

## **RESPONSABILITY AND TECHNOLOGICAL POWER**

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“It is not the solution of technological problems, but that of the ethical problems which will determine our future” thinks Sachsse (1972, 122) —one of the few authors who in his book on “Technology and Responsibility” explicitly deals with ethical problems of technological progress whithoug, however, being able really to present such solutions. Indeed, it would not be presumptuos to hope for neat solutions in advance while just the new ethical dimensions of technology and applied science have loomed in our range of vision. The reader is lured into modifying Sachsse’s statement which may be exaggerated for didactical reasons. Instead, we would state: only the solution of technological problems, but as well those ethical problems connected with technological progress and its worldwide application will amongst others decisively stamp the future of mankind, too. In any case, we cannot afford even today and particularly in the future to ignore or neglect the pressing ethical problems of technology and applied sciences. Today ethical and moral problems evolve much more than hitherto in connection with the extended technological power of man to dispose of our nonhuman environment, of “nature”, to manipulate and temper life, particularly even human life itself. Because of man’s tremendous technological effectiveness and the huge power of technological action a new situation for ethical orientation is evolving requiring new rules of behaviour —therefore a new ethics in the strict sense, too? Even if the basic principles of goodness remain constant, the “executive rules and conditions of ethics” are to be developed further and to be adapted to new possibilities of behaviour, action and side-effects. This adaption must not mechanically adapt to the new rules of behaviour, but is to be judged in the light of constant basic ethical values (perhaps interpreted in a new way) as well as in the light of predictable estimable consequences and of critical pragmatic discussion of details.

More precisely: What is the new situation determined by technological development and the ever-accelerating technological progress?

Doubtlessly, the situation is amongst others —but not only— characterized by the fact that certain moral and legal concepts do not fit to new technological phenomena and processes. Sachsse, for instance (*ibid.*, 134 ff), showed that the process of transmitting information cannot be interpreted plainly as an exchange of goods, since the seller still possesses the object of the bargain after the “exchange”. Information does not obey simple rules of addition and subtraction like material objects. Our moral concepts of property, theft and just exchange —all of them oriented at the category of substance— are not applicable to information (*ibid.*, 136).

But the origin of new technological phenomena and processes by itself does not —it seems to me— characterize the only factor of a new situation generating a new kind of ethical problems due to technological progress. The most decisive new perspective for a new interpretation or a new application of ethics is beyond any doubt the immensely grown technological power of man. Leading to some specific risks it requires new ethical perspectives.

1. The number of people affected by technological measures or their side-effects has increased tremendously. The affected ones frequently do not directly interact in the same context of action with the intervening agent.

2. The systems of nature are now an object of human action —at least in the negative. Man can permanently disturb or destroy them by his technological measures. Doubtlessly this is an absolutely new ethical situation: man so far never possessed the power regionally or even globally to destroy all life in an ecological partial system or decisively to deprave it by technological manipulations. Since some of these encroachments are not controllable and may be irreversible, nature (as an ecological system) and the species in her should gain a new ethical relevance regarding to the new division of technological power. Thus far, ethics were essentially anthropocentrically oriented toward actions, interactions, and consequences of these among men; however now ethics gains a new ecological relevance and significance for other life (like, *e.g.*, in Schweitzers “Ethics of Reverence for Life”). Taking into account possible irreversible in nocuous effects (change of climate, injuries by radiation, technological erosion, etc.) also the fate of man is at stake.

3. In view of the increased possibilities of effects and manipulation in the biomedical as well as in the ecological context, the problem of responsibility for unborn individuals and generations is getting special emphasis.

4. Not only in social manipulation and in the manipulation of the

unconscious, but also in any experiment with human subjects (be it pharmacological-medical or social scientific) man himself has become an object of scientific research. A special ethical problem involves in connection with scientific and technological experiments with human subjects (*cf.*, *e.g.*, Jonas 1969, Lenk in 1979).

5. Specifically in genetic engineering man has gained the power to change hereditary stock to generate new living species by mutative changes and maybe even genetically manipulate or change man himself. This certainly is a totally new dimension for ethical problems. Can man carry the responsibility? Has he the right to produce and change artificial species of life and to eugenically alter himself (even if toward the better)?

6. Man does not seem to be an object of technology only in genetic manipulation, but he has become an object of collective and individual manipulation not only by pharmacological and mass suggestive and subconscious influences, but also by pharmacological and medical selfmanipulation (tranquilizers, etc.).

