Knowledge and interdisciplinarity as socio-cultural uncertainties

The 2001 C.A. Doxiadis Lecture

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Preliminary narratives and questions – "Apories"

According to the Judeo-Christian tradition, in the beginning there was Word/Logos/Discourse, but according to the ancient Greek tradition in the beginning there was chaos. Are origins important? Do they provide figures and schemes as matrices or possible pathways to approach the (eternal) present and (possible) futures?

It is rather difficult to give an answer. But as a compromise between the two cultural possibilities in approaching "reality," we suggest two perspectives.

- The first is inspired by the destiny, the trajectory of ekistics as a separate/distinct field in the broad Science-and-Technology domain.
- The second is based on a permanent "problématique" on the socio-cultural foundations, conditions of knowledge, and of scientific knowledge in particular.

First perspective: The adventure of ekistics

During the last weeks, as I have been preparing my lecture for the Berlin Meetings of the World Society for Ekistics (WSE), I wrote down the names of persons, institutions, organizations which I would like to thank for the privilege to be here with you and inaugurate the "C.A. Doxiadis Lectures." In the end, the list was quite long. It began with the World Society for Ekistics, its Secretary-General, my friend Panayis Psomopoulos, the German colleagues who worked for the realization of this meeting, the pilots of Lufthansa, Constantinos Doxiadis and his associates, Greek society with its constraints and its opportunities which contributed to the shaping of Doxiadis' life and adventure. The list seems to be endless so I am almost obliged to skip this part of the ceremony concerning expressions of gratitude.

At the same time, I had the feeling that I am taking part in a ritual of transmission of the spirit of Constantinos Doxiadis. Of course, we, as social beings, cultivate the rational and the reasonable and this kind of "primitive faith" in the transmission of spirit is of course a metaphor. Nevertheless, a question remains: how the ideas, life, and achievements of such important men are present for generations that followed their death. It is evident that we face the metaphysical dilemma of "presence" and "absence," the eternal drama of "influence," the permanent challenge of "continuity" and "discontinuity."

I have the feeling of a *"rite de passage,"* a kind of ceremony and ritual. Are feelings sufficient, as they are necessary or inevitable? The answer would be "no," if they are not accompanied by an intellectual and scientific inquiry. Therefore, I will formulate some questions, the content of which has already been given a first form at a previous meeting of WSE in Athens (three years ago).

- What is the scientific status, the knowledge texture of ekistics in the context of modern science? (1)
- How does a scientific field, such as ekistics, shape its trajectory in a globalized economy, science, technology and socio-cultural practice? (2)
- Is it possible for scientists, scholars, engineers, from the "periphery of the scientific and technological agora," to propose and sustain a new scientific field (ekistics)? (3)
- To what degree does the personality of the inventor (if one considers that he was the only innovator) predetermine the evolution of his invention? To what degree and how have the epigones contributed to the formulation of the previously mentioned trajectory? (4)
- Will ekistics claim the title of a "discipline," "school of thought/analysis/action," "intellectual horizon" in the future? (5)
- If Constantinos Doxiadis were alive today, what kind of innovative projects and visions would he propose to the citizens of our globalized and complex world? (6)

I am not sure if all members of WSE give the same meaning to these questions, and I am not sure if these questions are pertinent, given the variety of scientific origins and experience of professionals related to the "kingdom" of human settlements. Simultaneously, I am sure that I cannot answer them, but only present some elements in order to clarify this kind of questioning, that is the socio-cultural "destiny," socio-cultural challenges of scientific knowledge and technology in the so-called risk societies.

Second perspective: Multidimensionality

Under the Acropolis: At the end of an afternoon, a magnificent sunset begins over the hill of the Acropolis. Along with the philosopher Michel Serres we discuss the eternal ques-

tion: What is the most important contribution of the ancient Greeks to the cultural heritage of mankind? For the French philosopher the answer was quite easy and straightforward: "geometry." The reasons according to him are obvious: geometry is a knowledge systematically and logically taught with a universal character; at the same time extremely local, because the spirit of geometry was the basic (cultural) device of thought and perception of reality. Our answer to the question was quite different: Greek "tragedy" was the "absolute" Greek achievement; this form of theater is not dedicated, of course, to knowledge, but it contains or refers to forms of human experience capable of provoking serious questions about human existence and dignity.

The sunset was at its most glorious moment, the red-purple color covering the Parthenon, the horizon and the ugly city of (today's) Athens.

