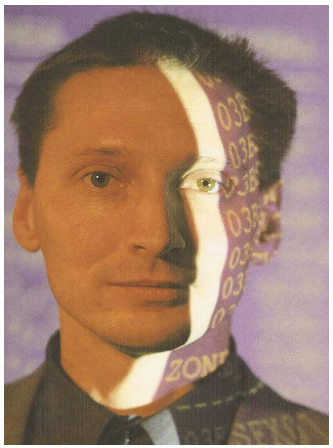

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EthicBot. Work Package II

Thomas Christaller
Michael Mock

Actual Status

Some initial discussion on the ethical principles which are relevant for our project

This is somehow starting already Work Package III

We identified ethically sensitive items and possible consequences or recommendations related to them

This is a preliminary and provisional list of items open to any changes or comments coming from the project members

Especially the recommendations must be discussed and will certainly change and is a maor topic for WP3

The basic motivation was to give us a framework to identify that type of research projects, strategies, and funding, which are relevant for us

We have to avoid to try to cover everything out there

~~A first draft was crafted and sent out to Tamburini and Warwick~~

It will be send out to everybody “today”

Ethically Sensitive Items (1st proposal)

16 items proposed

Some general ones with regard to general potential of robots for applications and perception of robots/humans in the public (Menschenbild)

Some on how the disciplines shall care about how they talk and communicate about their research

1 issue on robot toys

Some on how robots should be treated under societal and legal perspectives

Some on the usage of robots in medicine (surgery as well as prosthetics and taking care of humans)

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Robotics as key technology

Robotics is a key technology for the 21st Century. Therefore a sustained promotion is recommended. The promotion should include an ethical, legal, economic and social analysis and evaluation in the sense of an assessment of the technological impact. Both, the purposes of the use of robots and the means by which they are used should be considered. The expected benefit is to be compared to the costs. For the cost calculation, it is recommended to take into account that costs of hardware will be reduced over time. Furthermore, the comparatively high development costs should be accounted for only partly. This kind of the cost evaluation can be justified as contribution for the culture of future generations (see recommendation for the medicine market).

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Market studies and forthcoming technologies

The number of industrial robots (manipulator) is constant or even slightly falling in Germany, Japan, and the USA. The number of service robots, however, is expected to increase drastically in the coming years. Possibly, edutainment robots and robots for educational purposes will be the spearhead for service robots in general. Miniaturization of chips, actuators, sensors and development of new materials, new forms of the energy supply and transformation are driving technologies for perfectly new constructions. In addition, future applications are expected in areas, which are inaccessible for humans, like e.g. space, deep sea or sewers.

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New technologies and job market

The past conception of manufacturing processes as well as of services is questioned by intensified use of robot. The human work and its basic conditions are changed. In particular it is to be expected that robots will increasingly replace humans in manufacturing processes, because they work in the future more efficiently, more reliably and persistent than humans. Robotics will lead to a fundamental change in the job market from purely producing to more highly qualified control and/or administrative human activities. So that these chances for humans can be used, one recommends to create qualifying measures in first and continuing education.

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Extending human possibilities with robots

Expansion robots put humans into the position to overcome action barriers and to be □ remotely present □, thus to act at a not directly accessible place. Inaccessibility arises from large distances, like in space, as a result of the differences in size , like in the micro and nanometer range, and physical barriers. For example, the concept of remote operations in minimal invasive surgery can serve to transfer the hand movements of the operating surgeon intuitively comprehensibly and appropriately to instruments. Also the endangerment of humans can represent a barrier, which can be overcome by the being □remotely□ present - for example deep sea operations, explosive defusing, nuclear power plant inspection and nuclear power plant disassembly, or operations under medical irradiation. These applications are to be regarded as basis of the robot development, from which technical innovations flow into other ranges of application. We recommend therefore a generous research funding within these expansion ranges.

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Obligatory cost benefit analysis

In the context of the cost-benefit analysis, robot systems are judged relative to their alternatives. The cost benefit analysis plays a central role. In many ranges of application this analysis can be left to the market. The results of the comparison of telematics and robotics in the medicine show that an overall cost benefit analysis for these techniques is not sufficient. Instead, it is necessary to determine the cost-benefit ratio in the concrete individual cases, whereby the benefit has to be evaluated in the complete context. In application fields funded by the government, and/or in special markets as for example the health system, one recommends to accomplish a cost benefit analyses in each individual case.

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Exploit potential for public discussions

Until today robots are used almost exclusively in industrial environments. Their use bases there on rationalization and quality considerations. Outside of such environments, there is a multiplicity of further scenarios, whose use and acceptance do not add themselves yet into a clear picture. However, conceptions from usually utopian robots from literature and films of the Science Fiction genre already exist in the public. By Science Fiction, the cultural self-understanding of humans is addressed and can be changed potentially. Even if such utopian conceptions can never be technically implemented, they prepare nevertheless the interest of the broader public for concrete information and facts. We recommend to satisfy this interest by a public discussion on realistic applications of robotics in order to foster the establishment of a objective, transparent, public consensus.

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Usage of language in AI and Robotics

Due to the mutual condition of language and actions, the use of language in artificial intelligence and robotics must be examined, because term coinages in the technological field are by no means worth-neutral labeling. Rather they form directly the perception, interpretation and treatment of facts and circumstances. In the robotics, the unfounded use of expressions as □knowledge□, □intelligence□, □representation□ ', □Intensions□, □agents□, □ autonomy□, □humanoid robots□ and appropriate verb forms close to that, suggest that they refer to human abilities and characteristics. Accordingly, it is recommended to distinguish the language use in robotics from genuine anthropological regulations clearly. Clarifying and examination of the specialized technological vocabulary have to take place in the extended semantic contexts of the everyday life language. This will provide for making actions transparent and is in addition prohibitive for the acceptance of a natural primacy of the expert vocabulary.