7. Can we observe a progressive trend called technocracy in combination with bureaucracy and “electrocracy” —a very efficient syndrom of an impending encompassing systems technocracy alongside the progressing development of microelectronics, computer aided systems organization and automated administration? The development of applied computer technology and of electronic data and information systems certainly caused the problem of a technocratic total control of persons via collected, stored, and easily retrievable personal data. Personal privacy seems to be endangered. The secrecy of data leads to a legal problem of protection against commercial and social exploitation of personal data —a question of considerable moral significance.

8. However, technocracy also displays another very important component. Teller, the so called “father of the hydrogen bomb” stated in an interview with “Bild der Wissenschaft” (1975), the scientist and technological man. “ought to apply everything he has understood” and “he shouldn’t delineate borderlines in that”: “Whatever you can understand, you should also apply”. These statements refer to an overstated ideology of technocratic feasibility rendering Kant’s old moral dictum “ought implies can” to the reverse “technological imperative” (Lem, 1976), hypostatizing a normativity of technological opportunity leading to the slogan “Can implies ought” (Ozbekhan).

Whether or not man is allowed to or ought to make, apply, produce, and initiate as well as carry through everything he can produce and effect certainly comprises a specifically precarious ethical problem which may not be easily answered in the affirmative as Teller thought.

According to Ozbekhan the slogan seems to be a guiding orientation of technological progress apt to empirically describe technological developments in general: technological feasibility obviously gained such a fascination that it assumed quasi –normative force –the almost automatic requirement to be applied and carried through. Examples including the moon-landing-program as well as genetic manipulation and atomic bomb explosions are familiar. Some think that single counterexamples of an almost secular significance are only to be found in the decision of the American administration not to materialize the supersonic transport program and also in the moratorium by the molecular biologists of Asilomar for a short time stop of dangerous gene research which led to the development of detailed legal constraints.

Jonas in his new book “Das Prinzip Verantwortung” (The Principle of Responsibility, 1979) with his characteristic subtitle “Toward an ethic of technological civilization” explicitly takes up the challenge of modern technology for the moral orientation of human action. He develops a theory of an extended responsibility.

According to traditional ethics in epochs of relative technological powerlessness of man nobody was responsible for the “unintentional later effects of a benevolent, well conceived and well performed act” (1979). This has decisively changed parallel with the immensely grown technological power of man and the occurrence of many sometimes unintentional or uncontrollable side-effects of applied technology.

To be sure, “the old prescriptions of the ethics of the next brother, those pertaining to justice, charity, honesty, etc., are certainly still valid in their intimate directness for the day-to-day sphere of human interaction”, however they are to be superposed by a new extended ethics of technological and collective action within which agent, act and effect are not the same any longer as in the sphere of immediate social vicinity”. Due to the excessive technological power of man this realm would receive” a new never dreamed-of dimension of responsibility” (*ibid.*, 26). We have gained a negative power over the biosphere of the planet which we could irreversibly pollute (at least within subsystems) –be it by radioactivity, smog, or other effects.

“The critical vulnerability of nature by technological interventions of man” (*ibid.*) shows “that the nature of human actions *has de facto* changed”, and so far as nature as a whole became an object of human action and human responsibility: “a novum about which ethical theory has to ponder” (*ibid.*, 27). Irreversibility and cumulative addition of many effects go along with this, surpassing the narrow limits which traditional ethics obeyed regarding the problem of face-to-face action between men. Jonas thinks (and here he is wrong) that “no earlier

ethics (outside religion) did prepare us” to perceive nature and the “biosphere as a whole and in its parts” under trust of man with his own moral pleas and rights. Schweitzer’s comprehensive “ethics of reverence toward life” already did. However Jonas is right in stating that the worldview of the natural sciences did not take into account such a trusteeship toward nature. Therefore, nowadays not only predictive and technological knowledge gain a new altered ethical significance, but also metaphysical thoughts about nature herself (*ibid.*, 28-31). “The collective agent and collective action” also require ethical imperatives of “a new sort” in a new of the total responsibility for nature and for coming generations (*ibid.*, 32 ff).

