



**GLOBAL ACTION PLAN
ON
S&T SOCIO-ETHICAL ANALYSIS**

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Introduction

The rapid developments in Science and Technology (S&T) raise many ethical questions and regulatory challenges and addressing these questions and challenges requires understanding the impacts of these developments and how societies should develop frameworks and institutions to address them on a continuous basis. In post- World War II Europe and USA many initiatives have been taken to address ethical issues and to develop institutional frameworks to ground them in ethical guidelines and values and also in suitable international protocols and guidelines. WHO, UNESCO and other international organizations, including professional bodies, have played an important role in this effort. In developed countries different forms of social-ethical analysis are performed by different bodies or independent initiatives and often organizations doing Technology Assessment (TA) perform this function. In the US, for instance, the Bioethics Commission appointed by the President undertakes such tasks as and when required. The erstwhile Office of Technology Assessment in USA performed also social-ethical analyses in its processes and integrated them in its reports. But social-ethical analysis of technologies received a boost when as part of Human Genome Research, studies on Ethical, Legal and Social Issues (ELSI) were funded with a specific fund allocation and these studies generated much literature on the ELSI aspects of Human Genome Research. Similarly in Europe ELSI aspects of life sciences research and other emerging technologies have been supported by the EC and by national governments.

GEST is a project that seeks to contribute to such assessments and processes through developing frameworks that facilitate dialogues and bring together policy makers and stakeholders in different cultures. For this purpose the project has brought together institutions working as policy advisory bodies and academic research institutions to create platforms for addressing core ethical concerns and develop methodologies to compare ethical debates. The deliverables, including the final outputs, have been evolved by working closely together in developing a framework that is sensitive to national concerns and regional values without limitations in the mode of analysis (e.g. universal vs. national/regional).

GEST explored the role of ethics in S&T policy as it is currently developing in Europe, China and India. The reasoning behind this aim is that the way in which ethical considerations are incorporated in S&T policymaking has a direct impact in the development of particular technologies but also in the way that each region collaborates with others. There are certain interdependences between the three regions when it comes to technological developments that require strong collaborative activities and mutual understanding on the dynamics and driving forces behind each region's decision-making processes.

The work of GEST involving key S&T policy advisory institutes has increased our understanding of the role of ethics in S&T debates. The main objectives of the project were to analyse the concepts and issues surrounding ethics debates and create a robust global debate that will directly inform science policy. The main focus of this report is to present the findings of the

project and translate them into policy-specific ideas that can be taken up by the regions involved. Moreover, we hope that the relevance of this work goes far beyond the geographic coverage of the core project team and provides lessons learned for any S&T intensive society that needs to grapple with sensitive and complicated socio-ethical considerations.

State-of-art of Debates in the Three Regions

The first task of the project was to describe the state-of-the-art in ethics debates in Europe, China and India in order to provide the basic facts and background for a meaningful comparison. Deliverable 2.1 “State of Art of Debates in the Three Regions provides a detailed comparison. Here we are re-stating the main points of the report summary that are relevant for the purposes of this report.

In the state-of-art report we drew a conclusion that “S&T debates in the three regions have different starting points but similar qualities”. That means that naturally the three regions have different needs, perspectives and priorities in S&T developments that in turn influences the debates on ethics and social impacts of S&T. Nevertheless, many similarities are evident in the roots, process and even resolutions of some debates.

The starting point of the comparison was to look at the roots of attitudes and perspectives in values and belief systems in the three regions. We argued that the *values systems* pose perhaps the most distinctive feature of the differences that we witness in the three regions. The Enlightenment-derived values of Justice, Dignity, Freedom, Citizen’s Rights, Solidarity, and Equality in Europe appear rather different to those of Progress, Affluence, Peace and Harmony that we see in China, or Development, Self-reliance and Scientific Temper that we see in India. This is perhaps not surprising considering that Hinduism, Confucianism and Christianity, which represent the basic belief systems in the three regions, are rather different in their prescriptions. But, as we have seen in the case of India and China, contemporary understanding of ethics is not necessarily attached to traditional belief systems. Instead, they derive their logic from notions of development (mainly economic) and social coherence. This in turn appears less contradictory to contemporary European values that derive from the common understanding of a new humanism rather than the prescriptions of traditional belief systems deriving from religion. Overall, a careful reconstruction of the values systems in the three regions shows striking similarities when viewed at the level of technology applications.