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Robots in the children□s room

Robots can appear from the outside like organisms and can suggest, in predefined courses of motion, conclusions about attitudes, to which nothing corresponds in the internal conditions of the machine. In the fields of education and entertainment, there are hints to leveling and (economically motivated) excesses of the borders between natural kind and machine. Particularly with children, who still learn the differences between organisms and non-organisms, a robot should not create irritations. The reservations against such robots in general do not contradict the possibility that applications of AI and robotics can be used in the education of children. This holds particularly for the forms of the ' Edutainment ' in which machines can be built by □playing□, without the detour over manipulation scenarios, as for instance with robot component systems. It is recommended to keep apart these functionally different types of robots in the children's room and to pay attention particularly to the manipulative aspects of a toy.

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Robots as things

Robots are things and no persons in the sense of law. Robots can automatically deliver messages that declare the intention of the owner of the robot. A discussion about qualitative criteria for the acknowledgment of the robot as an artificial human, and thus as a limited legal person, is premature at present. From the legal point of view, the approach of the European Union economic system with its priority of private law,is to be regarded as sufficient, in order to avoid unwanted technical consequences caused by robots. Liability based on fault and product liability prevents the use of malfunctional robots by compensation obligations. It is recommended to intensify the adhesion regulations under private law for the addition of robot actions in the future.

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Robots and liability

The robot owner is responsible in principle only for his/her own faults (or those of his/her assistants) for damage caused by the robot. Such a fault is in particular valid during unsatisfactory organization, operation and maintenance by the robot owner. The robot producer is responsible for faults in the production, design and instruction of robots in the context of the product liability. It is recommended that courts facilitate the enforcement of requirements for compensation, which are caused by robots in the context of existing laws.

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Coping with learning robots

Learning robots should be distinguishable from non-learning robots, since by the use of learning algorithms, the liability for damage is affected between manufacturers and owners. It is recommended to make the learning process transparent for the robot owner and/or third parties. Installing of a not changeable Black Box for the current documentation of the substantial results of the learning processes and/or sensor technology can be helpful in this perspective.

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Identification of autonomously acting robots

Autonomous service robots will act in the future also in the environment of humans who are not robot experts. It is recommended to make the actions of the robot recognizable from the outside and predictable so that its hazard potential can be noticed and reduced also by laymen. The morphology of the robot should be arranged so that one can judge from it the radius of action and the direction of motion. Another possibility would be to let the robot communicate the plans of action before it starts acting. Concerning the identification, the serial number is sufficient in the premises and/or properties of the robot owner. On public traffic routes, the robot should carry an identification plate that gives the information about the robot, for example similar to cars.

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Position of humans in the control hierarchy

In the contexts of robotics, the authority of persons in principle has to be maintained. The associated prohibition of instrumentalization is to be considered during the design of the respective decision hierarchies. During the technical design, the arrangement of the man-machine interface and the design of the control program are of great importance regarding the decision authority. In order that humans can take the responsibility for functioning robots, these must be controllable in the sense of transparency, forecast and influence. It is recommended that in all cases, in which robots act on their own, the concerned persons have to be informed and must express their explicit or implicit agreement, in particular with medical treatment and care, the denial of this agreement should act as a veto function.

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Robotics in surgeries

Robots will substantially promote the further dissemination of minimal invasive surgeries. As far as the technical and computer-technical developments are to be surveyed, there will be no autonomous surgery robots in the foreseeable future for the surgery room. With the improvement of navigational control of instruments and the integration and actualization of vision, however, more and more intermediate steps of the surgery can be supported and/or executed by computer-assisted apparatuses and. It is recommended to promote this partial aspect of robotics as a promising development for the improvement and preservation of health. Future cost account laws should promote this desirable development, by recompensing a more careful interference technology and a faster recovery appropriately, for example. Also the rehablitation regulations of the health insurance companies should take into account the effects of non-invasive surgery techniques.

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Assistant robots in human care

Examples of the use of robots in the medical technology are computer-aided respirators, new assistance with moving patients from bed to bed, assistant systems for the rehablitation of human maneuverability as well as assistant robots, that facilitate the life of old and disabled persons. With the use of robots within care application fields, it is to be noted that humans should accomplish the responsible care of humans. Humans in need of care may not be made to things by withdrawing human maintenance personnel from their surroundings. It is recommended to use robots accordingly only as tools and/or as technical assistants in the care and for the maintenance of the autarcy of the in need of care in the domestic field.

Medical robotics and prosthetics

With concepts of the mechatronics and robotics, implants and prosthetics can be developed which adapt in an intelligent way to humans. Examples are active prostheses for members and joints, artificial internal organs such as blister or supporting heart pump and portable or implanted medicine pumps. The use of such techno-implants will be subject to probably fewer restrictions of ethical kind as the xenotransplantation or human organ donations. Also the chances of the implementation, considering technical and medical difficulties, costs, time and availability, appear higher. It is recommended to promote Techno implants subject to an analysis of the patient use.

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Next Steps

3rd March Sending out the 1st draft for the deliverable document of WP2

17th March deadline for comments, changes, additions to the list of ethical sensitive items

31st March deadline for providing material on research projects, strategies, literature, and funding programs related to these items

7th April intermediate draft of the deliverable document of WP2

30th April deadline for sending the final deliverable document of WP2 to the EEC

In parallel:

Collecting material for the tutorials to be given at the announced workshop 17-18th October in Naples

30th April deadline for a draft set of tutorials (topics, goals, ~~target audience, events where these tutorials could be given,~~ selected projects, selected media)

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