Kant’s categorical imperative did exclusively pertain to “logical compatibility” of intentions to act and, thus, merely is a formal principle exclusively addressed to individuals and toward the “subjective character of self-determination” of the acting person (*ibid.*, 35, 37). Now a new imperative has to pertain toward the future existence of mankind and the future integrity of man as an object and objective. The new categorical imperative has to display content, cannot be formal any longer: “Act in that way that the effects of human action is compatible with the permanence of genuine human life on earth”, or, expressed in the negative: “Act thus that the effects of your action do not destroy the future possibility of such life”; or simply: “Do not endanger the conditions of an indefinite future existence of mankind on earth”; or -again positively: “Include in your present decision the future integrity of man as an object of your will” (*ibid.*, 36). Because of the asymmetry and irreversibility the categorical imperative of future ethics has to have content comprising the existence of mankind as such and the perspectives of a possible future of mankind. Kant, however, also spoke about the existence of man and mankind as well as of reason being an objective in itself (AA IV, 428 ff). This is certainly compatible with the conditions of collective actions, future time-perspectives and the plea for a future existence of mankind in the sense of Jonas’ “new” categorical imperative. In other words, the principle of a responsibility oriented towards the totality of mankind is not a new as Jonas thinks. Kant’s statements are at least apt to be interpreted or at least slightly modified as to comply with Jonas’ ethics of extended responsibility. The “duty to provide for an existence of future mankind”, “the imperative *that* mankind be” and the responsibility toward “the *idea* of man” (Jonas 1979, 86, 90 ff) may as a metaphysical principle of practical reason easily be deduced from Kant’s approach, too. So far, Jonas’ approach does not render anything really deontologically new.

More important is the revision of the concept of responsibility as a function of power and knowledge: Jonas thinks that responsibility within traditional ethics has always been interpreted as “causal attribution of consummated actions”, referring exclusively to legal and moral responsibility (*ibid.*, 172 ff). By contradistinction, Jonas thinks it necessary to develop a new “totally other concept of responsibility”, “pertaining to the determination of what is to be done; according to which I feel responsible primarily not for my behaviour and its effects, but for an object which requires my acting”: “the object becomes to be mine, because power is mine and has a causal reference toward this object. The dependent, by its own proper right, becomes to be the commanding instance, the powerful in its causality becomes to be the obliged” (*ibid.*, 174 ff). Due to power “my control about something at the same time includes my obligation for it... the execution of power without observation of duty then is “irresponsible” or “neglect of responsibility” (*ibid.*, 176, 178).

Jonas thinks that the new responsibility for being, for something, for an object –primarily for the existence of future mankind and only after that for the ideal of good life– are the essential features of the new concept of responsibility (*ibid.*, 186 a.o.). According to the dynamics of change of life-circumstances in the wake of technological development, to the immensely grown technological power and the extension of the scope of action and effects including hardly controllable side-effects and sometimes irreversible encroachments into natural contacts “time-spans of responsibility as well as of planning based on knowledge... have been extended to an unforeseen degree” and led to “an excess of causal effectiveness over previous knowledge” always doomed to incompleteness in complex systems regarding side-effects, especially synergistic and cumulative effects (*ibid.*, 220). Earlier, one could be relatively sure of a considerably constant order of nature which man could not, or at most, ephemerically, disturb. Nowadays, after the rise of power of technology after Jonas, “dynamics has resumed aspects which have not been included in any earlier ideas of it”. “Responsibility for the historical future in terms of dynamics” (*ibid.*, 229) is conducive to the fact that power of mankind, that his capacity of doing, “engenders the *content* of the ought”.

Factual capacity is, so to speak, the “root of the ought of responsibility” (*ibid.*, 230 off). Factually and morally it is becoming man’s destiny. The ought “derives therefrom as self-control of his intentionally effecting power” pertaining towards its “own being”, particularly also toward the being of future mankind and toward of all other

objectives as such which somehow get under the law of his power” (*ibid.*, 232). This change in the scope of responsibility and time—perspective is according to Jonas the real new in the “ethics of responsibility for the future” necessary for the technological world (*ibid.*, 175).