Dis-locations: In a simplified manner we can say that as far as AIDS is concerned, the epidemic of AIDS is in the south while knowledge is in the north of the planet. The south is poor, the north is rich. Part of this wealth is produced by multinationals which use the south as their market, and this applies even to the cultural industry which sells its products (clothes, CDs, films, video games) to young people in the south (victims of the epidemic). During international meetings or conferences on AIDS, it was suggested that an international fund could be raised to buy a big pharmaceutical company active in the field of vaccines and/or products against the HIV virus. (This can be achieved in different possible ways by the financial markets of late capitalism, e.g. stock exchange method, merging techniques, etc.). Such a company could produce the necessary material for the prevention and treatment of AIDS. This simple idea confronts a lot of obstacles, and its non-realization demonstrates the non-convergence between human pain, needs, solidarity and knowledge; and also, it suggests that the capacity in technico-scientific level does not lead to a capacity of creating (in an easy or automatic way) organizational schemes to transform research results into means for humanitarian action.

Spiritual wealth: Sir John Templeton (pioneer and successful global inventor, founder of the Templeton Foundation in 1987), after a period of helping people to obtain high profits, decided to help the world to build up spiritual wealth. He declares: "Well, I believe some of the great questions awaiting an answer are: Why is there something rather than nothing? Are there realities that humans cannot yet comprehend that are vastly more awesome than things we can see or touch? Is there an intellect more vast than humanity can imagine? Does the whole universe have purpose, and a role for us in it? Can open-minded competition by millions of brains bring a multitude of blessings? Are humans designed to serve as helpers in the acceleration of divine creativity? Why do people who devote their lives to a noble purpose usually become happy?

These questions fascinate me, so much so that I decided to put my money where my mind was. Each year my foundation donates $20.3 million to encourage the many entrepreneurs who are trying various methods to increase our base to spiritual information. Today, 65 medical graduate schools teach courses in spirituality. Some medical schools now offer a variety of courses on spiritual health. The John Templeton Foundation sponsors courses at more than 400 universities worldwide on what has been or might be discovered through scientific research to enlarge human concepts of divinity." (TEMPLETON, 2000).

Brutality? In the middle of the 1980s, UNESCO organized an international meeting/conference on the future of science and research (KOUTOUZIS and AGRAFIOTIS, 1985). One of the basic questions was to find out and to classify different forms of research (e.g. basic, oriented, precompetitive, applied, etc.). The whole discussion was rather poor in ideas, except the moment when a Japanese participant asked for the floor, saying that he had a simple and clear idea about the whole problem. The audience was excited by his remark and promise. So, the participant declared that there were two types of research: "Research controlled by the companies who finance it and research published in magazines and reviews." The "brutality" of the statement blocked the whole discussion. Have "knowledge and research" become simple tools of corporate strategies, stripped of any other justification and legitimacy? This question cast a heavy burden on the conference and probably explains the silence and the astonishment of the participants after this intervention (UNESCO, 1985).

Wilderness: Three years ago a delegation from the American administration came to Greece to present the positions of the American Government concerning the question of Genetically Modified Organisms (GMOs). They expressed complaints, anxiety and questions concerning the fact that Europeans (and Greeks amongst them) refuse to use GMOs and they resist by not consuming products of the bio-technology industry. They presented the loss to the U.S. economy from the "stubborn attitude of the Old Continent." However, the participants of the workshop had formulated two issues for debate.

- The first, that "science and technology" as practices take different socio-cultural forms and receive different types of acceptance;
- the second, that agricultural activities have their own cultural histories.

For the first, their answer was that science is one, unique and universal; legal acts and international conventions prescribe its content and its methods and since the different states have signed agreements such as that of the World Trade Organization, they cannot put into question scientific activities.

For the second question, they asked for some explanations in order to understand it. The clarifications were the following: in Europe the agricultural landscape is a part of a historical landscape continuously modified and closely related to all expressions of the cultural and political life of its inhabitants. In the USA, the agricultural landscape is almost "autonomous" because it is part of industrial space having the wilderness – "nature vierge" – as its border (no longer existent anywhere in Europe). This kind of discourse was quite strange to the high level experts of the American administration. Their answer was quite clear: for anything that the American public wants to know, they can request and have access to different official web-sites in which they may find any statistics about GMO trials. The cultural gap between the American speakers and the Greek audience was quite marked. In the end our American colleagues felt obliged to repeat the norms of international trade (freedom and openness of the market) and to formulate some predictions for a future "war" (commercial and scientific) between the USA and Europe, if Europeans cannot find a solution to their "fantasies" and the European governments and other institutions do not accelerate the mechanisms of acceptance of GMOs (MENRAD, AGRAFIOTIS et al., 1999).

The above five narratives are only sources of inspiration and raw material to formulate some questions. The limits of this exercise are numerous: narrativity is always more subjective than scientific discourse, the rhetorics of narration aim

more at conviction than argumentation, the "stories" come from different societies, in different time periods, from different socio-cultural contexts. Beyond the above weaknesses and limitations, and in the framework of contemporary societies, these "five pieces" of reality lead mainly to the formulation of questions.

