel Aviv, Israel, October 1999.

which, however, was annulled again at the WMA General Assembly 2006 (Pilanesberg, South Africa). According to information by the WMA, a new version of the guideline may be expected this year. Paragraph (3) of the old "statement" says:

> The World Medical Association recognizes that, in addition to the positive consequences of telemedicine, there are many ethical and legal issues arising from these new practices. Notably, by eliminating a common site and face-to-face consultation, telemedicine disrupts some of the traditional principles which govern the physician-patient relationship. Therefore, there are certain ethical guidelines and principles that must be followed by physicians involved in telemedicine.

Also here it becomes obvious again that the "Codes of Ethics" of international professional associations must be taken into account for the field of "ethical regulations", even if the formulation "certain ethical guidelines and principles" in this document must be called vague. However, by the

- World Medical Association International Code of Medical Ethics

which was passed for the first time in 1949 and newly accepted in 2006, the WMA is provided with a basis for developing appropriate guidelines. According to DICKENS/COOK (2006: 77), the WMA in its statement from 1999 emphasizes that

> … regardless of the telemedicine system under which the physician is operating, the principles of medical ethics globally binding upon the medical profession must never be compromised. These include such matters as ensuring confidentiality, reliability of equipment, the offering of opinions only when possessing necessary information, and contemporaneous record-keeping.

It cannot be expected that in this respect the new version will be different. DICKENS/COOK (2006: 77) point out also to the risk "that these technologies may aggravate migration of medical specialists from low-resource areas, by affording them means to serve the countries or areas they leave, by electronic and robotic technologies." In so far, the possibilities of tele-presence must be judged on also under the aspect of a (potential) brain drain. As this challenge exists not only in the field of medicine, these explanations were also included into the general paragraph of the report.

The challenges by tele-presence in the field of medicine are an appropriate topic of the report also because in general the possibilities which are opened up are judged on positively, so that possible conflicts are adressed much more clearly than in the case of a possible use which is anyway seen with reservation. Here, DICKENS/COOK (2006) give the examples of „procedures that terminate pregnancy", „methods of medically assisted reproduction … such as preimplantation genetic diagnosis and using sex-selection techniques" (74) as well as „female genital cutting" (78) which in respect of the possibility of tele-presence may at least cause legal doubts. Also these special examples can be generalized if e. g. the question is raised if on behalf of a company which is located in the EU an EU citizen is allowed to control a robot in a country whose security demands are not appropriate to European standards of occupational safety, or if by help of a robot a European researcher is allowed to carry out experiments outside the EU which are not allowed within the EU.

Another question is if it must be obvious for third parties if an artificial agent is man-controlled from the distance. In respect of the general demand that humans having contact to machines should know which behaviour is to be expected from them, this may surely be expected. In detail, it must be made clear which information the agent or the provider must offer. Is it sufficient to know that control is (partly) taken over by a human? Or must additional information be offered, such as the country from where the machine is controlled? The latter is relevant a. o. in respect of valid regulations of data protection.

Even if cross-border data travel is not taken into account, particularly in the case of direct tele-presence, i. e. when an agent is directly controlled by a human or a group of humans, there are obvious challenges in respect of the possibility of far-reaching interventions into the protected zone of the private, which will be explained in paragraph 3.1.

2.4 Special Fields of Use

As explained in Part A under 3.1.3 in respect of the "Charter of Fundamental Rights of the EU", for judging legally on the purpose of robots it is of decisive importance if a possible use may be considered an intervention into the fundamental rights which are given there. Due to this, in the following the fields of use of medicine, armed forces, and entertainment shall be exemplarily viewed at, on which there are the most publications.

2.4.1 Medicine and Health System

As already explained under 2.3, in the field of tele-medicine there are special challenges which are not repeated in this paragraph.

In general, for the use of robots in the field of medicine the already mentioned

- Council Directive 93/42/EEC of 14 June 1993 concerning medical devices

is of essential significance, which according to Par. 1 Section 5 must not be applied on

- Active implantable devices covered by Council Directive of 20 June 1990 on the approximation of the laws of the Member States relating to active implantable medical devices (90/385/EEC);

Medicinal products covered by Directive 65/65/EEC including medicinal products derived from blood as covered by Directive 89/381/EEC;

Directive 90/385/EEC will have to be discussed under Paragraph 4 (Bionics). For judging on nano-technological developments, which are not covered by this report, however, Directive 65/65/EEC would have to be discussed.

Currently there is discussing in how far the existing directives on "medical devices" must be worked over and adjusted to each other. On this:

- Proposal for a Directive of the European Parliament and of the Council amending Council Directives 90/385/EEC and 93/42/EEC and Directive 98/8/EC of the European Parliament and the Council as regards the review of the medical device directives (22.12.2005)

At the time of writing this report the result of this debate was still open.

BAXTER et al. point out to the fact that in respect of defining "medical devices" Directive 93/42/EEC is vague: „… one can claim that if the technology is sometimes used by people without disease, injury or handicap then it is not primarily intended for ‚diagnosis, prevention, monitoring, treatment or alleviation' of those afflictions and so the regulation does not apply" (BAXTER et al. 2004: 250). This, they say, is problematic in so far as keeping the standards for "medical devices" is connected to high costs. Due to this, companies were tempted to avoid existing regulations by e. g. using machines which were developed for other purposes. But these were not always appropriate to the needs of those persons who are supposed to be supported by these machines. This might concern e. g. service robots which are used in the field of nursing.

In general, the extension of human possibilities to act in medicine and nursing must surely be judged on positively. From the point of view of surgery, DIODATO et al. (2004: 802) conclude e. g.:

> The introduction of robotics technology into the operating room has the potential to transform our profession. For the first time in history, surgeons will not be confined by their inherent physical limitations. These systems have the potential not only to improve the performance of traditional surgery, but to open entirely new realms of technical achievement previously impossible.

Similarly to Directive 2006/42/EC, Directive 93/42/EEC names extensive obligations to inform (particularly Annex I, Par. 13). In so far, also DIODATO et al. (2005: 804) must be taken very seriously when pointing out to the fact that due to the increasing use of robots

> … surgeons will need to become lifelong learners, since there will be almost continuous evolution of our surgical techniques as our technical ability becomes more coupled to increasing computer power. As surgeons, it will be our duty to direct this progress in close partnership with engineers, computer scientists, and industry to advance the surgical treatment of diseases. Most important, we must provide ethical and moral direction to the application of this technology to enhance both the art and the science of our profession.

Thus, here there is not only adressing the physicians´ self-obligation to the ethos of their profession but also there is demanding that close co-operation of developers and users, which has already been made a topic of discussion in Section 6 of D2. In our opinion, in the context of the "obligatory cost benefit analysis" which was demanded already in D1 the costs of training and further education must be taken into account.

Naturally in the field of medicine there is a particular obligation to inform the patient. Accordingly, the expert´s report by SCHRÄDER (2004: 59) on the assessment of methods by the example of Robodoc emphasizes that patients are to be informed extensively about risks, as this method must still count as "experiment". The example of "Robodoc" is of interest because patients took legal action against the use of the robot after it had become known that such an operation was more risky. However, action for compensation was finally rejected by the Federal Supreme Court of Justice (Germany) on June 13th, 2006, (VI ZR 323/04), the court pointing out to "lack of information", however.

In our opinion, challenges occur most of all where man might become dependent on the machine (may it be as far as physicians, nurses aso. or the patient or the nursed person may be concerned) as well as where the machine replaces a human.

Thus, in respect of the "Charter of Fundamental Rights" there should be asking if replacing human nurses by machines can be justified if contact to nurses is maybe one of the last possibilities left for somebody old and/or ill to interact and communicate with other humans. Here, e. g. according to Par. 26 (Integration of disabled people) there might be demanding that nursing by machines needs special justification.

Also, there may be asking if companies and perhaps the state might have a special obligation to support users with maintenance.

Finally we must ask how to deal with the fact that just in the context of using artificial entities for the nursing of old-aged people there is the possibility of violating the right to respect for private and family life (Par. 7 of the Charter of Fundamental Rights), Paragraph 25 emphasizing particularly the right of old-aged people to a life of dignity, which indeed includes the right to privacy (Par. 7). There are analogous regulations concerning children (Par. 24) and disabled people (Par. 26). The latter's demand to "respect of privacy" is also emphasized at the international level by Par. 22 of the United Nations'

- Convention on the Rights of Persons with Disabilities. Adopted on 13 December 2006 during the sixty-first session of the General Assembly by resolution A/RES/61/106. (A/RES/61/106).

2.4.2 Armed Forces

According to Par. 1 Section 2, Directive 2006/42/EC is not valid for "weapons, including firearms" as well as „machinery specially designed and constructed for military or police purposes". Seemingly, a common regulation following the above mentioned directive does not exist at the European level.

