

Note project to prepare the WTIS European-Chinese meeting in October

Management of technic and scientific choices viewed from Europe

1-Political goals of research and innovation

In the field of scientific and technic choices, it is not exaggerated to say that Europe has more questions than answers.

1-1-The first issue raised by the Green Book of the European Commission is that of coherence in diversity. Europe now comprises 27 countries, most of which speak different languages, and in some of of them several tongues are in use. After World War Two, Europe was built upon the strong idea that economic trade would bring peace between people that had been destroying each other for a century. Experience has shown that this bet was correct, but cultural diversity subsisted. It is even considered by most Europeans as a richness to be preserved. Nevertheless, concerning research, this diversity does not facilitate exchange; and Europe is led to take specific dispositions to make scientific curriculums the same everywhere and to stimulate exchange and mobility of scientists between the different Member States.

1-2-Another issue, more scarcely addressed, is that of defining or delimiting research. It can seem fastidious to ask ourselves what is to be researched and what is not. But when looking back at history, this question then makes complete sense. After World War Two, and the extraordinary display of resarch's power that was the nuclear weapon, the issue of determining the area of research, in order to better understand and control the resources dedicated to it, was raised at OECD level. This work, called "Frascati Manual", started (without being officially displayed as such) from military needs. Those needs, indeed, are very broad and cover most types of activities. Not only physics and chemistry (which had been used to make weapons) and biology (which could be used to make some more), but also health, mechanics, aeronautics, materials, and... communications. To cite a single example: isn't Internet an extension of Arpanet, a network built at DARPA's command to facilitate and accelerate communications between centers working for American department of defense?

1-3-However, artistic activities, those of craft, or even knowledge of natural ecosystems, were neglected by the research system built from the 50's to the 70's. The only major exception is astrophysics, accepted as a research even though it had no military use. However, from the 70's onwards, civilian applications of military research became so numerous and important that this original definition was forgotten. Research officially became the intellectual support for economic competition while preserving the idea, dear to scientists, that "fundamental" research is indispensable because, as the Einstein example clearly shows, its applications cannot be foreseen and can be decisive.

1-4-Still, if economic competition has replaced military rivalries to motivate and justify funding research, those are nonetheless two expressions of the will for power. Now as in the past, the end of research and innovation is power. Military power yesterday, economic power today. Will it always be so? That is where the big interrogation mark of our future lies.

2-Emerging phenomenons

2-1-It is a philosophical issue raised by every wisdom in the world – whether search for knowledge should obey power, or, on the contrary, knowledge should orient the exercise of power. Power that only aims at its own expansion is generally viewed by the wise as a "hubris", an immoderation that can but meet a tragic end.

2-2-This ancient view was brought back to foreground in the 90's – 2000's. At the request of the United Nations, preoccupied by climatic evolution, a worldwide network of research laboratories, the IPCC (Intergovernmental Panel on Climate Change) was created. Noticing that the concentration of carbon dioxide (and other gases) in the atmosphere was increasing dangerously because of human activity, this network of men of knowledge ask men of power to moderate gas releases and even to reduce them.

In a more general manner, economic development, considered for a couple of decades as an end in itself, around which a general merchandisation has been established, whose flows are (mis)used as sole comparison criterium between nations, is also the bearer of destructions endangering many species, maybe even the human species, which is not the least fragile of them. Protests from certain economic and political spheres attempted to minimise or discredit those works. All they achieved was discredit themselves, and the public is now aware of what is at stake.

Does this alarm foreshadow a general understanding of human species' interest, which goes beyond States clivage? One may think so. If it is the case, globalisation is no longer a competition, nor even a prestige rivalry. It is a cooperation, in order to best solve a difficult problem: limit the destructions inflicted on ecosystems while securing a honourable life for humans, including the poorest.

2-3-In this perspective, professionalised and institutionalised research, as defined over the last half-century, indisputably has a place. But one may wonder whether any economic actor, or even single individual, provided they study and develop new practices or unearth ancient practices more prone to solve future problems, should not be considered researchers as well. In other words, there is on one side the institutional research, and on the other side the research spirit, which may turn up anywhere. Therefore one may wonder what should be the priority now: reinforce research institutions, or spread the research spirit among evryday practices? To take an example, global warming will force to better insulate buildings. Doubling insulator layers, setting double or triple-glazed glass windows, equip buildings with solar panels and installing ventilation systems with heat-exchangers that limit caloric loss, these are all well-known techniques. But known and applied by whom? By a small minority of builders, when it should be by all of them. Therefore it is not an issue for research itself, but for the knowledge-sharing system and technological management.