A set of urgent questions

If we use the above-mentioned two perspectives, two ways to explore the "reality," it is reasonable in relation to contemporary societies to ask questions of the following nature:

- What modes of knowledge, or what articulation of the modes of knowledge, play a crucial role for an interdependent and interconnected world?
- To what degree does the financing of public science influence the form and the content of different modes of knowledge?
- Is it possible to imagine an effort to reduce the gaps of knowledge (between experts, experts and the general public, between regions, sections of the economy or fields of actions)?
- What forms and types of knowledge are produced, used and promoted in different levels of social life?

By accepting interdisciplinarity as the approach of which the objective is the creation of new ways of thinking, posing questions, treating problems, beyond and by the limits of the conventional borders of different scientific fields, it is legitimate to ask:

- What are the new forms of interdisciplinarity? What are their cognitive textures?
- To what degree are the organizational and strategic choices (both nationally and internationally) able to influence its character?

It is evident that this "problématique" is rather vast and complicated; and also, there are many ways to provide elements of answers to these questions. This paper is centered on typologies of knowledge and the issue of interdisciplinarity. Its whole approach is based on the concept of mode of knowledge and takes into consideration the cultural changes and challenges of "late capitalism" (BOLTANSKI and CHIAPELLO, 1999; AGRAFIOTIS, 1999 and 2000; IPTS-REPORT, 2001).

Typologies of knowledge

If we apply a "processual approach" then it is reasonable to argue that in any society we can distinguish amongst processes and procedures those which offer some answers to fundamental questions, issues, expectations and objectives, such as:

– Origin and evolution of a particular society (e.g. history, roots);
– Transformation of material conditions not only for the survival of societies but also in the quest for a cultural specificity (e.g. not only exploitation of natural resources, production of food, but also keeping alive cultural patterns);
– Elaboration of mechanisms of communication and channels of exchange between members of a society or between societies (e.g. objects, artifacts but also know-how);
– Constructions of symbolic and semiotic systems for assuring meanings for the action of communities, social groups and citizens.

Amongst all these mega-processes, social practice plays an important role because this practice assures us of:

- Correspondence between ends, means and actions;
- Reasonable or logical relationship between the order of words, symbols and collective life or phenomena in general (physical, social, etc)
- Dialogue along the lines "society" and "nature" and also the permanent dialogue inside a society about the "nature of nature" *(nature naturée / nature naturante)* (DUFRENNE, 1976).

The product and the conditions, cognitive and communicational (ALRØE, 2000), for the integration of the above-mentioned practice we may call "knowledge." Taking as our point of departure this general statement, it would be interesting to search for some socio-cultural patterns which govern the field of knowledge or to elaborate typologies of knowledge in order to have an overview of this complex area of social life. We propose two forms of typology, taking into consideration the character both of knowledge and of contemporary societies.

First typology – Forms of knowledge/results of learning

If we take the form of existence of knowledge or knowledge as a "final" product, we can distinguish knowledge as:

- **Tool:** – For the selection of material for the construction of an object.
  – For realizing, developing a style of life in a urban or metropolitan area.
- **Commodity:**
  – The whole system of intellectual and industrial property permits the regulation of price and circulation of scientific or technological knowledge.
  – Conferences and congresses can be considered as a "stock market" mechanism for scientific fields, teams and "scientific investments."
  – The "Black market of knowledge" related also to industrial espionage.
- **Symbol:**
  – Proof and indicator that a life can be dedicated to the investigation and study/inquiry of the "nature of things."
  – Field in which "humanness," dignity, and actualization are possible and valuable.
  – The Nobel prizes every year offer/give the official recognition that the life of a researcher-scientist is worthy and meaningful; and also, they offer the opportunity for states to prove and demonstrate their capacities to organize and support scientific endeavor.
- **Social sign:**
  – The ownership and the capacity of using knowledge give the (status sign) opportunity to both individuals and groups to manage their problems and their challenges successfully, and at the same time to produce a social difference (e.g. the knowledge and capacity to take care of health problems and to cope with health risks).
- **Element of power:**
  – The distribution of knowledge contributes to social inequalities.
  – Social alienation is increasingly related to an inability to access and acquire knowledge.
  – The geopolitical presence of states, companies or organizations depends on (scientific) knowledge and more precisely on the control of learning mechanisms.
- **Matrices of transformation:**
  – As late capitalism modifies the content and the forms of work, knowledge has become the matrix which transforms human labor from "cost" to "resources," creating the crucial difference between a "stagnant life career" and an "autonomous personal trajectory."

It is possible, of course, to propose other forms of existence of knowledge, but this first list gives the multiplicity and variety of areas-*topoi* in social life where knowledge appears as an issue and challenge of a different character and a different intensity each time. However, on a macro-scale and in the framework of contemporary societies, knowledge is conceived and "cultivated" as a fundamental "fuel" for their functioning because, as they try to exercise a systematic action on their own existence and their "evolution," they need knowledge for their

– continuous analysis of the present;
– well-founded foresight of the future;
– invention of the actions in order to assure the change from the "defectuous" present towards the desired and designed future.