As already noted in Part A, Paragraph 2.1 of the report, the term “robot” is defined by the “Common Military List of the European Union” (2007/197/CFSP). This list serves for export control in the context of the

European Union Code of Conduct on Arms Exports (1988)

where the member states are obliged not to allow any export which violates the criteria of this code, which includes „respect of human rights in the country of final destination“ (Criterion 2):

> Having assessed the recipient country's attitude towards relevant principles established by international human rights instruments, Member States will:
> (a) not issue an export licence if there is a clear risk that the proposed export might be used for internal repression.
> (b) exercise special caution and vigilance in issuing licences, on a case-by-case basis and taking account of the nature of the equipment, to countries where serious violations of human rights have been established by the competent bodies of the UN, the Council of Europe or by the EU;

e. g. robots “specially designed for military use” are included into this obligation, just as certain kinds of “software”.

Robots which are able to kill or only hurt humans have aroused much attention, as shown by the example of armed surveillance robots of the Samsung company, which are supposed to be used by Southern Korea at the border with Northern Korea. In this context German comments reminded to the so called “auto-fire systems” which were used at the border of the German Democratic Republic. The German Federal Supreme Court of Justice has repeatedly criticized these “blind killing automats” for being a grave violation of human rights (e. g. the verdict from April 26th, 2001 – AZ 4 StR 30/01). However, from the legal point of view two aspects must be taken into account:

1. Different from the so called “auto-fire systems” of Type SM-70, today´s systems are not “blind” – and there may be argumenting that new technologies are even more able to fulfil these tasks than humans.

2. From the technological point of view, the SM-70 was an “anti-personell mine” and not a complex machine. The SM-70 and comparable technologies do thus count among the topical field of the

- United Nations Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects (1980), particularly
- Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II to the 1980 Convention as amended on 3 May 1996), as well as the
- Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, 18 September 1997.

Thus, it must be defined if also robots, being complex machines, count among the topical field of these conventions.

2.4.2.1 Bi-Directional Dual-Use

Another challenge for export control exists in respect of the so called “dual-use”, that is the possibility to use civil technologies for the purpose of war. Also robots being developed for military purposes, however, may be considered an example of “bi-directional dual-use”. Here there exists a challenge e. g. regarding the question of how machines are used which were developed for military purposes but which can also be used for Police purposes. This

challenge is even bigger because these days particularly in the context of foreign missions armed forces often take over Police tasks (e. g. riot control).

2.4.2.2 Robots as Media

There is a general challenge regarding the question of how we shall deal with documents which are produced by the use of robots or may be produced this way. Those challenges as resulting for contents from embedding software agents into distribution systems will be discussed in Paragraph 3.2 (Filtrating and Blocking). Furthermore, certain types of robots may be considered parts of surveillance systems, which will be discussed in Paragraph 3.1 (Data Protection and Control).

The challenge resulting particularly from use in war but also from Police and rescue actions is due to the question of how we shall deal with those video and audio recordings as well as further data which are recorded by artificial agents at the place or – in the case of tele-presence – at the control unit. On the one hand, these data open up the possibility of controlling e. g. if regulations of international law are kept. On the other hand, new possibilities of manipulation are opened up to undermine just this control. Additionally, there must be taking into account that in case of a conflict between two war parties between which there is a "robotic divide" there may develop a kind of media or informational superiority on the side which is provided with the appropriate technology.

2.4.3 Entertainment

Under 2.2 (Machines Replacing Humans) we have already pointed out to the fact that in respect of the problem of child pornography the use of robots in certain fields of "entertainment" may be judged on critically. However, concerning this there is no common legal practice within the European Union. Whereas in Germany the

- Interstate Treaty on the Protection of Human Dignity and Youth Protection in Radio and Television Media from September 10th to 27th, 2002, last version by the Eighth Interstate Treaty on Changes of the Broadcasting System from October 8th/15th, 2004

expressively equates virtual depictions with real pictures, and in Italy by the

- Provisions on the fight against sexual exploitation of children and on child pornography on the internet (6 February 2006)

"virtual pornography" is also punished, the legal situation in other member states does not seem to be as clear. E. g. in the Netherlands there is currently trying to create certainty of justice by help of an exemplary case (Reuters, agency report from Febr. 21st, 2007).

The example of "virtual child pornography" in online offers such as "Second Life" shows that similar regulations must be expected also for humanoid robots if they, being media products, are not anyway included into the appropriate laws. In general, we must assume that humanoid robots, as far as they represent specific individuals, are not allowed to violate the personal rights of those depicted, and that as far as no example can be found they are allowed to be produced and used only within the frame of valid laws. Concerning this, Par. 1 of the Charter of Fundamental Rights (Human Dignity) may be supposed to be a point of reference, as it can be found e. g. in the

- Recommendation of the European Parliament and of the Council of 20 December 2006 on the protection of minors and human dignity and on the right of reply in relation to the competitiveness of the European audiovisual and on-line information services industry (2006/952/EC)

Furthermore, there must be pointing out to the fact that in respect of robots in the field of "entertainment" there already exist those challenges as mentioned under 2.3 (tele-presence).

E. g. in Germany selling the “Teddycam” (www.smarthome.com/7853.html) was prohibited, as such a combination of covered surveillance technology and an object of daily use is not allowed according to the German Act on Telecommunication.

As a conclusion, we must emphasize that we do not intend to create the impression that the use of robots for entertainment purposes should be restricted more than it is the case with other entertainment products. However in the context of this report, which aims at presenting the status quo, there must be pointing out to existing regulations. Indeed, by the robot jockey an example has already been mentioned where the use of artificial agents in this field must be welcomed.

3. Autonomous Software Agents

As already explained in Part A under paragraph 2.2, the main focus of this report is on the integration of autonomous software agents, in order of closing off from other developments in the field of information and communication technologies (ICTs), particularly from “ubiquitous computing” and comparable approaches.

The extensive literature on the ethical dimension of ICTs documents the lively debate on the information society. At the international level, here particularly the “World Summit on the Information Society” (WSIS) must be mentioned:

> As the first in the series of UN world summits, the World Summit on the Information Society was held in two parts: The first summit was in Geneva in December 2003, the second one in Tunis in 2005. A series of preparatory conferences was held in the run-up to the summits to negotiate process issues, summit declarations and action plans. (www.worldsummit2005.org)

In the context of the WSIS particularly the following documents were passed:

- Geneva Declaration of Principles (WSIS-03/GENEVA/DOC/0004)
- Geneva Plan of Action (WSIS-03/GENEVA/DOC/0005)
- Tunis Commitment (WSIS-05/TUNIS/DOC/7)
- Tunis Agenda for the Information Society (WSIS-05/TUNIS/DOC/6 - rev. 1)

None of these documents includes specific considerations on software agents.

Part of the “Geneva Plan of Action” is the “Implementation of Action Line C10 (Ethical Dimensions of the Information Society)”, the UNESCO acting as a “moderator/facilitator” for this. Here there is working out a. o. the draft of a

- Code of Ethics for the Information Society

which might gain essential significance at the international level. Also for the previous draft software agents are not particularly taken into consideration. By “Ethical Implications of Emerging Technologies: A Survey” (UNESCO 2007), however, it becomes obvious where, from the point of view of the UNESCO, there might be need of regulations concerning software agents in the context of “Semantic Web” and “Digital Identity Management”, for which reasons are given in respect of the “Universal Declaration of Human Rights”. We will come back to this.

Also at the European level there exists a number of regulations and decisions on the topic of ICTs or the information society. In respect of autonomous software agents, in our opinion most of all the

- Communication from the Commission to the European parliament, the council, the European economic and social committee and the committee of the regions on fighting spam, spyware and malicious software (COM(2006) 688 final)

seems to be of interest, as “worms” and “viruses” can definitely be understood to be – admittedly: primitive – “autonomous agents” (and are dealt with as such e. g. by FLORIDI/SANDERS 2004). Apart from this, European regulations do not immediately refer to autonomous software agents. Thus, as a first intermediate result we may state that for the time being there exist only a few specific regulations on autonomous software agents.

In the following we will focus particularly on two problem fields: the first challenge is in the fact that autonomous agents, being “systems which are capable of adjusting and learning” must perceive, store, and process numerous data from our environment. In so far they are (parts of) *surveillance infrastructures*, the operation of which is maybe an intervention with the fundamental right of *privacy* which must be justified. The second challenge is in the fact that software agents may support users with being informationally autonomous (KUHLEN 2004: 164). E. g. agents may help us with distinguishing relevant from irrelevant information. However, also new ways of manipulation, censorship, and dependency can be imagined.