A further comparison dealt with similarities in the *official structure of ethics advisory* in the three regions. We described how The Ministries of Science and Technology, Agriculture and Health in China have established ethics advisory committees, as have the Council of Medical Research, the Department of Biotechnology, and the Ministry of Environment and Forest in India. In this, there are obvious similarities with the European institutional structures that is further accentuated in the case of China with the establishment of ethics advisory structures in research institutions and research funders (e.g. Chinese Academy of Sciences, Chinese Academy of Engineering, Chinese Academy of Social Sciences, etc.) which are directly

comparable to those in Europe. All three regions have also established quasi-official institutional structures in ethics advisory at the level of professional associations, healthcare practitioners and environmental organizations.

Our comparison of *lay morality* indicators was drawn mainly from public perception survey data mainly in China and Europe. We described how the European public appear to have a twofold, even contradictory, view of S&T (at the same time positive and extremely cautious) while the Chinese public seem more inclined to profess an unqualified positive view of S&T. For instance, 89% of Chinese respondents agree that “science and technology make our life healthier, easier and more comfortable”, compared to 66% of Europeans. Similarly, on the other side of the spectrum, only 14% of the Chinese questioned agree that “scientists are scary because they have the knowledge and capability to change the world”, compared to 53% of Europeans. Moreover, the Chinese public appears less worried than the Europeans that S&T developments can bring about a crisis in their belief systems (16% versus 34% agreement respectively) which can be interpreted as an opinion that S&T ethics is less attached to values systems in China than we see in Europe; alternatively, one might argue that the new “humanistic” blueprint developed in Europe that is not based on traditional belief systems is more sensitive to the societal changes that S&T developments can instigate. The limited data that we analysed in India point in the general direction of a highly positive view of S&T with some reservations when it comes to developments that have created intense public debates (e.g. GM foods).

One of the most interesting comparisons dealt with *civil society participation* in S&T debates. Whereas in Europe we found a well-established civil society culture that has a direct influence in various debates on specific technologies (e.g. GM foods or Nanotechnologies), in China and India we found a far more limited but for some cases and technologies (such as food) nevertheless intense civil society articulation. In the case of China, the lack of organised civil society structures does not preclude public debates with strong policy influence. The most recent Chinese Government’s S&T programme explicitly promotes public participation in decision making, although it is uncertain how this will be realised. In India, civil society groups are organized around specific themes (e.g. Bt Brinjal) with functions focusing on empowerment of marginalized groups to influence policy processes. Unlike China, the Indian Government does not focus on public engagement in official decision making but it strongly supports practical inclusion of relevant stakeholders at local level.

Finally, the development of Participatory Technology Assessment (pTA) is also widely dissimilar in the three regions. pTA is well established in Europe as a means of bringing about a structured stakeholder debate in S&T. In China, with the intense but unstructured civil society sector, pTA is recognized as a positive development but not applied widely as yet. The occasional pTA exercises undertaken in China are the result of isolated institutional initiatives without any official coordination. In India there is no evidence of pTA development at Governmental or institutional level but a keen interest in promoting local capacities for such undertaking.

Based on this comparison, we identified the parameters on which to base an analytical methodology that can provide in-depth comparisons between the three regions on the discussion and uptake of ethics. The methodology was designed to compare debates on values, rights and ideals aiming at engagement in public discourses on regulations, politics and governance. These debates are both historic, influenced by cultural norms, and reflective. They focus on the risks, and side-effects, of science and technology but also on goals and problem-solving possibilities, and thus also on the chances for innovation in socio-economic contexts. The analysis focused on the *Innovation discourse* (i.e. discussions on the economic and strategic goals), *Power discourse* (i.e. the role that existing legislation and principles play), *Reflective discourse* (i.e. the professional perspectives and systematic views of the debate) and *Lay morality* (i.e. the role that value judgements, emotions, hopes and fears in the general society play in the ethics debates).