In other words, in this mega-process knowledge, the system of knowledge or the production and diffusion of knowledge play an important and crucial role. And a sign of "maturity" for contemporary societies is their capacity to produce both "knowledge" and "society" – "knowledge society".

Second typology – Mode of knowledge

The multi-dimensionality of knowledge allows different types of taxonomy, i.e. classifications. We assume that it is possible to propose a taxonomy-typology based on the notion of "mode of knowledge." But what do we mean by this expression? First of all, let us give some basic assumptions:

• "Knowledge" refers to different forms of knowledge. One of them is the well-constructed, solidly-founded, socially (widely) accepted and culturally legitimate knowledge. Another form is knowledge that is latent, diffused, without a well-elaborated discourse, sometimes closer to the inexpressible and undefinable. The French language offers the words *savoir* and *connaissances* to name the two forms. (It is clear that for the first form of "knowledge" we can make reference to the case of quantum mechanics/physics as a solid scientific field, while for the second form of "knowledge" we can consider the case of a citizen of a metropolitan area who has to face so many constraints and obstacles in order to "survive" in such a complex environment, by using a multiplicity of experiences and small-scale skills and competencies, accumulated throughout his life). (i)

• Knowledge is a point of departure and a product of both personal and collective initiatives. (ii)

• Knowledge presupposes a complex articulation of conditions – cognitive, bodily, material – in order to be recognized as such. (iii)

• Knowledge offers the possibility to elaborate/construct versions of reality or patterns which lead us to explore the limits of reality. (iv)

• Knowledge is produced under concrete procedures and its access and diffusion depend on procedures and institutions. (v)

• Knowledge is provoked, demanded, expected, produced, addressed to social actors or active members of communities in different levels and fields of society. (vi)

• Knowledge is supported and realized with the aid of rhetorical schemes, discourse devices and symbolic/semiotic processes, using words, images, representations, forms, signs, etc. (vii)

• Knowledge permits us to obtain a combination of:
- description
- recognition
- understanding
- explanation
- exploratory capacity
- interventionist potential
- transformational power

vis-à-vis the things to which it refers. (viii)

The above-mentioned assumptions are quite general but they authorize us to say that a mode of knowledge is a rather coherent arrangement of the elements of assumptions i-viii, with their socio-cultural relevance and meaning. In this perspective we may distinguish different modes of knowledge such as:
- religious
- philosophical
- scientific
- artistic
- journalistic
- narrative
- rumorous.

It is clear that each mode of knowledge
• leads to a different representation of the world, to a specific understanding of the "nature of things"
• opens a particular perspective and view of "reality"
• provokes the mobilization of different powers and processes, and finally,
• establishes a relatively coherent correspondence between:
- emotions
- mental images
- representations
- thoughts
- experiences
- words
- discourses
- gestures
- objects
- events.

The above approach and especially the notion of *mode of knowledge* is evidently inspired by the perspectives of anthropology and cultural sociology and it is preferred to the notion of "production of knowledge" (GIBBONS, 1994; LEYDESDORFF, 2001) as more pertinent to our inquiry into the cultural transformation of contemporary societies. The use of the terms "mode of production" or "production" suggests a systematic or systemic character, which is dominant mainly in the case of scientific knowledge.

Beyond typologies

This first overview of the issue of knowledge is characterized by a very general approach, of an almost positivist flavor. It is necessary to correct or to complete this first image by questioning the limits of this overview, by pointing out some persistent uncertainties. The latter are of a different kind and, of course, are not just some probabilistic alternatives of a supposedly well-founded and established pattern. That is to say, the uncertainties come from the fact that knowledge is related and connected with a variety of other factors, variables and dimensions of social life, which themselves are also in a transitional phase. With a metaphor, knowledge is a knot of socio-cultural networks in continuous transformations; this dynamic is the source of **uncertainties** and not of simple variations of a relatively stable structure (MEYERSON and MARTIN, 1987; HATCH, 1997; AGRAFIOTIS, 1999).

● The first uncertainty comes out of the typologies themselves, because each of them satisfies the assumptions and the objectives of a specific analysis. Each typology an-

swers some preoccupations and questions. For instance, the above two typologies could function as a complement to the typology proposed by Callon and the variation of the latter by Audetat (2000) which are more institutional, more processual and more oriented towards the mechanism or production of knowledge. Are all these typologies compatible? Is it possible to imagine a "hypertypology" by which we could combine the three typologies (in our case)? It is clear that only fieldwork could specify the domains of society in which the combined elements of these typologies emerge as entities, taking into consideration the fact that the number of combinations and concrete social conditions seem enormous.