3.1 Data Protection and Surveillance

As early as in 1999 BORKING/VAN ECK/SIEPEL published a report on the topic of “Intelligent Software Agents and Privacy” by order of the Dutch gouvernment. In their concluding recommendations (p. 45ff) it says a. o.:

> In spite of the fact that agents are not yet as sophisticated as researchers claim, the implications of the use of (intelligent) agents for the privacy of individuals already need to be taken into account. … Agents can exchange personal data of their owners with others, but it is also possible that agents collect personal data of
> individuals in the interest of their owners. This could lead to the following potential threats to privacy:
> – loss of control; …
> – the exchange of personal data with the environment:
> – agents that are in disguise; …
> – the collection of personal data of individuals, by:
> – entering the privacy domain of the individual;
> – entering databases that contain information about the individual;
> – entering the user-profile of an individual’s agent.

At first we may state that some of the challenges we have already met in the case of robots are also named by this list, such as the question of how a sufficient degree of user control of the artificial entity could be guaranteed (see 2.1.3 – also in respect of attributing responsibility). Also “agents in disguise” have already been mentioned under 2.3.

As today software agents are much more widely spread than *robotic agents*, there exist already examples from practical work by which it becomes obvious that also regulations of the civil law may contribute to meeting these challenges. By the

- “Terms of Use Agreement” (January 11th, 2007) of the online role-playing game “World of Warcraft”

e. g. the use of “bots” (software agents taking over control of the game character) is excluded. As a reason the producer states that this way the “World of Warcraft experience” would be changed – furthermore, every programme is prohibited „that intercepts, ‚mines’, or otherwise collects information from or through the Program or the Service“. Due to the international use of this offer and comparable ones, the observation of legal cases in this environment may be supposed to be very telling.

Probably, from the legal point of view it is not sufficient if providers and developers simply give advice such as the following one for their products (in this case the chatbot “P.A.U.L.A SG”):

> Warning: because Paula learns by herself, most of the things she knows are results from other users talking to her. She may therefore curse, being politically incorrect and express offensive comments. (www.botspot.com/Intelligent_Agent/2187.html)

Such advice, however, makes obvious that already today there are challenges due to learning agents which in this case concern youth protection on the one hand but also the protection of privacy, as the behaviour of agents interacting with more than one person allows to conclude on the behaviour of other participants.

Another challenge exists in respect of the interaction of software agents with other software agents, which has already been emphasized by BORKING/VAN ECK/SIEPEL (1999). Also the UNESCO account (2007) points out to the fact that due to current developments in the field of "Digital Identity Management" also the exchange of personal data among agents or information systems in general is clearly made easier: „the empowering of machines in this way could ignite an explosion in machine-to-machine interaction" (UNESCO 2007: 37).

However, software agents may support users with purposefully releasing or hiding information. Beyond this, ALLEN/WALLACH/SMIT (2006) suggested to develop agents being able to recognize private situations and to react appropriately. There may also be reminding to the suggestion by ROSEN (2004) to build "blob machines" instead of "naked machines". Such thoughts are also found e. g. in around the "Semantic Web", where in the context of the "Platform for Privacy Preferences (P3P) Project" (www.w3.org/P3P) there is trying to describe the collecting and use of data in a way which could be read by machines and to this way control the flow of these data. In a general sense, also developments towards the "Policy-Aware Web" (KOLOVSKI et al. 2005) must be taken into account here. However, together with BORKING (2006) we must e. g. state: „Building privacy rules set down in the Directive 95/46/EC and 2002/58/EC into information systems for protecting personal data poses a great challenge for the architects." In this context BORKING also names two essential European Directives:

- Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data.
- Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector.

At the European level the

- Convention for the Protection of Individuals with regard to automatic processing of personal data

was passed by the "Council of Europe" (COE) as early as in 1981.

On Directive 95/46/EC e. g. the network "European Parliamentary Technology Assessment" (EPTA 2006: 26) remarks: „The Directive serves as a model with worldwide impact." Also BENNETT/RAAB (2006: 93) call it "by far the most influential international policy instrument to date". Insofar, it may be used for giving evidence to the fact that still today it is possible to influence at the global level by help of appropriate regulations.

The global effect of this directive is also due to the fact that Par. 25 deals also with data transfer to third party countries which must prove a certain standard for this (BENNET/RAAB 2006: 98ff). Also the COE convention by its Par. 23 offers the possibility to invite *non-member states* to signing, to which e. g. the "Montreux Declaration", which was passed at the "27th International Conference of Data Protection and Privacy Commissioners", points out.

However, this may definitely result in problems in third party countries, as OLINGER/BRITZ/OLIVIER (2005) showed by the example of South Africa, where at least in

the context of the Ubuntu philosophy there does not exist any comparable concept of "privacy". The western origins of the concept of *privacy* counts also among those challenges as existing with the development of autonomous agents and other technologies which are supposed to contribute to guarantee data protection and to protect privacy. Also in the context of the UNESCO Survey (2007: 39) the establishment of a "Community of Technologists to Protect Personal Data" is recommended to develop appropriate tools which are supposed to be orientated at the already mentioned COE convention as well as at the

- OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (1980)

However, there must be asking in how far it will be possible to develop such agents in such a way that they can be welcomed also from the inter- and trans-cultural point of view (see i. e. MÖLLER 2003 on *legal localization of* P3P).

There must also be pointing out to the fact that "Data Protection Laws" alone are not sufficient to secure the fundamental right of privacy: „ … laws may enforce appropriate methods of the processing and storage of personal data, once collected. But they are only sometimes able to prevent the collection of personal information in the first place, or to effect the dismantling of existing systems" (BENNETT/RAAB 2006: 147). Exactly this might be one of the greatest challenges with integrating artificial agents into human society, as in principle we must assume that the use of artificial agents will come along with producing personal data to an extent which has previously been unknown, in the context of which we may state together with the SURVEILLANCE STUDIES NETWORK (SSN 2006:1) that already today we are living in a *surveillance society*:

> It is pointless to talk about surveillance society in the future tense. In all the rich countries of the world everyday life is suffused with surveillance encounters, not merely from dawn to dusk but 24/7.

The quoted report emphasizes also that: „Surveillance is two-sided, and its benefits must be acknowledged" (p. 2). In so far, the challenge is in the question of how the use of surveillance technologies can be organized in such a way that it will not undermine the fundamental convictions of a pluralist, democratic society (see SSN 2006: 75ff).

In this context it must finally be taken into consideration that already today critics speak of "panopticon Europe" (BROEDERS 2007, DAVIS 2005). We must not overlook that already today particularly fringe groups are kept under surveillance by help of appropriate technology (see e. g. GILLIOM 2006). Although we must assume that artificial agents will at first be used by wealthy members of society, the integration of artificial agents into society may have consequences also for those who themselves are not provided with them.

3.2 Filtrating and Blocking

The use of *AI systems for communication and information* is supposed to serve for offering users access to relevant information. With this, we must distinguish between kinds processing and offering a pre-determined amount of information for the user (such as the KBS Hyperbook System mentioned in D2) and those being supposed to support the use of public information (such as the "Letizia" agent introduced in D2). In the following we will focus on use of the latter kind.

As not at last such systems pre-select available documents, there must be asking in how far such technologies might be a kind of censorship and might open up possibilities of manipulation, as they are able to prevent access to certain information or to attribute a low level of relevance to certain documents. Furthermore, there results the possibility to discriminate against certain users or groups of users by restricting their access to certain documents.

Particularly regarding the suspicion that appropriate software might result in a new kind of censorship we think it is necessary, while following KUHLEN (2004: 199), to distinguish the filtration of contents from blocking them:

- filtration means the positive performance of providing only that kind of information the user wants.
- blocking, instead, means the possibility to refuse access to certain contents, while we speak of passive blocking if this is not due to the respective user´s initiative.

Particularly passive blocking of contents must be justified, as it is an intervention with the freedom of information which is guaranteed by the EU´s Charter of Fundamental Rights in Par. 11(2). One possible justification might be e .g. in respect of the protection of minors and human dignity. E. g. in the

- Amended proposal for a Directive of the European Parliament and of the Council amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities ("Audiovisual media services without frontiers") (COM/2007/0170 final - COD 2005/0260)

there is pointing out to the fact that e. g. from the

- Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - The future of European Regulatory Audiovisual Policy (COM/2003/0784 final)

there results that

> [The] Commission … stresses that regulatory policy in the sector has to safeguard certain public interests, such as cultural diversity, the right to information, the importance of media pluralism, *the protection of minors and consumer protection* and action to enhance media skills. (italics by the authors)

In this context there is also taking into consideration that there might be the obligation to "draw attention to the specific nature of certain programmes before they are transmitted and in accordance both with Article 1 and Art 24 of the Charter of Fundamental Rights of the European Union". However, emphasizing the time ("before they are transmitted") also indicates that intervention in public networks is seen critically at the European level, something to which the already mentioned proposal points out:

> However, the European Court of Justice has consistently held that any restriction of the freedom to provide services, such as any derogation from a fundamental principle of the Treaty, must be interpreted restrictively.