Mainstreaming Socio-ethical Analysis in the Three Regions

While mainstreaming social-ethical analysis in S&T policy is important there are many routes/options to accomplish it. Mainstreaming is an objective and achieving this objective is not easy when social-ethical analysis is considered as irrelevant or an impediment for policy making. There is a general lack of institutions to give priority to mainstreaming or integrate ethical analysis as part of their mandate. Another important issue is that of values and normative guidelines that should help mainstreaming. Often bringing in universal values and claims that seek to guide institutions are resisted as they are perceived to be impositions from abroad or the values are perceived to be out of context or will create conflicts with current practices and socio-economical objectives. The challenge lies in addressing these concerns and this can be done by identifying values that can be shared by different stakeholders and by establishing platforms for open debate that allow to developed a joint understanding of ethical as well as socio-economical issues involved.

In India and China this is not the case. In both countries the innovation discourse is the dominant discourse and S&T policies have objectives that are closely linked to national development, economic competitiveness, self-reliance and strategic interests. Hence the S&T policy making process is more influenced and directed by actors and agencies who articulate the visions that assume such objectives. In both countries, S&T is an integral part of policy making where Five Year Plans separate S&T components and broad priority areas are identified in them. In case of China there are also Special Programs in different sectors with specific mandates and funding for these programs has helped China to make significant advances in many technologies including biotechnology. Thus, the experience in India and China indicates that S&T policy process has provided little scope for other voices and discourses and social-ethical analysis has not been given the importance it deserves. However this is changing as evident in the Science, Technology and Innovation Policy of India and in the initiatives taken by Chinese Government to assess public perceptions and also the increase in importance given to ELS issues.

Mainstreaming social-ethical analysis does not mean that India and China should replicate structures and processes that are found in Europe nor it means that they should adopt the same policies for mainstreaming. Mainstreaming social-ethical analysis in both countries is possible and will be considered desirable only when such mainstreaming is not perceived as a counter-narrative to the innovation discourse. Mainstreaming as a process will take time to form roots and expand. Hence the modalities of mainstreaming have to develop taking into account the S&T contexts in both countries and the relationship between S&T and society and the diversity in stakeholders in both countries.

India and China have public agencies with a potential for technology assessment and have significant strength in undertaking social science research in social-ethical analysis. Scientific bodies and organizations of scientists have often displayed their interest in understanding the social-ethical implications and on issues in science, technology and society. With policy makers acknowledging the importance of understanding social-ethical implications, the modalities of mainstreaming can be developed. Both countries need to expand further their institutions in technology assessment and broaden their mandate to include social-ethical analysis. The use of public perception surveys should be expanded in China while in India such surveys have to be undertaken systematically.

The lack of space for other voices and narratives is a serious issue and this has to be addressed by providing space for involving stakeholder participation in consultations. Science Academies, Universities and publicly funded institutions can act as mediators between policy makers, researchers and technology developers, social-ethical analysis and civil society representatives.

Mainstreaming S&T Socio-Ethical Analysis: Food Technologies in the Three Regions

The focus of the case studies in the realm of food technology is confined to GM food in Europe and China while the case study from India has also discussed additional technological trajectories implicated in it. Mainstreaming social-ethical analysis in food technologies is an important task but as social impacts and implications are considered in policy making and in technology assessment, the major task lies in incorporating ethical concerns and linking that with technology assessment and social impact assessment of food technologies.

Both India and China have robust systems to assess gains in productivity and measure economic benefits from technological interventions. These can be used effectively to develop socio-economic impacts analysis and also to understand whether technological interventions enhance access to better technologies. However, the dominance of innovation discourse with a narrow focus on productivity, particularly the economic gains from technology has overshadowed other concerns including ethical ones.

With respect to ethical values, it is important to identify the key values in case of each technological intervention and study what role they should play in doing social-ethical analysis.