● The second uncertainty comes from the socio-cultural arbitrariness of the mode of knowledge. More precisely, which mode of knowledge has to be taken as the point of reference, as the system of coordinates, in order to assess the relative presence of a mode of knowledge? In contemporary societies, the scientific mode is dominant but in "every day epistemology," individuals and organizations create hybrids from the "pure" modes of knowledge and sometimes the role of a minor mode of knowledge could play a catalyst type of role for the production of hybrids. In other words, by choosing a mode of knowledge (almost a language game according to Wittgenstein) we create a specific universe of understanding which will vary according to these crucial initial choices of perspective. Finally, is pursuit of "wisdom" (practical and theoretical) behind the production of the hybrids? Or are tradition and the socio-cultural context important factors in this inquiry of an active-performative epistemology?

● The third uncertainty comes from the "global" socio-cultural orientations of the so-called postmodern societies. If we look into the naming of the "postmodern" technological transformation (table 1), there is almost an inflation of expressions which attempt to grasp the essential part of change of contemporary societies. The triptych: technology, economy and cultural patterns are the most frequent categories in this long list of expressions. However, the central question for this mega-evolution of collective life can be phrased as follows: What degree and what types of knowledge, especially scientific knowledge, and what logic of distribution are necessary? Is it possible to plan or even to conceive the issue of regulation of the production of different types and forms of knowledge? Do we have some criteria for rational decision making? And what kind of rationalities can be applied for this challenge? Is it sufficient to intervene only for technological and scientific knowledge and to leave the other modes of knowledge "on their own"? How much "scientific reality" can be supported and absorbed by the members of our societies?

The recent shift of emphasis from "knowledge" to "learning" indicates the potential impact of knowledge and culturally promotes the idea that the process is more important than the explicit orientations and the "values." Does that mean that change is more important than the reason and the nature of the change? The uncertainty comes from three sources:

- the boundlessness of knowledge,
- the power of knowledge production processes, and
- the acceptance of risks as a major socio-cultural characteristic of contemporary societies.

To use another expression, we expect a lot from one mode of knowledge based on its speedy performance and not its durability. So, on the one hand the future depends on knowledge, but this knowledge is fragmented, partialized and itemized: the future seems increasingly near, but at the same time increasingly unpredictable. This projection to the future, but at the same time the precariousness of this future, seems to create a new feeling and concept about the meaning of personal and collective life. We may call this situation or this symptom post-cultural (AGRAFIOTIS, 1999).

The question of interdisciplinarity

In the international bibliography one can find terms and words such as: multidisciplinarity, interdisciplinarity, transdisciplinarity, hyperdisciplinarity, *polidisciplinaire* (E. Morin), pluridisciplinarity. Very often, these terms are translated into other languages carelessly and, as a result, a terminological confusion has been created concerning the content of these terms. In the Greek case, we have all these terms but not composed on the same word: the notion of "disciplinarity" is expressed through the word "scientificity." For instance, we use the term "diepistimonikotita"/ "inter-scientificity" for "interdisciplinarity." Culturally speaking, the general spirit of science prevails over its "disciplinary" character in the Greek case.

The debates about the definitions of the above terms are numerous; sometimes they have a historical, or an institutional, or a philosophical character (DURAND and WEIL, 1994; TSOUKAS and CUMMINGS, 1997). On this work, we present in the Note (at the end of the text) some hypotheses for the nature of the scientific mode of knowledge and additionally we assume that:

● A ***pluridisciplinary*** approach presupposes that

- the cooperation and union of scientific fields is established in order to solve a concrete problem;
- the mutual influences between the sciences do not provoke serious or radical changes to any of the collaborative sciences; and finally,
- the criterion of success of pluridisciplinarity is itself the solution to the problem.

● An ***interdisciplinary*** approach presupposes that the cooperation and articulation of the scientific fields is established according to the following conditions:

- The origin of the collaborative effort is not always a well-defined problem or issue.
- An essential part of the effort is to clarify the foundations concerning the pertinence of the problem or the issue.
- The above-mentioned clarification is based on scientific endeavors which have as their aim or ambition going beyond the already established objectives and practices. The whole inquiry aims at the creation of new concepts, new types of analysis, new rhetorics in relationship with an open and innovative "problématique."
- With the completion of the interdisciplinary project each collaborative science has been strongly influenced, and serious changes have taken place on the level of its concepts, techniques, methods and areas of reference and/or pertinence.
- The criterion of success or failure is not the solution to a problem or the answer to a question, but the test *(l'épreuve)* itself of the scientific fields, especially at their limits, by their limits, and beyond their limits.