3.2.1 Youth Protection and Related Rights to Protection

Here, at the European level particularly the

- Council Recommendation of 24 September 1998 on the development of the competitiveness of the European audiovisual and information services industry by promoting national frameworks aimed at achieving a comparable and effective level of protection of minors and human dignity (98/560/EC)

must be mentioned as a fundamental document. There, in paragraph 2.2.1 of the "Guidelines" it says:

> … additional tools or services are supplied to users to facilitate parental control, including:
> - filter software installed and activated by the user,

> - filter options activated, at the end-user's request, by service operators at a higher level (for example, limiting access to predefined sites or offering general access to services)

Thus, at the European level the possibility of filtrating contents is judged on positively, as becomes obvious also by the

- Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - Final evaluation of the implementation of the multiannual Community action plan on promoting safer use of the Internet by combating illegal and harmful content on global networks (COM/2006/0663 final)

One specific challenge with using agents for filtering out *illegal and harmful content* is in the fact that there is no common national law among the member states. Recommendation 98/560/EC recommends only "the establishment of a national framework for self-regulation by operators of on-line services" (Par. 1). Also the "Proposal" (COM/2007/0170 final) aims only at "minimum harmonisation with regard to protection of minors, hate speech, commercial communication" (par. 2), while at the same time by Amendment 33 it is suggested that

> Member States must be able to apply stricter rules in the fields coordinated by this Directive to media service providers under their jurisdiction, while ensuring that those rules are consistent with Community Law.

But for this report the problem of youth protection is of interest also because in Germany after 2005 the "Selbstkontrolle Suchmaschinen" (self-control 'search engines') was founded, members of which are a. o. AOL Germany, Netscape, Google, Lycos, MSN Germany, T-Online, and Yahoo! Germany. The members of "Selbstkontrolle Suchmaschinen" have obliged themselves to keep the

- Code of Behaviour for Providers of Search Machines of the FSM (VK-S).

A. o. it includes the obligation " not to show or to take away every URL [from web offers]" which have been put on the *list of youth-endangering media* by the *Federal Department for Media Harmful to Young Persons* or violate other regulations of the German Penal Code (Strafgesetzbuch, StGB), such as

- the use of means of propaganda or symbols of unconstitutional organizations (Par. 86 StGB, Par. 86a StGB)
- incitement of the people and denying Auschwitz (Par. 130 StGB)
- proposing or enticing into criminal deeds (Par. 130a StGB)
- depicting violence (Par. 131 StGB)

In the context of this report this is of interest due to three reasons:

1) The code of "Selbstkontrolle Suchmaschinen" does *not* concern those software agents (webbots) by help of which contents are found but only the publication of search results.

2) E. g. Google´s German offer informs if one or several URLs are not shown. In our opinion this seems to be generally advisable everywhere where users do not expect not to get access to certain information.

3) For filtering out appropriate offers, producers of user-autonomous filtrating programmes can be provided with a software module (BPjM-Module) which is also used by German providers of search engines.

In respect of the last aspect, on the other hand, we must take into consideration that although the blocking of URLs is done by help of software the decision about which contents are to be blocked is made by a state institution in the course of legal proceedings. Making this list automatically, on the other hand, would not be allowed, as we will explain in the following paragraph.

If, anyway, one is willing to classify complex online offers, such as Google, as “autonomous systems”, we will understand this to be an example of an “artificial moral agent” in the sense of “machine ethics” (paragraph 2.4.1). However, criticism of this norms-oriented behaviour shows that enforcing the law by help of agents is not only judged on positively, as far as this restricts the users´ previous freedom. This must be taken into consideration also in respect of other developments (digital rights management aso.).

3.2.2 Free Access to Knowledge and Participation in Public Life

Altogether, the support of humans by machines with the search for and the processing of information must be judged on positively. The development and use of appropriate software agents may contribute to realizing those objectives as mentioned in the documents of the WSIS as well as at the European level in the following and in further texts:

- Council Resolution of 15 July 2003 on Social and Human Capital – Building social and human capital in the knowledge society: learning, work, social cohesion and gender. (2003/C 175/02)
- Council Resolution of 27 November 2003 on equal access to and participation of women and men in the knowledge society for growth and innovation (2003/C 317/03)
- Council Resolution of 8 October 2001 on "e-Inclusion" — exploiting the opportunities of the information society for social inclusion (2001/C 292/02)

As a common goal of these documents we can identify that it shall be made possible for more people to use ICTs both for getting information and for communication and publication. Also here, we must again point out to developments such as the “Semantic Web”:

> The wealth of content available on information networks, particularly the Internet, is useful only if people can actually find and access the information that they need. The semantic web allows people to use computers as agents to search for appropriate content based on a wide range of criteria – which could include the public domain or intellectual property status of the content, alternate sources of the content in different formats or languages, or even the existence of evidence serving to refute the view offered in the content. (UNESCO 2007: 30)

At the same time, such technologies make it possible for their users to publish information in a way which makes them easy to find. In so far, these technologies may increase the visibility of previously marginalized groups.

In respect of the goal to make free access to these resources possible for disabled or old-aged people, this must surely be judged on positively. Here, also the development of the

- Web Content Accessibility Guidelines 2.0 (WCAG)

must be mentioned, which will be completed in 2007. They will also include recommendations on the “Semantic Web”.

Barrier-free access to information and online services does also play an essential role in the field of e-government. At the European level this becomes obvious e. g. by the

- Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee, and the Committee of Regions - eEurope 2002: Accessibility of Public Web Sites and their Content (COM/2001/0529 final)

which refers particularly to the WCAG in its 1.0 version. At the national level the demand for barrier-free access to public information offers is determined in Germany by Par. 11 of the

- law on equal treatment of disabled persons (Behindertengleichstellungsgesetz, BGG9 FROM April 27th, 2002,

so that

> offices and other institutions of the federal administration - including bodies under immediate control of the federal gouvernment, institutions and foundations of public law - ... will step by step technically organize their Internet presentations and offers as well as the IT-based graphic programme interfaces they provide ... in such a way that they can in principle be used unrestrictedly by disabled persons.

This is organized in more detail by the

- By-Law on Barrier-Free Information Technology from July 17th, 2002 (BGGI. I. S. 2654)

which also follows Version 1.0 of WCAG.

Furthermore we must state that the use of “Semantic Web”-technologies gains increasing significance also in the field of e-government (see e. g. www.semantic-gov.org). In so far it cannot be ruled out that in the future also public Internet presentations and offers will be based on these technologies. *AI systems for communication and information* might thus become an essential part of these offers, which according to what has been stated so far must be judged on positively. However, there is a challenge in creating a legal frame for this, as Par. 6a of the

- Federal Law on Data Protection by its version as officially announced on January 14th, 2003 (BGBI. I. S. 66), latest version of Par. 1 of this law from August 22nd, 2006,

determined that

> decisions resulting in legal consequences for those concerned or considerably affecting them must not exclusively be based on the automatic procession of personal data which serve for assessing single personality traits.

Currently the range of this regulation is under discussion (EIFERT/PÜSCHEL/STAPEL-SCHULZ 2005: 68). However, a restrictive interpretation might mean a considerable restriction for the use of *AI systems of communication and information* by state institutions. As at the European level Par. 15 of Directive 95/46/EC is equivalent to the quoted Par. 6a, this challenge also exists at the European level.

At the same time these regulations remind us to the fact that the integration of software agents being provided with appropriate information about individuals is also connected to the danger of discrimination against individuals and groups, a danger e. g. also the UNESCO has already pointed out to (2007: 37). Here, we are again confronted with a paradox we have already pointed out to in paragraph 2.4.1: particularly if developments serve the goal of increasing and realizing the rights of old-aged or disabled people, these technologies are at the same time an intervention with their fundamental rights which must be justified and which confronts them with the danger of discrimination.

4. Bionics

On the last subject of this report there are currently no specific regulations, so that the already quoted EGE Opinion 20 plays an essential role. Thus, the most important results will be shortly summarized in the following paragraph. As the EGE recommends a narrow frame for *implants for non-medical purposes*, in the second paragraph we will pursue the question

of in how far research in this field may happen, to then turn to a specific example of the use of implants and prostheses.