On the other hand mainstreaming social-ethical assessment in food technology can be used to assess technologies in terms of suitability for a region taking into account the natural resource constraints, benefits and costs as well as the perspective of small and medium scale producers and of consumers. In short, mainstreaming social-ethical analysis in food technologies means going beyond productivity oriented innovation discourse to incorporate wider concerns and values in assessing technologies and using this as a tool in policy making. Institutionalizing social-ethical analysis is important. For this to happen, the capacity of the current system to address these concerns has to be strengthened. Existing capacities (mainly in China) in conducting representative surveys on attitudes and concerns of the general public and interest groups can be used to support such activities.

The current institutional capacities have to be strengthened to include widespread discussion and consultations of experts, lay public and farmers to better understand the positions and views of all stakeholders. Institutions should have the capacity to undertake such initiatives and facilitate processes that reduce gaps in understanding and promote wider consultations. India and China have a long way to go in this respect and they can learn from Europe's rich experience in stakeholder engagement and consumer feedback on new technologies.

For Europe, given its rich experience in dealing with food technologies, it may seem that there is not much to learn. But in fact Europe can learn from experiences in India on dealing with different technological solutions and how to go beyond pro and anti GM stance in food technology. For example given the standoff in Europe on GM food, Europe can look at non-GM option in biotechnology - as India has done - and examine their relevance in the European context through proper consultation exercises.

Mainstreaming S&T Socio-Ethical Analysis: Nanotechnology in the Three Regions

Our brief survey, as evident from the case studies, reveals that the innovation discourse is the dominant discourse in all the three regions. For each region was found that the nanotechnology innovation discourse started at the beginning of the 2000s. Especially in China and Europe governments were starting to build up coherent strategies and central bodies for the coordination and governance of nanotechnology development. Both regions installed central administrative bodies by the year 2000 charged with setting up nanotechnology innovation strategies. The resulting strategy and policy papers as well as subsequent action plans emphasize the political expectation to quickly translate nanotechnology from basic research into commercial products. India, too, is focusing on applications of nanotechnologies, but government efforts for a coherent strategy for nanotechnology development and research infrastructure are not as strong as in China and Europe. Therefore India is not engaged in all possible pathways of nanotechnology research. Policy focus lies on application development in the health area as well as on fast translatable nanomaterials research.

One of the challenges for nanotechnology policy – and related ethics discourses - is the heterogeneity of the field. This became particularly obvious in the case of related risk discourses. In early stages, these discourses dealt with various nanotechnology approaches and applications. Since the mid-2000s, the risk discourse focused (some would say: Was limited to) the environmental health and safety (EHS) risks of nanomaterials. At that time, EHS issues were voiced by Chinese and European research communities. The Chinese government integrated risk research into its policy agenda – particularly thanks to the advocacy and promotion of the scientists – on the basis of a cost-benefit framework. Since the years 2003/2004 EHS issues were increasingly addressed by a variety of actors in Europe – NGOs, European Parliament, regulatory authorities, expert bodies, reinsurance companies, STS community etc. – and the risk (governance) discourse has become one of the strongest and most visible discourses in the debate on nanotechnologies. It created linkages to other nano-discourses and led to scrutinizing conventional risk assessment frameworks and regulatory approaches with references to the precautionary principle or sustainability. In India, risk assessment of nanotechnology is not ranking as high on the policy agenda as in China or Europe. Some actors try to push this issue, but so far there has not been much significant research or policy action. Risk governance of nanomaterials is an important subject of research and negotiation in various international arenas, including OECD and UNESCO.

The power & control discourse related to nanotechnology emerged in Europe almost in parallel to the risk discourse - around the years 2003 / 2004, when at that time current developments of nanotechnologies underwent first technology assessment studies. With a strong innovation discourse allowing actors to frame nanotechnology as a representative of any technologically driven innovation, consequently, the question of an adequate and inclusive governance framework became a hot topic in science and technology policy. The actors who initiated the power & control discourse were scientists, especially social scientists, philosophers and STS authors, as well as NGOs. They are tackling issues of controllability and power or access and equity and appeal to the inclusion of broader socio-economic impacts, like consequences for developing countries, into governance frameworks for nanotechnologies. Thereby they also refer to similar developments in other technology fields, e.g. biotechnologies.