The above definitions, in reality, create a spectrum in which different mixtures of pluri- and inter-disciplinary efforts might be classified. (An example of a pluridisciplinary project can be found in the MAB (Man and Biosphere) of the U.N. and one of interdisciplinary experience is Physical Chemistry). Also, the same definitions can be used as a tool for the detection of the mixture of pluridisciplinarity/interdisciplinarity in any scientific and technological initiative. At the same time, the same definitions permit us to ask some questions of a more socio-cultural nature. Why has the question of interdisciplinarity acquired such importance? What is its texture in

Table 1
Naming the postmodern technological transformations

Year	Transformation	Sources
1950	Lonely crowd Posthistoric man	Riesman (1950) Seidenberg (1950)
1953	Organizational revolution	Boulding (1953)
1956	Organization man	Whyte (1956)
1957	New social class	Djilas (1957); Gouldner (1979)
1958	Meritocracy	Young (1958)
1959	Educational revolution Post-capitalist society	Drucker (1959) Dahrendorf (1959)
1960	End of ideology Post-maturity economy	Bell (1960) Rostow (1960)
1961	Industrial society	Aron (1961, 1966)
1962	Computer revolution Knowledge economy	Berkeley (1962), Tomeski (1970), Hawkes (1971), Machlup (1962, 1980); Drucker (1969)
1963	New working class Post-bourgeois society	Maller (1963); Gintis (1970); Gallie (1978) Lichtheim (1963)
1964	Global village Managerial capitalism One-dimensional man Post-civilized era Service class society Technological society	McLuhan (1964) Marris (1964) Marcuse (1964) Boulding (1964) Dahrendorf (1964) Ellul (1964)
1967	New industrial state Scientific-technological revolution	Galbraith (1967) Richta (1967); Daglish (1972); Prague Academy (1973)
1968	Dual economy Neocapitalism Post-modern society Technocracy Unprepared society	Averitt (1968) Gorz (1968) Etzioni (1968); Breed (1971) Meynaud (1968) Michael (1968)
1969	Age of discontinuity Post-collectivist society Post-ideological society	Drucker (1969) Beer (1969) Feuer (1969)
1970	Personal society Post-economic society Post-liberal age Prefigurative culture Technetronic era	Halmos (1970) Kahn (1970) Vickers (1970) Mead (1970) Brzezinski (1970)
1971	Age of information Communications Post-industrial society Self-guiding society Superindustrial society	Helvey (1971) Oettinger (1971) Touraine (1971); Bell (1973) Breed (1971) Toffler (1971)
1972	Limits to growth Post-traditional society World without borders	Meadows et al. (1972); Cole (1973) Eisenstadt (1972) Brown (1972)
1973	New service society Stalled society	Lewis (1973) Crozier (1973)
1974	Consumer vanguard Information revolution	Gartner and Riiessman (1974) Lamberton (1974)
1975	Communications age Mediacracy Third industrial revolution	Phillips (1975) Phillips (1975) Stine (1975); Stonier (1979)
1976	Industrial-technological society Megacorp	Ionescu (1976) Eichner (1976)
1977	Electronics revolution Information economy	Evans (1977) Porat (1977)
1978	Anticipatory democracy Republic of technology Telematic society Wired society	Bezold (1978) Boorstin (1978) Nora and Minc (1978); Martin (1981) Martin (1978)
1979	Collapse of work Computer age Credential society Micro millennium	Jenkins and Sherman (1979) Dertouzos and Moses (1979) Collins (1979) Evans (1979)
1980	Micro revolution Microelectronics revolution Third wave	Large (1980, 1984); Laurie (1981) Forester (1980) Toffler (1980)
1981	Information society Network marketplace	Martin and Butler (1981) Dordick et al. (1981)
1982	Communications revolution Information age	Williams (1982) Dizard (1982)
1983	Computer state Gene age	Burnham (1983) Sylvester and Klotz (1983)
1984	Second industrial divide	Piore and Sabel (1984)

(*Source:* Tom Forester (ed.) (1991), *Computers in the Human Context: Information Technology, Productivity and People* (Cambridge, MA, MIT Press), pp. 50-51).

"post-cultural" societies (AGRAFIOTIS, 1999)? To what degree are organizational, institutional and strategic choices able to influence its character?

The interdisciplinary approach, in substance, is not a new approach. The historians of science argue that there was always a collaboration and mutual influence of scientists (e.g. the use of Mathematics for the solution to problems of Physics or Economics; and also the role of the latter as a stimulus for Mathematics). The new element is that interdisciplinarity has become a tactical variable for all scientific fields, because scientists and technologists hope to improve the effectiveness of their scientific action, knowing that innovation and novelty arise at the interfaces of sciences and technologies.