4.1 EGE Opinion No. 20

At the European level, the

- Opinion of the European Group on Ethics in Science and New Technologies to the European Commission – No. 20 - 16/03/2005 - Ethical aspects of ICT Implants in the Human Body

must be considered an essential document on the *physical, invasive integration* of artificial entities, where a. o. there is refering to

- Council Directive 90/385/EEC
- Directive 95/46/EC of the European Parliament and of the Council of the European Union, as well as to
- Council of Europe Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine, signed on 4 April 1997 in Oviedo

In respect of the "Convention on Human Rights and Biomedicine" we must remark that some member states have neither signed nor ratified it (a. o. Austria, Belgium, France, Germany, Ireland, United Kingdom). The same is true for the EU which, being an international organization, could sign and ratify the Convention (source: www.coe.int).

The EGE sees the need for *regulations*. As already explained in paragraph 2.3 of Part A of this report, the EGE distinguishes "implants for health purposes" from "implants for non-medical purposes". The recommendation on *devices for medical purposes* says: They "should be regulated in the same way as drugs when the medical goal is the same, particularly as such implants are only partly covered by Council Directive 90/385/EEC on the approximation of the laws of the Member States relating to active implantable medical devices" (EGE 2005: 35).

On "non-medical devices", however, there is stating that currently they "are not explicitly covered by existing legislation, particularly in terms of privacy and data protection" (ibid.). Appropriate *legislation* must be based on the principles of "dignity, human rights, equity, autonomy and the derived principles, precautionary, data minimisation, purpose specification, proportionality and relevance" (ibid.). Also, paragraph 6.4.4 of the Opinion demands the prohibition of some kinds and ways of using implants (EGE 2005: 33f). This concerns a. o. "ICT implants used for changing the identity, memory, self perception and perception of others".

Also by

- Opinion No. 21 - 17/01/2007 - Ethical aspects of nanomedicine

the EGE (2007: 64) emphasizes the difference between "medical and non-medical uses":

> Maintaining the distinction between medical and non-medical uses is important with respect to European research funding policies, too, because non-medical research funding of nanomedicine may not be advocated as easily as research funding within the medical sphere. The Group proposes that enhancement technologies should not be given priority. Health care concerns must be met first.

If the EU follows these recommendations, there will not be much leeway for the development of *implants for non-medical purposes*.

In general, there must be pointing out to the fact that particularly in respect of data protection and the fundamental right to privacy there exist great challenges in this field (see e. g. EGE 2005: 34; EGE 2007: 46).

4.2 Research on Animals and Humans

According to what has been said so far, we must assume that particularly in respect of the development of *implants for non-medical purposes* also the possibilities of research within the EU will be very restricted.

The question if this possibility exists at all is difficult to answer, particularly given the status of the "Convention on Human Rights and Biomedicine. In respect of *predictive genetic tests* the latter´s Par. 13 determines that such tests „may be performed only for health purposes or for scientific research linked to health purposes". Indeed, the EGE refers to this (2005: 24) in order of explaining that "a relationship is established between specific circumstances, available tools, and reference values" (ibid.) and that accordingly the appropriateness and the purpose of an operation is essential for judging on its reliability. Due to this, there is the question if in analogy the statement shall be valid that research on *implants for non-medical purposes* is not at all allowed, as this attempt does just not serve for "health purposes". This is particularly true if "health purposes" are interpreted in a narrow, reparative sense. A rather narrow interpretation is supported by the fact that in the context of a convention dealing with "biomedicine" "health purposes" are again explicitly demanded to be the purpose of research.

Anyway, Par. 3 of the "Charter of Fundamental Rights of the EU" is less restrictive than the COE convention, as here even in the context of biological research for scientific purposes the intervention into the right to freedom of bodily harm is said to be allowed. In so far the question must be answered if research in the field of "Bionics" must be classified as such.

In any case, research will have to be done while observing the relevant regulations, such as

- World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects, adopted by the 18th WMA General Assembly, Helsinki, Finland, June 1964.
- Council for International Organizations of Medical Sciences: International Ethical Guidelines for Biomedical Research Involving Human Subjects (2002)

At the European level

- Directive 2001/20/EC of the European Parliament and of the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice in the conduct of clinical trials on medicinal products for human use.

is decisive.

Experiments on animals are regulated a. o. by the

- Council for International Organizations of Medical Sciences: International Guiding Principles for Biomedical Research involving Animals (1985)
- Council Directive of 24 November 1986 on the approximation of laws, regulations and administrative provisions of the Member States regarding the protection of animals used for experimental and other scientific purposes (86/609/EEC)

Also in respect of the latter regulations we must remark that regarding the purpose research must serve for to allow experiments on humans or animals they are not the same everywhere.

Particularly in respect of the “European Charter for Researchers” and the included “Code of Conduct for the Recruitment of Researchers” it should be recommended to work out guidelines on experiments in the field of “Bionics”, in order of stimulating a debate both within the Community and in society, as even the EGE (2005: 33) emphasizes:

> More research on the long term social, cultural and health impact of different types of ICT implants needs to be carried out, with a particular focus on risk characterisation, risk assessment, risk management and risk communication.

4.3 The Example of “Sex Change“ in German Law

Just because due to the existing regulations it is difficult to make a clear statement on the possibilities of research and development in the field of “Bionics”, as a conclusion we like to have a closer look at a special example which is about the *physical, invasive integration* of artificial entities. This is the German

- law on the change of surnames and the identification of the sex in particular cases (Law on Transsexuals, TSG) from September 10th, 1980, last version from February 19th, 2007.

In respect of this law we must remark that currently its reform is being prepared. As for operations aiming at changing external sex organs there is partly the use of active implants, in our opinion this law seems to be relevant for our project, and we recommend observation of its reform.

In our context particularly Par. 8 (conditions) is of interest, where it is determined that an individual wishing to change his/her sex for his/her official papers “has been forced to live according to his/her ideas for at least three years”. Furthermore, Par. 1 determines a minimum age of 25 years for changing one´s sex in official papers. Although the

- The Harry Benjamin International Gender Dysphoria Association's Standards Of Care For Gender Identity Disorders, Sixth Version, February, 2001

recommends only “a real-life experience of at least two years in the gender role of the sex with which the adolescent identifies” (p. 11) and a minimum age of 18 years it is obvious that for this irreversible operation both the “Standard of care” and the TSG demand a period of time during which the concerned individual shall at first test if the operation is necessary.

Apart from determining a minimum age, which is surely advisable also in respect of other kinds of *physical, invasive integration of articifical entities into the human body*, there must also be the question if also for other interventions with the human body a period of time must be demanded, during which the respective individual wishing this intervention will at first assess his/her wish by help of comparative, non-invasive technologies.

5. Summary of the Essential Results of Part B

In the summary of part B we will not present a list of all major regulations found in the course of our research, since they are included in the overview of national and international ethical regulations presented in the annex of this report. Rather, we would like to point out to the general topics within the three fields of the Ethicbots project.

One major finding is, while there is still a need for regulations in the field of bionics, a vast number of regulations can be applied with regards to artificial agents (robots and software agents), although there are no regulations dealing explicitly with neither autonomous robots nor autonomous software agents.

Major issues with robots as well as with software agents are connected with the possibility of direct or indirect forms of tele-presence, which raise concerns about moving into a surveillance society and a “panopticon Europe”, although these kind of techniques may also

be used to protect privacy. In this area we are also confronted with a paradox: if developments serve the goal of increasing and realizing the rights of old-aged or disabled people, these technologies are at the same time an intervention with their fundamental rights which must be justified and which confronts them with the danger of discrimination.

We have also emphasized that especially with regards to the increasing use of artificial agents in the world of work cannot be judged on only by looking at those countries where these robots are used. There must also be asking about the effects on other countries. Also, the possibilities of tele-presence must be judged on also under the aspect of a (potential) brain drain.

References

ALLEN/WALLACH/SMIT 2006: Allen, Colin; Wendell Wallach; Iva Smit: Why Machine Ethics? In: IEEE Intelligent Systems, July/August 2006, 12-17.

BALDWIN ET AL. 1998: Baldwin, R., Scott, C., Hood, C.: Introduction. In: R. Baldwin, C. Scott, C. Hood (Eds.): A Reader on Regulation. Oxford: Oxford University Press, pp. 1-55.

BAXTER ET AL. 2004: Baxter, G. D.; A. F. Monk; K. Doughty; M. Blythe; G. Gewsbury: Standards and the Dependability of Electronic Assistive Technology. In: Simeon Keatas, John Clarkson, Partrick Langdon; Peter Robinson (Eds.): Designing a More Inclusive World. London; Berlin; Heidelberg: Springer 2004, pp. 247–256.