2-4-It is even observed that the unbridled economic development in the last half-century has caused knowledge losses among proffesionals. For instance, in the urban areas of some African countries, craftsmen still able to build with clay are difficult to find. Nearly all of them use breezeblocks and cement, when the thermic properties and comfort of traditional clay buildings are way more adapted to their climate. In some way, local craftsmen have unlearned techniques that were adapted to their environment and able to face global warming, because they copied those of economically dominant countries and social classes, the which are still far from mastering their overconsumption.

2-5-Confronted with those difficulties, the notion of progress, which has been dominant since the 18th century, is being questioned again. History is not a one-way movement. It displays not only knowledge-losses hampering the solving of technical challenges (including that of rebuilding equilibrium between the human species and nature), but also some omissions and

scientific forgettings. For instance, knowledge of medicinal plants, the base of every traditional medicine, was neglected in favour of chemistry. As a result, a loss of knowledge occurred among practitioners, plus the shortcomings of descriptive research. The number of animal and plant species is estimated between 5 and 30 millions. Only 1.8 have been referenced. The research effort was applied to genomics, because some patenting could be expected in this area, and neglected the description of nature. This is another example of knowledge made to serve power.

3-Globalisation

3-1-For a couple of decades, globalisation has been the dominant factor of the transformation of societies, regardless of what culture. It is often considered obvious that this globalisation is primarily an economic phenomenon, that it was triggered and accompanied by political decisions to liberalise commercial trade. But History's perspective gives a more nuanced view: the first "globalisation", indeed, dates back several millenia ago. It is the "silk road", or rather the commercial roads that have linked the Mediterranean world to China for 2500 years. The second globalisation is a maritime one. It took place at the beginning of Renaissance, 500 years ago. We are now living a third globalisation, that of instantaneous electronic communications, that of space exploration too, which sends back Earth's pictures and location.

Those globalisations are political events, but also technological events. The first one started with domestication of horse and camel, the second one with long sea navigation techniques, and the third with radio wave transmission and digital electronics. Political systems adapted to these transformations, they did not create them. Therefore, since those technologies have still not produced all of their effects, the first thing that should be attempted is to try to analyse their consequences.

3-2-The first major consequence is standardisation, and simultaneously a higher technological level of consumption goods. The example of automobile industry is particularly demonstrative: models are looking more and more like each other. On every segment of the market, car manufacturers, disseminated over all continents, offer the same equipments, the same sizes, almost the same colours. The product is no longer the expression of a particular cultural identity; it blends in an international standardisation, because the ways of life of buyers are converging too. The same goes for mobile phones and microcomputers.

3-3-The second consequence is world-scale building of large equipments, through cooperation between the more advanced countries on scientific research. Europe first established a space cooperation, ESA, which is not even a byproduct of the European Union but the expression of a specific international treaty. The same went for aeronautics, with Airbus, and for CERN's large particle-accelerators. In the International Space Station and the ITER project, cooperation was made worldwide from the beginning; which allows us to suppose that for this kind of very large equipment, prior negociation of a world-scale cooperation shall be the norm in the future.

3-4-The third consequence is that evaluation of research and education quality has become international too. The University of Shanghai has published a ranking table of college education in the world, which generated considerable commotion in European universities. It is understood that this comparison was motivated by the necessity to enlighten the choice of Chinese students who plan to complete their formation abroad. However, since it puts on the same plane different institutions living separate lives and funded by different governments, the simple fact to compare them caused reactions. Even if, in the research field, international comparison is usual. The Nobel Prize has been its keystone since 1895, but upstream its judgement, there are publications of journals with reading committees, most of them Anglo-Saxon, and mostly American to be more precise. Certainly do those journals work seriously, and the scientific quality of what they publish is respected everywhere. Nevertheless, first they are more interested in the novelty of research (while remaining conform to a certain cultural model of research) than in its usefulness to solve the planet-scale problems previously evoked, and second, the network of American universities is dominant in them, which inevitably has an influence over both the acceptance of publications and their notoriety by citations (NSF's citation index). It would not be superfluous to ask ourselves whether alternative ways to publish researches and make them known could be constructed.

4-Public authorities, new roles, new policies?

4-1-In Europe, public opinion toward research remained mostly favourable. Nevertheless, in some intellectual spheres, a doubt appeared: development of the nuclear weapon and genetic manipulations caused some opposition. Although the image of Pasteur, father of vaccination, had established in people's mind the beneficial and humanitarian role of science, the path

followed since World War 2, when science was made to serve power, generated doubt.

One political manifestation of those doubts is the creation, in parliamentary spheres, of bureaus for evaluation of technological choices. For the European parliament, this bureau, called STOA (Science and Technology Office Assessment), is chaired by the former Research Commissar, Philippe Busquin. He studied most of the areas that get questioned over the social usefulness of research orientation: genetic manipulations, RFID, thermonuclear fusion, nano and converging technologies, intellectual property, energetic issues, new transports, the Galileo programme, etc...