We accept as our point of departure the following facts:

- The complexity and the cruciality of the scientific mode of knowledge in the framework of contemporary societies or of the so-called "planetary society."
- The existence of multiple levels and domains in social life in which the scientific mode of knowledge is produced, diffused and used.
- The scientific fields are modified in a continuous manner by re-examining and re-defining their questions, objects, "problématiques," methods, mechanisms of review and evaluation and, finally, their relations with other fields. In this eternal metamorphosis we have to add the strategies of scientists, the policies of administrative bodies, the political conflicts and cooperations, the influence of traditions and stereotypes.
- The above-mentioned dynamics of scientific fields lead to the hypothesis that in every scientific field a version and pattern of "scientificity" is cultivated and not a concept of "truth."
- The focus on processes and the relative suspension of the "final truth," the existence of variations and differences in "scientificity" and the rapid exchange of practices and skills between scientific fields prevent the establishment of rigid typologies of scientific fields, well-defined frontiers between sciences and also the demolition of hierarchies between sciences (e.g. Mathematics is no longer the measure of scientificity of other sciences).
- The explosive and multiform fragmentation of science leads to the idea, even to the desire, of re-organization of *"corps morcelé du savoir scientifique."*

With the framework of the above hypothesis, it is reasonable to ask if interdisciplinarity is feasible, since the parts involved in the collaboration are not as stable or as pure as they used to be or were supposed to be (e.g. as different institutions control different parts of scientific fields with an unequal degree of power and resources (enterprises, firms, research centers, consultancy agencies, universities) how can we ensure a minimum of coherence or interdisciplinarity?). The effort to obtain a degree of interdisciplinarity becomes uncertain as the whole field of science becomes more diffused, interrelated and interpenetrated.

This new situation becomes more complicated as science is called to face almost any problem of modern societies (from the environment to the design of health systems, from the management of metropolitan areas to pain) – the number of combinations and permutations are infinite. So, it is almost impossible to have a clear vision of favorable moments, types and opportunities of interdisciplinarity in a rapidly changing world. If (additionally) we consider that from the laboratory to human needs, and from social demand to laboratory, there are so many institutions, so many social actors and so many interfaces, so many types of experts, then the question of interdisciplinarity is diluted in many ways. At the same time, interdisciplinarity is needed because it might be the tool in order to establish a communication between the interfaces.

Finally, there is a tendency for post-cultural societies to analyze (in a rather systematic and generalized manner) every aspect of thought and action, and to re-define concepts, forms of action and practices. Interdisciplinarity is both the domain where this global tendency is tested, treated and re-modified, and a condition of any scientific and technological endeavor.

Statement and interrogations

The assumption of "the postcultural condition" as a dominant trend of contemporary societies implies that the processes of fragmentation/differentiation on the one hand and integration on the other co-exist and their coherent articulation is an objective in itself, and its achievement is being realized without meta-social guarantees of success. In this mega-trend, knowledge and interdisciplinarity participate in both processes and contribute in several ways. By using our approach of mode of knowledge, typologies and interdisciplinarity (as work of limits by the limits), it is possible to demonstrate how scientific knowledge and interdisciplinarity contribute to continuous change of norms and some practices and the destabilization of other practices; and at the same time, knowledge and interdisciplinarity are asked to contribute to re-unify the dispersed domains of social life and, of course, their own domain. This double expectation, double function or double social mission are at the origin of many cultural uncertainties.

Which of these uncertainties is the most crucial from the socio-cultural point of view? Or at least, which uncertainties play an important role for the socio-cultural change of the destiny of contemporary societies? We might propose **three uncertainties:**

- The first one has to do with the collective memory: the speed of changes in the area of knowledge creates a "terrorism" of the obsolete, as the chronological depth of knowledge tends to diminish on the scale of months, even weeks. The memory becomes instantaneous, or at least under continuous reconstruction. What will happen to the triptych past-present-future, as the last two tend to absorb the first one? Will collective memory be useless?
- The second uncertainty comes from the expression "knowledge society," as the question which arises is the following: taking as our point of departure that knowledge is the "fuel and the catalyst" of socio-cultural evolution, is society organized consequently? (e.g. do interdisciplinarity and socio-professional power converge? or "should we be paid for learning not to work?"). What changes have to be realized and by whom in order to pass from knowledge economy to knowledge culture or to knowledge as culture? If not to culture as knowledge?
- The third uncertainty emerges as a distribution of modes of knowledge will be established according to which scientific knowledge will be present in any human activity transforming everything "natural" to "mono-cultural" (e.g. human reproduction will not be "natural" but "scientifically and technologically" feasible, "even, emotions could be treated in the name of science or at least any treatment could be justified in the name of their bio-physiological basis). What will be the result of this domination? What might the other modes of knowledge and the arts claim as their specific field? What could be the path between scientific knowledge and the other modes of knowledge? Will we find incompatibility? Unbridged differences? Total separatedness?

Science working for the known and knowledgeable creates at the same time the unknown and mystery; science working for the possible creates at the same time challenges for the impossible; science working for solutions to problems generates the problems of (past and future) solutions. Does scientific knowledge finally cultivate paradox and uncertainties instead of robust solutions?

If Constantinos Doxiadis had the opportunity to begin his adventure today, some of his ideas and analyses would be extremely pertinent, efficient and fertile: for instance the idea of networks is now a universal concept, and his interdisciplinary spirit is the key concept not only for pure scientific investigation but also for decision making in a complex world. He would face a more favorable environment on at least two levels:

- in Greece, a more solid scientific atmosphere and more diversified institutional setting (universities, research centers, consultancy companies, agencies, social associations active in city planning);
- in the international arena, the acceleration in the exchange of ideas, products and influences would permit his innovative ideas and methods to be spread widely.