BENNETT/RAAB 2006: Bennett, Colin J.; Charles D. Raab : The Governance of Privacy. Policy instruments in Global Perspective. Cambridge, Massachusetts – London, UK: The MIT Press.

BORKING 2006: Borking, John: Privacy Rules – A Steeple Case for System Architects. Position Paper. W3C Workshop on Languages for Privacy Policy Negotiation and Semantics-Driven Enforcement, 17 and 18 October 2006, Ispra/Italy. < http://www.w3.org/2006/07/privacy-ws/papers/04-borking-rules/ >

BORKING/VAN ECK/SIEPEL 1999: Borking, John J.; B.M.A. van Eck; P. Siepel: Intelligent Software Agents and Privacy. The Hague: Registratiekamer. (=Achtergrondstudies en Verkenningen 13)

BORKING/VAN ECK/SIEPEL 1999: Borking, J. J. ; B. M. A. van Eck; P. Siepel: Intelligent Software Agents and Privacy. The Hague: Registratiekamer. (= Achtergrondstudies en Verkenningen, 13) < http://www.dutchdpa.nl/documenten/EN_av_13_Intelligent_software_agents_and_privacy.shtml >

BROEDERS 2007: Broeders, Dennis: The New Digital Borders of Europe. EU Databases and the Surveillance of Irregular Migrants. In: International Sociology, January 2007, Vol. 22 (1), pp. 71–82.

BROOKS 2001: Brooks, Rodney: Flesh and machines. In: Peter J. Denning (Hg.): The Invisible Future. New York u. a.: McGraw-Hill, pp. 57-63.

BROOKS 2005: Brooks, Rodney: Menschmaschinen. Frankfurt am Main: Fischer Taschenbuch. (= German Edition of: Flesh and Maschines. New York: Pantheon 2002.)

CHRISTALLER ET AL. 2001: Christaller, Thomas; Michael Decker; Joachim M. Gilsbach, Gerd Hirzinger, Karl W. Lauterbach, Erich Schweighofer, Gerhard Schweitzer, Dieter Sturma (2001): Robotik. Perspektiven für menschliches Handeln in der zukünftigen Gesellschaft. Berlin – Heidelberg – New York: Springer.

CHRISTEN 2003: Christen, Markus: Die Ontologie künstlicher Körper. In: Emil Angehrn, Bernard Baertschi (Redaktion): Der Körper in der Philosophie / Le Corps dans la philosophie. Bern; Stuttgart; Wien: Haupt 2003, pp. 225-243.

DAVIS 2005: Davis, Mike: The Great Wall of Capital. In: Michael Sorkin (Ed.): Against the Wall. New York – London: The New Press 2005.

DICKENS/COOK 2006: Dickens, B. M.; R. J. Cook: Legal and ethical issues in telemedicine and robotics. International Journal of Gynecology and Obstetrics (2006) 94, pp. 73-78.

DIODATO ET AL. 2005: Diodato, Michael D.; Sunril M. Prosad; Mary E. Klingensmith; Ralph J. Damiano: Robotics in Surgery. Current Problems in Surgery, Vol. 41, Issue 9 (September 2005), pp. 752–810.

EGE 2005: European Group on Ethics in Science and New Technologies to the European Commission: Opinion No. 20 - Ethical aspects of ICT Implants in the Human Body (16/03/2005) < http://ec.europa.eu/european_group_ethics/docs/avis20_en.pdf >

EGE 2007: European Group on Ethics in Science and New Technologies to the European Commission: Opinion No. 21 - Ethical aspects of nanomedicine (17/01/2007) < http://ec.europa.eu/european_group_ethics/activities/docs/opinion_21_nano_en.pdf >

EIFERT/PÜSCHEL/STAPEL-SCHULZ 2005: Eifert, Martin; Jan Ole Püschel, Claudia Stapel-Schulz: Rechtliche Rahmenbedingungen für E-Government (16.03.2005). Modul des: E-Government-Handbuch. Online-Version. < http://www.bsi.bund.de/fachthem/egov/download/2_Recht.pdf >

EPTA 2006: European Parliamentary Technology Assessment (EPTA): ICT and Privacy in Europe. Experiences from technology assessment of ICT and Privacy in seven different European countries. Final report (October 16 2006). < http://epub.oeaw.ac.at/ita/ita-projektberichte/e2-2a44.pdf >

FLORIDI/SANDERS 2004: Floridi, Luciano; J. W. Sanders: On the morality of artificial agents. Online: < http://web.comlab.ox.ac.uk/oucl/research/areas/ieg/publications/articles/omaa.pdf >

FRANKLIN/GRASSER 1996: Stan Franklin, Art Graesser: Is it an Agent, or just a Program? A Taxonomy for Autonomous Agents. < http://www.msci.memphis.edu/~franklin/AgentProg.html >

FREITAS 1985: Freitas, Robert A. (1985): The Legal Rights of Robots. In: Student Lawyer 13 (Jan 1985), pp. 54-56. Web version: < www.rfreitas.com/Astro/LegalRightsOfRobots.htm >

GESANG 2005: Bernward Gesang: Der perfekte Mensch in einer imperfekten Gesellschaft – Die sozialen Folgen einer technischen Veränderung des Menschen. In: Abel, Günter (Hg.): Kreativität. XX. Deutscher Kongress für Philosophie. 26.-30. September 2005 in Berlin. Sektionsbeiträge, Bd. 2. Berlin: Universitätsverlag der TU Berlin 2005, S. 375-385.

GILLIOM 2006: Gilliom, John: Struggeling with Surveillance – Resistance, Consciousness, and Identity. In: Kevin D. Haggerty; Richard V. Ericson (Eds.): The New Politics of Surveillance and Visibility. Toronto – Buffalo – London: University of Toronto Press, pp. 111-129.

GRÄF 2004: Gräf, Winfried: Maschinensicherheit. 3. Auflage. Heidelberg: Hüthig.

ICHBIAH 2005: Ichbiah, Daniel: Roboter. Geschichte – Technik – Entwicklung. München: Knesebeck.

IFR 2005: International Federation of Robotics. Service Robots: Classification and Definition. Online: http://www.ifr.org/pictureGallery/servRobAppl.htm

JORDANA/LEVI-FAUR (2004: Jacint Jordana, David Levi-Faur: The politics of regulation in the age of governance. In: Jacint Jordana, David Levi-Faur (Eds.): The Politics Of Regulation: Institutions and Regulatory Reforms for the Age of Governance. Cheltenham u. a.: Edward Elgar Pub 2004, pp. 1-28.

KOLOVSKI 2005: Kolovski, Vladimir; Yarden Katz; James Hendler; Daniel Weitzner; Tim Berners-Lee: Towards a Policy-Aware Web. < http://www.csee.umbc.edu/swpw/papers/kolovski.pdf >

KUHLEN 2004: Kuhlen, Rainer: Informationsethik. Konstanz: UTB.

LENK/MARING 1998: Hans Lenk, Matthias Maring: Formen der Institutionalisierung von Technikethik und Wirtschaftsethik. In: Hans Lenk, Matthias Maring (Eds.): Technikethik und Wirtschaftsethik. Opladen: Leske + Budrich 1998, pp. 239-255.

LEVY 2006: Levy, David: Robots unlimited. Wellesley, MA: A. K. Peters.

LI 2006: Li, Kun: Former camel jockeys reclaiming their lost childhood. Online: < http://www.unicef.org/infobycountry/pakistan_30655.html >

MÖLLER 2003: Möller, Jan: Legal localization of P3P as a requirement for its privacy enhancing effect. Position Paper. W3C Workshop on the long term Future of P3P and Enterprise Privacy Languages, 19-20 June 2003, Kiel, Germany. < http://www.w3.org/2003/p3p-ws/pp/uld.html >

MOSER 2004: Moser, Stefan Beat: Vollautomatisierung der Spritzbetonapplikation. Dissertation. Zürich. < http://e-collection.ethbib.ethz.ch/show?type=diss&nr=15621 >

OLINGER/BRITZ/OLIVIER 2005: Olinger, H. N.; J. J. Britz; M. S. Olivier: Western Privacy and ubuntu: influence in the forthcoming data privacy bill. In: P. Brey, F. Grodzinsky, L. Introna (Eds.): Ethics in New Information Technology. Proceedings of the Sixth International Conference of Computer Ethics: Philosophical Enquiry (CEPE 2005). Enschede, NL: CTIT, pp. 291-306.

RENGELING/SCZCEKALLA (2004): Rengeling, Hans-Werner; Peter Szczekalla: Grundrechte in der Europäischen Union. Charta der Grundrechte und Allgemeine Rechtsgrundsätze. Köln: Carl Heymanns Verlag.

ROSEN 2004: Rosen, Jeffrey: The Naked Crowd. New York: Random House.