In China, most topics that can be related to power & control discourse appeared with the emergence of systematic and intensified ethical reflections from 2009 on. Issues in this sense are

- Government's focus on the country's position in the international military and economic competition,
- scientists' reflections about their social responsibility in terms of self-governance,
- sociological reflections on the relationship between the public and the scientists,
- scientists' considerations of the respect for the public's right to know, social justice, and the danger of a possible nano divide.

But, taken together, the Chinese power & control discourse is centred on a concept of harmony that shall foster innovation and progress.

In India, the nanotechnology power and control discourse, too, is overshadowed by the government's innovation discourse which harbours an optimistic vision for the applications of nanotechnologies in addressing many societal challenges as well as helping in economic development. Therefore many actors in the nanotechnology field hold the view of "innovate now, regulate later". Still, some experts criticize the government for particularly promoting those research projects which lead to commercially viable and profitable products, while not giving enough support to those projects which focus on products addressing societal needs and integrating different stakeholders' views. Few other experts plead for more governmental activity in terms of informing the public about the risks and benefits of nanotechnologies as well as the application of a labeling system giving consumers the opportunity to make an informed choice. One might conclude that the power & control discourses are the most sensitive and most heterogeneous ones – both within and between the regions since they address issues that are highly politicized and tend to challenge some key narratives of the dominant innovation discourses.

Mainstreaming social-ethical analysis is an objective that can be met through various ways and it has to be contextualized. While nanotechnology is an emerging technology with a universal appeal and application, the capacity of countries to invest in and apply this technology is not uniform. Mainstreaming social-ethical analysis of nanotechnology is necessary and is not an anti-thesis of innovation discourse. If this is understood clearly then it is easy to evolve policies to do mainstream.

Modalities of mainstreaming cannot be uniform and modalities cannot be developed in a short period of time. It very much depends on the availability of actors and institutions to facilitate the same. In case of nanotechnology modalities to mainstream range from institutionalising structures to support ELSI research to integrating socio-ethical assessment in decision making. But when innovation discourse dominates the policy discourse and regulatory issues are neglected, mainstreaming has to begin with the task of advocacy and arguing for socio-ethical analysis and to gain space for such thinking in policy making.

Also, the differences in the socio-political and cultural scenarios in the respective regions needs to be taken into consideration, as it has a bearing on the overall S&T development in the region. This may necessitate mainstreaming the socio-ethical exercises at the sub-national levels including regions.

Europe has a rich history of technology assessment and feeding the insights from such assessments in policy making. But this has happened over several decades and the mainstreaming efforts have also seen controversies and conflicts between actors and institutions in influencing policy making both at national level and at the level of European Community. Hence mainstreaming cannot be expected to be a smooth affair, nor can it be considered as an approach that will find favors with policy makers at all times and in all technologies.

In case of India and China, the stakes in technology are high and the imbalance in the powers of various actors and the dominance of innovation discourse is a major constraint in

mainstreaming. The modalities of mainstreaming, at least, to begin with, will be different from that of Europe. The modalities of mainstreaming in India and China can be in different forms, Dialog with policy makers and scientists and creating an understanding that mainstreaming socio-ethical analysis will not hinder innovation or funding nanotechnology can be the first two steps that could be used to convince the policy makers and other actors about the need for mainstreaming. Simultaneously it is important to contextualize mainstreaming on the basis of relevant issues and concrete objectives. For example the issues of EHS can be emphasized on the need to avert disasters like Bhopal Gas Tragedy while safety of products can be stressed as a condition to win consumer acceptance.

Mainstreaming S&T Socio-Ethical Analysis: Synthetic Biology in the Three Regions

Synthetic biology is an emerging technology that is expected to take further the biotechnology revolution. Although synthetic biology has been characterized differently based on underlying techniques and design principles, it is much different from typical genetic engineering and biotechnology. The innovation discourse in synthetic biology capitalizing on the potential of synthetic biology gives emphasis to the new avenues opened up by synthetic biology in developing organisms, biological parts and their wide ranging applications in many fields particularly in energy and health.