Jonas thinks that the first duty of collective human behavior is the future of mankind in an era of a modo negativo “almighty” technological civilization and “the future of nature as a *sine-qua-non* is obviously comprised, too”. However, independently, a metaphysical responsibility as such is included after man has become dangerous not only for himself but for the whole biosphere” (*ibid.*, 245). The “community of destiny of man and nature” and “the proper dignity of nature” have been discovered. Therefore, man is in proportion to his power to manipulate, disturb, or even destroy taking over responsibility for the state of nature, “the state of the biosphere and the future existence of the species of man” and other creatures (*ibid.*, 246, 248). “The *no* toward *non-being* first to the non-being of man” seems to be the most important basic principle for “an emergency ethics of the endangered future” necessary for the limitations of sometimes wildgoing technological power in view of apparently looming apocalyptic situations and catastrophes. Only “the highest amount of political and social discipline” may be a reason of subordinating actual short—time advantage under the long—range commandment of the future” (*ibid.*, 250, 255).

Jonas only sees the alternative of “an ethics of responsibility which today, after several centuries of post Baconian, Prometheic euphoria (also prevailing in Marxism), has to bridle the galloping ahead”; if not, nature later on “should take revenge in its own dreadfully harsher manner” (*ibid.*, 388). Only “together with the evil” “the good to rescue becomes visible”. “Fear for the basically vulnerable object of responsibility” is “becoming a duty... of course only together with hope”. “Fear itself becomes a first preliminary obligation of ethics of historical responsibility” requiring “courage of responsibility” to act in spite of uncertainties: “Responsibility is the obligation as acknowledged care for another being...: what will happen with *him*, if *I do not* care for him?” (*ibid.*, 391 ff).

The main idea of Jonas ethics for the technological civilization is that facing an immensely grown technological power of man and a galloping dynamics of life in the industrial world and also facing dangers for nature and creatures (including man himself) stemming from side-effects of the industrial process an extension of the concept of moral responsibility is necessary: the transgression from a con-

cept of causal responsibility toward the trusteeship and stewardship responsibility of man, from a regressively attributing ex-post —responsibility toward a prospectively oriented care-for-responsibility, from a past-oriented responsibility of the results of actions toward a future-oriented responsibility for being by observing capacity of control and feasibility and restrictions of power, toward a responsibility of preservation and prevention, so to speak.

Indeed, if we are confronted with cumulative effects and synergistic combinations of consequences, the concept of a responsibility oriented merely at a single agent and at consummated actions does not satisfy any longer. Individual attribution cannot be applied to combined and collective processes. We are not, however, allowed to leave the non-attributable, non-manipulable processes simply to destiny. This would indeed be “irresponsible”. At the same time we have to be able to attribute, under the concept of a responsibility of preservation, prevention, trusteeship, and stewardship for ecological systems, nature and life in general, collective responsibilities aimed to prevent disturbances or destruction. Omissions (particularly intentional omissions), according to the new concept of responsibility, should be attributable individually or collectively, respectively. Traditional ethics had considerable difficulties in coping with the moral judgement of omissions (analytic philosophy of action tried to interpret intentional omissions as a sort of actions of its own). Every man within his system of interconnected actions and life conditions has to bear his part of this extended responsibility in proportion to his power (including the almost anywhere present negative power of potentially disturbing or destroying highly interconnected and therefore highly susceptible systems).

Regarding Jonas’ basic approach, one has to add or correct, respectively, at least one general outlook: there is no real crossing-over from traditional responsibility of action results toward a responsibility of prevention and preservation; but the traditional responsibility for consummated acts continues to exist regarding the causalities of action —also with regard to the technologically immensely extended scope of action, if individually attributable. However, with respect to side-effects which are difficult to survey and may be unintended this responsibility is more difficult to bear and sometimes not easily or not at all to be attributed to an individual agent as mentioned before. Instead of speaking of a change from one type of responsibility to another one should think of *two* concepts of responsibility at the same time: A more strict and narrower causality-oriented one and a more refined and wider one, including the mentioned orientation at prevention and preservation. A going-over or a passage is at most to be seen

in the fact that according to the changed situation in the technological area ethical thinking cannot restrict itself to the more strict and narrow traditional concept of responsibility, but has also to orient itself at the new wider concept without ignoring or substituting the traditional responsibility for action results.