However, he might be obliged to modify his schemes of analysis and inspirations.

- First of all, in a more fluid scientific setting, "ekistics" would constitute a school of thought rather than a "discipline" – and he might even have to abandon the title of "ekistics," taking into consideration the rapid re-arrangements between titles, themes-objects, practices and processes in the scientific arena.
- Second modification: his multilevel approach to the organization of human settlements in spite of his wealth of variables and well thought-out complexity is rather "essentialist" and probably needs a more "constructionist" flavor, in the sense that today as we need more social participation, more cultural legitimacy for important techno-social projects, any methodology for collective action has to include mechanisms of public debate and interactive potential between social groups, institutions and innovators.

Are these suggestions in the spirit of Constantinos Doxiadis? Are these speculations relevant to the experience of city planners, or specialists in human settlements or analysts of socio-cultural changes of the present and future? The World Society for Ekistics is certainly the field of debate and control of these types of arguments. If Constantinos Doxiadis was an imaginative initiator to utopia, is it reasonable and feasible (for us today) to be utopian in a more participatory and interactive way?

Note

On the question of interdisciplinarity, we thought it would be useful for the reader to refer to the following which concerns the **Socio-cultural dimensions of the scientific mode of knowledge.**

Taking into consideration that our interest is focused on socio-cultural uncertainties, we present some indications about the use of the term "science." This presentation is quite selective and, of course, it makes no attempt to summarize the rich and heterogeneous debate about the nature of contemporary science. The only ambition is to show the multifaceted "nature" of the scientific mode of knowledge, which is characterized by:

i. Articulation of acts and activities (parallel and consecutive): formulation of "problématique"/selection of methodological strategy/fieldwork or any activity for the collection of data from observation or experimentation/elaboration of discourse/production of conclusions/evaluation of the whole effort.
ii. Application of the above-mentioned chain of acts on different levels of reality or different levels of the energy scale (e.g. from nuclear particles to galaxies, from viruses to the ecological system of Earth, for the individual person to the population of the planet).
iii. Application of the above chain of acts for the observation, description, understanding, interpretation and explanation of both immutability and change of reality, and very often with a view to formulating predictions for the evolution of phenomena or situations.
iv. Elaboration of types of discourse and the invention of rhetorical schemes of words, images and forms of logical cohesion (e.g. mathematics or mathematical symbolism) in the name of "Reason" and by exploring the limits of language (e.g. grammar).
v. Procedures to transform the rough reality, the first vague impression, intuition or events to scientific phenomena by using theories, bibliography, previous experiences and efforts, international expertise by continuous dialogue with peers.
vi. "Arsenal" from theories, hypotheses, axioms and a mechanism of verification either by experimentations or by testing data and conclusions for their relevance to reality(ies) based on discussions, workshops, meetings.
vii. Continuous and systematic re-definition, re-formulation of the above elements through verifications or non-verifications as new questions, new phenomena, new paradoxes emerge. (This continuous process is completed through open discussion and mutual control).
viii. Establishment of mechanisms for the attribution of scientific pertinence by peer review, publications, assessment of methodological strategies with the aid of critical analysis, discussions, conferences and other collective procedures.
ix. Cultivation of patterns of creativity, imagination and potential for synthesis of cognitive elements, in spite of the fact that these elements are not present in an explicit manner in the final form (e.g. articles, books) of scientific endeavor. Especially in scientific life argumentation, theoretical foundations, references are both values and tools; also there is a tendency to promote the consensus and not the conflicts or the unjustified differences.
x. Establishment as a major cultural event not only in Europe but on the universal level, beyond the origins (e.g. Greek), the influences (e.g. Arab). In relationship with the industrial revolution, this unique cultural achievement has marked and continues to mark the destiny of humanity.
xi. Mobilization of resources (material, institutional, financial, human) for the conception and realization on specific policies (from a wide spectrum of social actors) for scientific and technological development and its integration in the global effort of contemporary societies to exercise a systematic influence or control on their "evolution." In other terms, the scientific mode of knowledge presupposes and is based on schemes of mobilization of resources, division of work and existence of norms, and its social impact is measured and assessed by its contribution to the solution of (big and small) problems of modern societies and its relevance on both national and international levels.
xii. Permanent redefinition of the scientific mode of knowledge depends not only on the other modes (e.g. philosophical) but also on issues and practices related to private/public, risk, social control of the "destiny" of the world, the distribution of power and decision making (e.g. experts), the realization of "legitimate/legitimation"; the social acceptance of new knowledge depends during the first phase on its autonomy (management of pertinence and validity of its products) but during a second phase in relationship with other social practices in a continuously changing socio-cultural context.

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