This discourse in Europe integrates synthetic biology in the Knowledge Based Bioeconomy perspective which envisages a greater role for biotechnology and synthetic biology in the transition to bioeconomy which will be the outcome of better understanding and harnessing of capacities of living systems, bioorganisms and their widespread use. In contrast the innovation discourses in India and China do not give emphasis to the idea of bioeconomy and perceive synthetic biology more as a continuation of biotechnology/genetic engineering paradigm. In China the innovation discourse gives importance to opportunities for China to leap frog using synthetic biology and considers this as a great frontier of modern biotechnology. Modern biotechnology in China has been strongly supported by the government over the years and Chinese scientists expect that the government will support synthetic biology also like that so that China does not miss the bus in key technologies and is able to apply synthetic biology in solving problems in energy and environment sector. While the risk discourse in China underscores the case for cautious optimism, there is also a perception that considering ethical issues and risk dimension at early stages themselves will hinder progress. While some experts call for more positive portrayal of synthetic biology a minority of experts give importance to risk and safety management. In India while the innovation discourse is dominant, concerns about societal issues and risks are also expressed. The Task Force Report takes a comprehensive approach towards synthetic biology and recognizes the potential of synthetic biology and at the same time it draws attention to regulatory, ethical and social issues and points out that these have to be addressed and gives importance to public engagement also.

In the case of Europe the discourses on synthetic biology have gone beyond innovation discourse and have given importance to risk aspects also particularly the issue of dual use. Moreover the studies funded on Ethical, Legal and Social Issues in synthetic biology have contributed to policy making in the field. Thus Europe has a better understanding and road map for synthetic biology since the innovation discourse is tempered by risk discourse and social-ethical concerns. Moreover, in Europe the debate has indicated steps that would be needed to minimize risks and strengthen the biosafety frameworks. While the power and control discourse has been dominated by experts and bodies that consider synthetic biology as an opportunity to expand the frontiers of applying biosciences, civil society groups and organizations performing TA have raised concerns about regulation and risk aspects. Public engagement has also been part of the discourses on synthetic biology in Europe and involving stakeholders and public engagement has been given due importance. Besides these, the discourse in Europe has also been paying attention to global governance issues in synthetic biology. Nevertheless, surveys show that the public is largely ignorant of synthetic biology. This has resulted in initiatives to engage with the public and assess the lay perception and values and attitudes towards synthetic biology.

Overall, we find that while in India and China the innovation discourse is dominant and promoted by experts, planners, scientific bodies, and government organisations, in Europe all main discourses are tempered by counter narratives and other voices. This has also influenced the policy making process. In India and China, the risk dimension is underplayed or considered as a technical issue while in Europe the risk dimension is assessed differently by focusing on regulation, biosafety and stakeholder involvement in decision making. While public engagement is almost absent in the discourses in India and China, it is given due importance in Europe.

As synthetic biology is in nascent stages in India and China and is yet to get major support from governments, we can expect more vigorous debates and discussions in the future. At the same time, as these countries have not paid any attention to ELS issues so far discourses on social-ethical analysis may not evolve rapidly. But as industry and scientists are aware of issues in biosafety and risk and on account of the increasing importance to these in research, development and sharing of data and materials, it is likely that - even if civil society is not active in this area - industry and scientists would press for greater biosafety and more comprehensive regulation and harmonization with global standards and practices. But this may not challenge the dominance of innovation discourse and is likely to supplement it in the interest of safe use of synthetic biology and better governance through technological means.

The modalities of mainstreaming in India and China have to take into account the dominance of the innovation discourse and the salient role of such technologies in governmental activities for socio-economic development. For example, as synthetic biology is expected to expand the technical capacity to provide a variety of synthetic fuels, government support for such research will also likely be supported by the public. Similarly, application of synthetic biology in the health sector in India and China is likely to be supported as part of programmes to develop capacities in the bio-pharma sector. In order to connect mainstreaming to this context

it might be a feasible way to start with TA mechanisms taking into account technical and economic aspects relevant to national economic development. Dialogue with scientists, policy makers and scientific bodies can help in creating a space for mainstreaming socio-ethical analysis. A large section of the expert scientists are concerned with social-ethical issues and this might lead to gain more support for mainstreaming.