All of this certainly has considerable consequences for ethics in general: The traditional, exclusively individualistic ethics of the moral obligation of an individual has to be extended in the direction of a future-oriented ethics also for collective agents with wider time perspectives and for holders of power —even, and most notably perhaps, when those do not act. In a world of progressively evolving systems interconnections, of growing economic political, social and ecological dependencies, of increasing susceptibility against technical manipulation and risks, side-effects, cumulative and synergistic effects, no effects of mere “love thy neighbour” can suffice any longer as it has evolved perhaps from phylogenetic and especially historical experiences from face-to-face actions between men. Future ethics have to be based more than ever on a fundamental responsibility for the whole of mankind including future generations and nature. In addition, ethics must become more future-oriented with larger time perspectives, more social, more cooperative and more pragmatic regarding situational dependencies and mixtures of power (including technological power). The ethical responsibility has to be extended toward collective agents or bearers under a wider concept of trusteeship and stewardship as well as under the obligation for preservation and prevention. Finally, ethics oriented at pragmatic conditions of application in an everchanging world cannot remain static, but has to be confronted with changing possibilities of effects and efficacies as well as potentials of side-effects in the realm of the technologically feasible without merely mechanically adapting to technological change. Constant ethical basic impulses can and must pragmatically be related with the present situation of *homo faber technologicus*, taking into account the responsibility of preservation and a more sensitive moral assessment of side-effects which may possibly not be foreseen or controlled. Therefore, more strict and precautions judgments are necessary without avoiding all kinds of risks. Even if the basic ethical impulse may hardly have changed the conditions of application have drastically changed under the perspective of a system technological area. As far as ethics refers to the acting man, in particular man who produces new artifacts and situations and changes the world, ethics has continuously to be developed further, regarding the dynamic development in the world. It cannot stay where it is; it has pragmatically to be

dinamized, for “new possibilities of actions and an extended power actualize wider and modified responsibilities”, as has been stressed by the author before (Lenk 1979, 73). This pragmatic orientation is easily compatible with the discussion in analytic ethics (*cf.*, *e.g.*, Frankena 1972): A realistic and pragmatic modern ethic can only a mixed theory of ruleutilitarianistic and deontological components. This is true whenever “morality is created for man, not man for morality” (Frankena, *ibid.*, 64, 141).

It is easy to transfer the mentioned insights to the problems of technological progress in the narrower sense. This can only be sketched out in short here. Technological progress is a multidimensional construct phenomenon resulting from a permanent interaction with other realms of influences and actions and displaying a great complexity with reference to individual contributions, different areas, and social basic factors (as, *e.g.*, the “status of societal achievement”) (Boltet). The probability of improvements and changes is dependent on the actual state of development which is causing the quasi-legal basic form of an exponential technological progress-particularly with respect to acceleration.

With respect to moral judgments there is a similar result as the one mentioned earlier regarding synergistic and cumulative effects, namely, that a causal responsibility usually cannot be attributed to a single individual or sometimes even to a single area of activity, if development and acceleration are dependent on a multiplicity of mutually escalating interactions. However, in the wider sense mentioned before individuals who are in the game take over a responsibility of preservation and prevention, *i.e.*, technician, engineers, and, generally speaking, members of the so called technological intelligence have to bear this certain coresponsibility without anyone of them *alone* being able to bear the total moral responsibility for the application of a discovery or an invention with possibly nocuous applications even they could not have foreseen. (This is the problem of individual responsibility of technicians and scientists in applied research which cannot be discussed here in detail). Weizsäcker’s distinction between the “discoverer” and the “inventor” (“the discoverer usually cannot know anything possibilities of application”) seems to be plausible at first view. It is, however, plausible at most in an ideal typical sense hypostatizing two simple conditions: Almost all technical developments (*e.g.*, the development of the combustion-machine or production of dynamite) naturally show the ambivalence of positive and destructive applicability. In addition, basic research and technological development are not

any longer divided and distinguished so easily as the ideal type distinction between “discoverer” and “inventor” postulates.

With respect to the splitting up of individual responsibilities and the almost unsurveyable ramifications of decisions and development, society and its representative decision makers take over a collective responsibility for the application of developed technologies –and in part also for the development of “big technologies” as such (think of the Manhattan project), if no thesis of an autodynamic quasi– “natural” technological process of development should be defended. In the last analysis it is acting man who constitutes technology and its development, albeit in a synthetic combination. Together with the extension of the concept of responsibility as mentioned before they take over –also as members of an acting collectivity– responsibility of preservation and prevention against abuse or misuse. This is particularly true for individuals in system-strategic positions.