SCHOLTZ 2005: Scholtz, Christopher: Leben mit dem Roboter – Leben im Roboter? In: Magazin für Theologie und Ästhetik 35/2005. <www.theomag.de/35/crs1.htm>

SCHRÄDER (2004): Schräder, Peter: Roboterunterstützte Fräsverfahren am coxalen Femur bei Hüftgelenkstotalendoprothesenimplantation. Methodenbewertung am Beispiel „Robodoc®“. < http://infomed.mds-ev.de/ >

SSN 2006: Surveillance Studies Network (SSN): A Report on the Surveillance Society for the Information Commissioner by the Surveillance Studies Network. September 2006. Full Report. < www.ico.gov.uk/upload/documents/library/data_protection/practical_application/surveillance_society_full_report_2006.pdf >

UNESCO 2007: UNESCO, Information Society Division, Communication and Information Sector (Eds.): Ethical Implications of Emerging Technologies: A Survey. Paris: UNESCO 2007. < http://unesdoc.unesco.org/images/0014/001499/149992E.pdf >

Annex:
Overview of national and international ethical regulations

Human and Fundamental Rights

- Charter of fundamental rights of the European Union (2000/C 364/01)[1]
- Draft Charter of Fundamental Rights of the European Union − Text of the explanations relating to the complete text of the Charter as set out in CHARTE 4487/00 CONVENT 50 (CHARTE 4473/00, CONVENT 49)[2]
- Council of Europe Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine, signed on 4 April 1997 in Oviedo.[3]

Rights of the Child / Youth Protection

International (United Nations)

- Convention on the Rights of the Child. Adopted and opened for signature, ratification and accession by General Assembly resolution 44/25 of 20 November 1989 entry into force 2 September 1990, in accordance with article 49[4]
- Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography - Adopted and opened for signature, ratification and accession by General Assembly resolution A/RES/54/263 of 25 May 2000 - entered into force on 18 January 2002[5]
- Consideration of Reports submitted by States Parties under Article 12 (1) of the optional Protocol to the Convention on the Rights of the Child on the Sale of Children, Child Prostitution and Child Pornography (CRC/C/OPSC/QAT/CO/1) (2 June 2006)[6]

EU

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[1] Official Journal of the European Communities (= OJ), 18.12.2000, < http://www.europarl.europa.eu/charter/pdf/text_en.pdf >

[2] < http://www.europarl.europa.eu/charter/pdf/04473_en.pdf >

[3] < http://conventions.coe.int/Treaty/en/Treaties/Html/164.htm > – Some member states have neither signed nor ratified the Convention (a. o. Austria, Belgium, France, Germany, Ireland, United Kingdom). The same is true for the EU.

[4] < http://www.ohchr.org/english/law/pdf/crc.pdf >

[5] < http://www.ohchr.org/english/law/pdf/crc-sale.pdf >

[6] < http://www.ohchr.org/english/bodies/crc/crcs42.htm >

- Recommendation of the European Parliament and of the Council of 20 December 2006 on the protection of minors and human dignity and on the right of reply in relation to the competitiveness of the European audiovisual and on-line information services industry (2006/952/EC)[7]
- Council Recommendation of 24 September 1998 on the development of the competitiveness of the European audiovisual and information services industry by promoting national frameworks aimed at achieving a comparable and effective level of protection of minors and human dignity (98/560/EC)[8]
- Amended proposal for a Directive of the European Parliament and of the Council amending Council Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities (''Audiovisual media services without frontiers'') (COM/2007/0170 final - COD 2005/0260)[9]

National

- Law No. 22 of 23 May 2005 on Banning the Employment, Training and Participation of Children in Camel Racing in Quatar
- Interstate Treaty on the Protection of Human Dignity and Youth Protection in Radio and Television Media from September 10th to 27th, 2002, last version by the Eighth Interstate Treaty on Changes of the Broadcasting System from October 8th/15th, 2004 (Germany)[10]
- Provisions on the fight against sexual exploitation of children and on child pornography on the internet (6 February 2006) (Italy)
- German Penal Code (Strafgesetzbuch, StGB), [11] especially
    - the use of means of propaganda or symbols of unconstitutional organizations (Par. 86 StGB, Par. 86a StGB)
    - incitement of the people and denying Auschwitz (Par. 130 StGB)
    - proposing or enticing into criminal deeds (Par. 130a StGB)
    - depicting violence (Par. 131 StGB)
- Code of Behaviour for Providers of Search Machines of the FSM (VK-S) (Germany)[12]

Rights of Persons with Disabilities

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[7] OJ L 378, 27.12.2006, p. 72. < http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/c_051/c_05120070306en00070015.pdf >

[8] OJ L 270, 07.10.1998, p. 48. < http://eur-lex.europa.eu/LexUriServ/site/en/oj/1998/l_270/l_27019981007en00480055.pdf >

[9] < http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0170en01.pdf >

[10] < http://www.spio.de/media_content/672.pdf > (Text in German)

[11] < http://bundesrecht.juris.de/stgb/index.html > (Text in German)

[12] < http://fsm.de/de/Subkodex_Suchmaschinenanbieter > (Text in German)

International

- Convention on the Rights of Persons with Disabilities. Adopted on 13 December 2006 during the sixty-first session of the General Assembly by resolution A/RES/61/106. (A/RES/61/106)[13] (United Nations)
- Web Content Accessibility Guidelines 2.0 (WCAG) (W3C)[14]

EU

- Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee, and the Committee of Regions - eEurope 2002: Accessibility of Public Web Sites and their Content (COM/2001/0529 final)[15]

National

- Law on equal treatment of disabled persons (Gesetz zur Gleichstellung behinderter Menschen, BGG, from April 27th, 2002) (Germany)[16]
- By-Law on Barrier-Free Information Technology from July 17th, 2002 (Germany)[17]

Preparation, Adoption and Application of Standards

- "Agreement on technical barriers to trade" of the World Trade Organisation, particularly Annex III (Code of Good Practice for the Preparation, Adoption and Application of Standards)[18]

Definitions

- ISO 8373 Manipulating Industrial Robots - Vocabulary
- Common Military List of the European Union (adopted by the Council on 19 March 2007) (equipment covered by the European Union Code of Conduct on Arms Exports)

[13] < http://untreaty.un.org/English/notpubl/IV_15_english.pdf >

[14] < http://www.w3.org/TR/WCAG20-TECHS/ >

[15] < http://eur-lex.europa.eu/LexUriServ/site/en/com/2001/com2001_0529en01.pdf >

[16] < http://bundesrecht.juris.de/bgg/index.html > (Text in German)

[17] < http://bundesrecht.juris.de/bitv/index.html > (Text in German)

[18] < http://www.wto.org/English/docs_e/legal_e/17-tbt.pdf >

(updating and replacing the Common Military List of the European Union adopted by the Council on 27 February 2006)[19]

Research

International

- World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects, adopted by the 18th WMA General Assembly, Helsinki, Finland, June 1964[20]
- Council for International Organizations of Medical Sciences: International Ethical Guidelines for Biomedical Research Involving Human Subjects (2002)[21]

EU

- Council Decision 1513/2002/EC of 27 June 2002 concerning the sixth framework programme of the European Community for research, technological development and demonstration activities, contributing to the establishment of the European Research Area and to innovation (2002 to 2006)[22]
- Commission Recommendation from 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers[23]
- Directive 2001/20/EC of the European Parliament and of the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice in the conduct of clinical trials on medicinal products for human use[24]

Safety

- EN 775 (Manipulating industrial robots – Recommendations for safety)
- ISO 10218-1 (Robots for industrial environments – Safety requirements – Part 1: Robot)

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[19] OJ L 088, 29.03.2007, p. 58. < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:088:0058:0089:EN:PDF>

[20] < http://www.wma.net/e/policy/pdf/17c.pdf >

[21] < http://www.cioms.ch/frame_guidelines_nov_2002.htm >

[22] OJ L 232, 29.8.2002 p. 1. < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:232:0001:0033:EN:PDF >

[23] OJ L 075, 22.3.2005, p. 67. < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:075:0067:0077:EN:PDF >

[24] OJ L 121, 1.5.2001, p. 34. Consolidated version of 2007-01-26: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/2001/L/02001L0020-20070126-en.pdf >

- Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (85/374/EEC)[25]
- Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC)[26]
- Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety[27]
- Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)[28]
- Directive 98/37/EC of the European Parliament and the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery[29]
- Council Directive 93/42/EEC of 14 June 1993 concerning medical devices[30]
- Council Directive of 20 June 1990 on the approximation of the laws of the Member States relating to active implantable medical devices (90/385/EEC)[31]
- Proposal for a Directive of the European Parliament and of the Council amending Council Directives 90/385/EEC and 93/42/EEC and Directive 98/8/EC of the European Parliament and the Council as regards the review of the medical device directives (22.12.2005) (COM(2005) 681 final - COD 2005/0263)[32]