In terms of institutional capacities and institutionalizing processes for public engagement it is necessary that current TA organizations should be strengthened. More over, as synthetic biology is more complex than biotechnology/genetic engineering, it is decisive to set up interdisciplinary groups of scientists to address the relevant issues and more interaction with stakeholders will be useful in creating awareness. National Academies of Sciences and professional bodies can play an important role in this. Another important issue is that of assessing lay perception and values and public understanding of synthetic biology. While China has been doing many surveys on public perception on S&T, India has to make a beginning in this. For this India has to develop institutional capacity and conduct surveys besides giving importance to popularization and communication on synthetic biology.

Mutual learning between India and China in addressing social-ethical issues is desirable and as both countries are in the initial stages of development in synthetic biology this is the time to initiate efforts in this. For example India and China can develop models for public engagement, identify the key issues in biosafety that are of interest to both countries and consider joint programs in developing biosafety regimes and regulation of synthetic biology. As both countries have to take positions at the global level on dual use and on the linkages between synthetic biology and the Convention on Biological Diversity and address issues in global governance, the scope for joint work on these issues is immense.

Conclusion: *Mainstreaming Socio-Ethical Issues and challenges*

The case studies and the research done for the project indicate that mainstreaming ethics in S&T policymaking is a major challenge that needs to be addressed flexibly. Given the diverse contexts and the influence of various discourses in policymaking and the normative values embedded in them, it is not possible to suggest one size fits all model approach or solutions based on that. The Innovation discourse on S&T for development is dominant in China and India while in Europe the institutional mechanisms are in place to consider stakeholder views and bring in ethical values in TA exercises. Mainstreaming can be achieved in many ways and the outcomes need not converge but can result in divergences that are relevant and suitable to the given national context. Besides the suggestions made in different case studies, the project has found that a number of specific steps would be necessary to make mainstreaming more acceptable and relevant in the three regions:

Establish common global deliberation platforms on social determinants of S&T

GEST has been the start of such deliberation platform but it should be continued by a permanent platform that will include all major global S&T players. The form and location of the platform is less important than the actual step to create it. International organisations such as UNESCO include specific initiatives on S&T discourses (e.g. COMEST group) but they lack the financial commitment to attempt research and coordination actions that will bring about common solutions. One would need a specific S&T programme with wide membership and equal financial contribution to establish a regular platform of discussion and instigate research programmes on specific global S&T challenges.

Instigate capacity building programmes for common structures on ethics policy advisory

GEST has shown that proper ethics insitutionalisation requires official structures to analyse relevant issues and accordingly advice policymakers on the available options for action. TA has taken up this role in most European countries, while pTA has specialised in bringing in divergent stakeholders and engage the public in the process of issue analysis. Such institutional function and setting would be welcome in China and India. There is scope to instigate capacity building programmes on TA/pTA methodologies in order to allow for similar initiatives to take hold within the particular context of India and China.

Promote the development of common S&T social impact indicators

Impact assessment is key in establishing socio-ethical analysis in any region. Impact indicators are a complex but necessary step in such assessment. OECD has already started this initiative by bringing together an expert group to work further on improving the current set of indicators. UNESCO and other relevant UN organizations can contribute to this while some of the findings from EC funded projects (e.g. InnoS&T) are relevant here. In this context developing such indicators for emerging technologies is very important. The development of such indicators will be relevant for research on Responsible Research and Innovation (RRI)

Develop comparative systematic public perceptions databases

We have seen that a major tool in uncovering and assessing lay morality is public perception surveys on S&T in general or on specific technologies. Unfortunately, such surveys are not widely used and that hampers the possibility for direct comparisons between countries and cultures. It would be necessary to have directly comparative public perceptions data in order to reach common understanding and pursue a common analysis. This can be done with the establishment of an expert group that, based on the analysis in GEST, can devise a common survey to capture the diversity of the values context and the local perceptions of risk and benefit.

Promote common templates of public engagement

We have seen that public engagement is a serious challenge in all three regions. Europe has a certain tradition in it while India and China are willing to develop structures to promote engagement locally. It would be desirable to develop common templates and structures of public engagement in order to allow for direct comparisons where possible. With respect to national traditions in public discussion and decision making, it is possible to develop common programmes of engagement through established pTA methodologies.