## SUMMARY

1. Power and knowledge oblige –this is true also for technological (superpersonal) power. The creation of new dependencies creates new moral responsibilities of a personal and superpersonal sort. A rather utopian extended power of technological feasibility with respect to time-perspectives and the scope of actions and effects including sometimes unforeseen and uncontrollable side-effects generates an extended responsibility: beyond the traditional responsibility of causation, man has to take over a “caring” responsibility of preservation and prevention.

2. This responsibility applies not only to the well-being of our neighbour and to a human survival of mankind, but also to the preservation and care of nature (including its conditions of ecologic systems functioning) and to non-human co-creatures. Nature as a whole and in its parts has become to be a moral object –at least in view of man’s negative technological power (capacity for disturbing or destroying).

3. The extended responsibility is mainly oriented toward the future existence of mankind. Succeeding generations, have to acknowledge their moral rights not only for human life in an acceptable environment, but also for the future of nature and co-creatures. A legalized right of succeeding generations and co-creatures could and should occur.

4. The responsibility of preservation and prevention cannot only be attributed to individuals. With respect to the effects and dangers

of synergistic and cumulative effects and technological big projects (with thousands of co-workers), a collective responsibility of the collective agent and of anyone who disposes of possibilities of encroachments has to be borne: Concepts of team-responsibility, responsibility of the whole generation and responsibility of the experts and specialists have to be developed further.

5. The responsibility of scientific and technical experts at strategic positions is part and parcel of this responsibility of preservation and prevention (think of a strike of the chemists in charge of water supply or so). In strategic positions the responsibility of prevention can —modo negativo— be attributed individually.

6. The responsibility of the scientist and technologist is given where ever and whenever detrimental effects can be foreseen and avoided, *e.g.*, in directly applied technological projects. A personal causal responsibility may be given then. A general strict responsibility of causality cannot be defended with respect to the ambivalence and collective development of research (in particular basic research). All the more important is preventive responsibility. The distinction between the type of “discoverer” (pure scientist) and “inventor” (technologist) is useful for first overall orientation. All kinds of mixtures occur and engender mixed responsibilities within the general responsibility of provision and care.

7. Scientists and technologists conducting experiments with human subjects, in addition to the responsibility of the expert, also have to take over normal interhuman action responsibility for the subjects (particularly in non-therapeutical experiments). Despite declarations of the World Medical Association and Psychological Associations the legal situation of experiments with human subjects is far from being clarified (Eser).

8. Man certainly must not produce everything which he is technically able to produce, he must not apply everything which he can produce. “Can implies ought” is not an ethical imperative and should not be an unrestricted technological imperative either. On the other hand innovative creativity of technological man should not be restricted beyond necessity —all the more since technological developments are ambivalent, can be and must be positively used, conducive to the well-being of man and to the preservation of nature: mankind has become dependent on technological progress and can only dispense with it at the price of catastrophes. Today’s mankind cannot afford to stop technological progress (as H. Marcuse proposed) or even to devaluate and hamper it. This does not mean that mankind is dependent on an exaggerated fetishism of industrial growth or on a “technological

imperative” to produce or innovate, respectively, everything feasible.

9. What is convenient for man and the cosmos or for ecological subsystems changed within the course of history dependent on systems conditions. (Anticonception problems, *e.g.*, did not occur in times of population scarcity). Ethics, therefore, has dynamically and pragmatically to take into account the historical situation. Notwithstanding the constancy of basic ethical impulses it has the task to refine the capacities of coping with new technological challenges.

10. A special challenge is the tendency towards systems technocracy, a syndrome in which all trends of bureaucracy, role-segmentation, functionalization, technical perfection, and automatization, as well as computerization convene. Legal and ethical problems of data protection (Datenschutz) are aggravating.

11. There is no ethical general recipe beyond the constant basic responsibility for mankind and future generations as well as nature. A necessary condition of coping with future ethical challenges is to foster moral conscience, particularly in professional contexts. The development of professional ethics and the respective education is prevalent. Hardly a medical student takes courses in medical ethics so far. Technicians and scientists are nowhere introduced to the ethical problems of their disciplines in pragmatic and practice-oriented concreteness, as far as I can see Ethics should not only be required as a subject in school, but also as a professional “moral guardian discipline” (as already postulated by the Mount Carmel Declaration on Technology and Moral Responsibility (1974)).

Indeed, we will only be able morally to control technological progress if we do not stay with the superficial moral policy of avoidance-behaviour blindly relying on or surrendering to apparently autonomous dynamics of technology.