4-2-Once those studies completed, the issue of research “management” remains. This question is particularly difficult, for who better than a researcher knows where they are prone to find something? Nevertheless, some “piloting instruments” remain in the hands of public authorities. They are:

-Heavy equipments, among which the large measuring instruments such as cyclotrons, astronomic observation devices, or even the “neurospin” project for an 11-tesla MRI. Every science, indeed, relies on measuring instruments; and the introduction of a new instrument (as it was the case for the Hubble telescope) multiplies accessible universes and opens new fields, including theoretical ones.

-Public orders of high technological intensity. For half a century, those orders were mostly military. But nothing says high technology cannot be developed for civilian uses too. For instance, continuous surveillance of the effects of climate change, including those on ecosystems, funded by governments, will no doubt be a highly technical subject of international cooperation.

-Construction of “excellence nodes”. Experience has shown that proximity of research teams knowing each other and working on related subjects is prone to generate creativity. When the circumstances are opportune, a stimulating “environment” is created in which researchers tend to help each other out even if they are more or less in competition. Those “nodes” are often concentrated around costly measuring equipments, and also work with the industrial users of scientific research.

-Finally, public authorities, when they get the chance, do some **prospective surveys in order to better manage research policies**. Those have long-term effects, and therefore can only be defined according to a certain view of the future. Too often, research programmes get inspired either from imitation of foreign programmes or from continuation of works currently carried out. In a time when global warming and economic globalisation generate tensions and call for re-adaptations, it is important to orient research toward a certain vision of the world's future, not according to logics inherited from the 20th century. But this inflexion remains to be taken!

5-A few organisation issues for European research

5-1-One specificity of the European model is that it is utterly related to the very construction of Europe. Every member country has their own research policy, and for near to three decades a European policy has gradually been established.

The basis of that policy rely on articles 163 to 173 of the treaty (version 2002), and more specifically on articles 163 to 165:

Article 163

1. The Community shall have the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting all the research activities deemed necessary by virtue of other Chapters of this Treaty.

2. For this purpose the Community shall, throughout the Community, encourage undertakings, including small and medium-sized undertakings, research centres and universities in their research and technological development activities of high quality; it shall support their efforts to cooperate with one another, aiming, notably, at enabling undertakings to exploit the internal market potential to the full, in particular through the opening-up of national public contracts, the definition of common standards and the removal of legal and fiscal obstacles to that cooperation.

3. All Community activities under this Treaty in the area of research and technological development, including demonstration projects, shall be decided on and implemented in accordance with the provisions of this Title.

Article 165

1. The Community and the Member States shall coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent.
2. In close cooperation with the Member State, the Commission may take any useful initiative to promote the coordination referred to in paragraph 1.

This coordination role is not necessarily constraining, but it calls for a real political will from everyone to be applied. The commission has two main tools at disposal to promote that cooperation and coordination, the Framework Programme and article 169:

Article 169

In implementing the multiannual framework programme the Community may make provision, in agreement with the Member States concerned, for participation in research and development programmes undertaken by several Member States, including participation in the structures created for the execution of those programmes.

Besides, subsequently to the Lisbon Agreement in 2000, the open coordination method allows engaging a cooperation process between member countries wishing to go further on the path of common programme and activities sharing.

The debate frequently raised by those procedures is that of the proactive role of the Commission for a better coherence and integration of Europe's national policies.

5-2-Another issue raised concerning the undertaking of research policies is their relation with other community policies. European construction demands stronger bonds with economic, educational, industrial and regional policies, but also with international cooperation policies with emerging countries as well as with less developed ones. This issue is complex, because once again 27 different policies have to be coordinated with a unity strategic vision everytime. The greater each level's autonomy, the stronger the will to get closer to the basic citizen; and the more complex this integration process gets. Which does not mean it should be renounced: new modes of

communication, information and participation to decisions allowing it should simply be found.

5-3-The recent creation of two institutions, the European Research Council and the European Institute of Technology, aim at reinforcing intervention tools for a research policy that is up to the challenges of the 21st century.

The role of the European Research Council is to “stimulate scientific excellence by supporting and encouraging the best and most creative researchers, engineers and students to take risks in their own research projects. Those researchers should pass the borders and barriers of disciplines.”

The role of the European Institute of Technology shall be to “contribute to reducing the gap between college education, research and innovation; it shall be part of a strategy aiming at mobilising knowledge and innovation for growth and employment, and creating a favourable environment to promote innovation and a high level of excellence in Europe.”

5-3-Finally, the European research policy, in every of its components, shall better take into account and respond to the needs of European society, but also other societies and more specifically the less developed ones, while developing its own competitiveness at worldwide level. This double challenge, during the Göteborg Summit between Heads of State, was augmented with a third pillar: that of taking environmental issues into account.

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