Responsibility / Code of Ethics

- "Code of Ethics" of the Institute of Electrical and Electronics Engineers (IEEE)[33]
- "Code of Ethics" of the Association for Computing Machinery (ACM)[34]
- World Medical Association (WMA): International Code of Medical Ethics. Adopted by the 3rd General Assembly of the World Medical Association, London, England,

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[25] OJ L 210, 7.8.1985, p. 29. Consolidated version of 1999-06-04: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1985/L/01985L0374-19990604-en.pdf >

[26] OJ L 183, 29.6.1989, p. 1. Consolidated version of 2003-11-20: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1989/L/01989L0391-20031120-en.pdf >

[27] OJ L 011, 15.1.2002, p. 4. < http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/l_011/l_01120020115en00040017.pdf >

[28] OJ L 157, 9.6.2006, p. 24. < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:157:0024:0086:EN:PDF >

[29] OJ L 207, 23.7.1998, p. 1. Consolidated version of 1998-12-07: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1998/L/01998L0037-19981207-en.pdf >

[30] OJ L 169 , 12.07.1993, p. 1. Consolidated version of 2003-11-20: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1993/L/01993L0042-20031120-en.pdf >

[31] OJ L 189, 20.7.1990, p. 17. Consolidated version of 2003-11-20: < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1990L0385:20031120:EN:PDF >

[32] < http://eur-lex.europa.eu/LexUriServ/site/en/com/2005/com2005_0681en01.pdf >

[33] < http://www.ieee.org/portal/cms_docs/about/CoE_poster.pdf >

[34] < http://www.acm.org/constitution/code.html >

October 1949 and amended by the 22nd World Medical Assembly Sydney, Australia, August 1968 and the 35th World Medical Assembly Venice, Italy, October 1983 and the WMA General Assembly, Pilanesberg, South Africa, October 2006.[35]

- World Medical Association (WMA): Statement on Accountability, Responsibilities and Ethical Guidelines in the Practice of Telemedicine. Adopted by the 51st World Medical Assembly Tel Aviv, Israel, October 1999 and rescinded at the WMA General Assembly, Pilanesberg, South Africa, 2006[36]

Animal Rights

- Treaty of Amsterdam amending the Treaty on European Union, the Treaties establishing the European Communities and certain related acts - Protocol annexed to the Treaty of the European Community - Protocol on protection and welfare of animals[37]
- Council for International Organizations of Medical Sciences: International Guiding Principles for Biomedical Research involving Animals (1985)[38]
- Council Directive of 24 November 1986 on the approximation of laws, regulations and administrative provisions of the Member States regarding the protection of animals used for experimental and other scientific purposes (86/609/EEC)[39]

Warfare Applications

International

- United Nations Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects (1980)[40]
- Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II to the 1980 Convention as amended on 3 May 1996)[41]
- Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, 18 September 1997[42]

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[35] < http://www.wma.net/e/policy/c8.htm >

[36] < http://www.wma.net/e/policy/a7.htm >

[37] OJ C 340, 10.11.1997, p. 110. < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:11997D/PRO/10:EN:HTML >

[38] < http://www.cioms.ch/frame_1985_texts_of_guidelines.htm >

[39] OJ L 358, 18.12.1986, p. 1. Consolidated version of 2003-09-16: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1986/L/01986L0609-20030916-en.pdf >

[40] < http://www.icrc.org/ihl.nsf/INTRO/500 >

[41] < http://www.icrc.org/ihl.nsf/INTRO/575 >

EU

- European Union Code of Conduct on Arms Exports (1988)[43]

Information- and Communication Technologies (including data protection)

International

- Geneva Declaration of Principles (WSIS-03/GENEVA/DOC/0004)[44]
- Geneva Plan of Action (WSIS-03/GENEVA/DOC/0005)[45]
- Tunis Commitment (WSIS-05/TUNIS/DOC/7)[46]
- Tunis Agenda for the Information Society (WSIS-05/TUNIS/DOC/6 - rev. 1)[47]
- Code of Ethics for the Information Society (UNESCO) *(upcoming)*
- OECD Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (1980)[48]
- 27th International Conference of Data Protection and Privacy Commissioners (14 – 16 September 2005): The protection of personal data and privacy in a globalised world: a universal right respecting diversity" (Montreux Declaration)[49]

EU

- Communication from the Commission to the European parliament, the council, the European economic and social committee and the committee of the regions on fighting spam, spyware and malicious software (COM(2006) 688 final)[50]
- Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data[51]

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[42] < http://www.icrc.org/ihl.nsf/FULL/580 >

[43] < http://consilium.europa.eu/uedocs/cmsUpload/08675r2en8.pdf >

[44] < http://www.itu.int/dms_pub/itu-s/md/03/wsis/doc/S03-WSIS-DOC-0004!!PDF-E.pdf >

[45] < http://www.itu.int/dms_pub/itu-s/md/03/wsis/doc/S03-WSIS-DOC-0005!!PDF-E.pdf >

[46] < http://www.itu.int/wsis/docs2/tunis/off/7.pdf >

[47] < http://www.itu.int/wsis/docs2/tunis/off/6rev1.pdf >

[48] < http://www.oecd.org/document/18/0,2340,en_2649_34255_1815186_1_1_1_1,00.html >

[49] < http://www.privacyconference2005.org/fileadmin/PDF/montreux_declaration_e.pdf >

[50] < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0688:FIN:EN:PDF >

[51] OJ L 281, 23.11.1995, p. 31. Consolidated version of 20-11-2003: < http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1995/L/01995L0046-20031120-en.pdf >

- Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector[52]
- Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data - CETS No.: 108 (1981)[53]
- Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - The future of European Regulatory Audiovisual Policy (COM/2003/0784 final)[54]
- Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - Final evaluation of the implementation of the multi annual Community action plan on promoting safer use of the Internet by combating illegal and harmful content on global networks (COM/2006/0663 final)[55]
- Council Resolution of 15 July 2003 on Social and Human Capital – Building social and human capital in the knowledge society: learning, work, social cohesion and gender (2003/C 175/02)[56]
- Council Resolution of 27 November 2003 on equal access to and participation of women and men in the knowledge society for growth and innovation (2003/C 317/03)[57]
- Council Resolution of 8 October 2001 on "e-Inclusion" — exploiting the opportunities of the information society for social inclusion (2001/C 292/02)[58]

National

- Federal Law on Data Protection by its version as officially announced on January 14th, 2003 (BGBI. I. S. 66), latest version of Par. 1 of this law from August 22nd, 2006. (Germany)[59]

Miscellaneous

- “Terms of Use Agreement” (January 11th, 2007) of the online role-playing game “World of Warcraft”[60]

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[52] OJ L 201, 31.7.2002, p. 37. Consolidated version of 2006-05-03: < http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/l_201/l_20120020731en00370047.pdf >

[53] < http://conventions.coe.int/Treaty/en/Treaties/Html/108.htm >

[54] < http://eur-lex.europa.eu/LexUriServ/site/en/com/2003/com2003_0784en01.pdf >

[55] < http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0663en01.pdf >

[56] < http://eur-lex.europa.eu/LexUriServ/site/en/oj/2003/c_175/c_17520030724en00030006.pdf >

[57] < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2003:317:0006:0008:EN:PDF >

[58] < http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2001:292:0006:0008:EN:PDF >

[59] < http://bundesrecht.juris.de/bdsg_1990/index.html > (Text in German)

ICT Implants

- European Group on Ethics in Science and New Technologies to the European Commission – No. 20 - 16/03/2005 - Ethical aspects of ICT Implants in the Human Body[61]
- European Group on Ethics in Science and New Technologies to the European Commission - Opinion No. 21 - 17/01/2007 - Ethical aspects of nanomedicine[62]
- Law on the change of surnames and the identification of the sex in particular cases (Law on Transsexuals, TSG) from September 10th, 1980, last version from February 19th, 2007[63]
- The Harry Benjamin International Gender Dysphoria Association's Standards Of Care For Gender Identity Disorders, Sixth Version, February, 2001[64]

[60] < http://www.worldofwarcraft.com/legal/termsofuse.html >

[61] < http://ec.europa.eu/european_group_ethics/docs/avis20_en.pdf >

[62] < http://ec.europa.eu/european_group_ethics/activities/docs/opinion_21_nano_en.pdf >

[63] < http://bundesrecht.juris.de/tsg/index.html >

[64] < http://www.wpath.org/Documents2/socv6.pdf >