



Knowledge Swaraj: An Indian Manifesto on Science and Technology

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This document has been facilitated by a network “Knowledge In Civil Society” or KICS. KICS is a forum (www.kicsforum.net) for conversations amongst activists and academics on issues relating to science and democracy. Started in 2005 KICS forum carries out these conversations through e-groups, common exploration and joint work through research studies and collaborative workshops. KICS is a decentralised forum that works closely with academic institutions such as the Xavier Institute of Management, University of Maastricht and University of Hyderabad and civil society organizations such as the Centre for World Solidarity and its solidarity partners.

The “Knowledge Swaraj” Manifesto is the outcome of efforts spread over an year, starting from the Workshop at the Adivasi Academy, Tejgadh, Gujarat (November 2008). “Thought Pieces” and other notes at, and from, Tejgadh helped make the first draft that was discussed at a second workshop at Hyderabad (March 2009). The draft was elaborated at the Hyderabad meet, and later (April-August 2009) through e-mails and other communications. The revised draft was presented for a discussion at the University of Hyderabad by a select invited audience of knowledgeable persons drawn from all over the country in September 2009. A few commissioned pilot studies around some postulates in the Knowledge Swaraj Manifesto are in progress, and when completed, those would help sharpen the draft’s content in the coming months.

As a parallel process, the Knowledge Swaraj Manifesto (December 2009) is now being placed in public domain for its further enrichment from all in its onward journey. KICS thanks many individuals and organisations who have participated in the manifesto process during the development, the public launch and later. KICS acknowledges the support of the Science, Ethics and Technological Responsibility for Developing and Emerging Countries (SET DEV) project (www.set-dev.eu) of the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement no 217811.

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Introduction

Writing a *Hind Swaraj*-inspired document for the 21st Century; asking what “self-rule for India” can mean, one century after Mohandas Gandhi wrote his manifesto for an independent India on board of a ship from Europe to Africa—such is this Manifesto’s mission. Indian self-rule in the 21st century can only mean Indian self-rule about its science and technology too. If Mahatma Gandhi gave prominence to science and technology in the form of law, medicine and railways, into the 21st century we see biotechnologies, tribal knowledge, space technology, handloom, information and communication technologies, and ayurvedic medicine. This Indian Manifesto on Science and Technology argues for Indian self-rule of its science and technology, for a knowledge democracy that draws its agenda for research and technology on the richness of Indian culture and the needs of the Indian people.

This Manifesto engages with the original *Hind Swaraj* by recognizing a crisis and the need for personal engagement. It asks the questions that need to be asked at this turn of times. This Manifesto is to serve as a wake-up call to citizens from the illusory stupor of momentarism. It is to build a framework for moving from short-term individual fixes to longer term community solutions. The world today is facing a multi-faceted crisis: a resource crisis signalling the end of the fossil fuel era and the drying up of most modern resources; a climate crisis which almost reached a point of no return; an institutional crisis with an eroding credibility of the state as well as the market; and an economic-financial crisis that questions the received neo-liberal strategies for development of wealth and health. This manifesto calls for a soul-search and urges the new commons to turn these crises into opportunities.

This Manifesto derives from, but is not restricted to, the Gandhian ideal of a polity of ‘oceanic circles’—the seed of collaborative local institutions ultimately bearing fruit on a global scale. It seeks to question a blind faith in technology without being Luddite; to restore cultural identity and pride without being chauvinistic; to outline an ideal of knowledge democracy without the illusion of concrete policy solutions. Gandhi’s *Hind Swaraj* offers an inspiration in 2009 as much as in 1909 for the need to revalue and legitimise peoples’ practices. India, Gandhi believed, needs not only to free itself from colonial rule, but has a responsibility to the world to liberate the West from a developmental mindset that alienates people and is deeply unsustainable. As Gandhi has suggested in 1909, we believe that citizens and civil society in 2009 can engage in *swaraj* or self-rule, and inform state processes to reinvent development. In that sense this Manifesto is not just for India, but a modest offering for all from India.

This Manifesto is written from the perspective of citizens while engaging with science and technology. In doing so we do not look too much into the past, but try to work towards a positive and innovative framework that can help provide a fresher look at India’s capabilities and responsibilities. We seek to provide the Manifesto with an earthy fragrance that brings together the ordinary majority, and with an innovative spirit that breaks the vicious cycles that many sectors have been trapped in. The Manifesto will present a vision that enthruses those stuck with modest experimentations towards

painting a wider canvas, and in that process will restore dignity to the majority who are vulnerable victims and yet potential champions of a new and sustainable knowledge society. Indian citizens are thus seen as active contributors in the knowledge society and not as mere recipients of science and technology.

The Manifesto addresses the three key dimensions of justice, sustainability and plurality. Justice is taken—not given—and conditional on democratization of governance with informed participation of all. The Manifesto’s understanding of sustainability is long term, with emphasis on universal human rights with access to food, health and education, and focus on reduction of vulnerability of the under-privileged. Recognizing plurality begins by the realization that there are multiple knowledge systems and different kinds of experts as opposed to the conventional division of experts and non-experts. The Manifesto takes cognizance of the existence of a large number of marginalized who have the capacity to significantly contribute to the development of society, including its science and technology, but are currently excluded.

This Manifesto starts by arguing for a plurality of knowledge and expertise. Then the need is argued for a new social contract on science in India—science and technology do not develop in a social vacuum. Conclusions are drawn to indicate how a *swaraj* of science and technology will yield justice, sustainability and plurality.

On plurality of expertise

Science and technology have played a crucial role in the development of India. This encompasses centuries-old traditions of agricultural, medical and architectural science, as well as recent investments in science and technology that moved India to the forefront of international modernisation in the global south and east. The latter has resulted in giving India prominence in the international scientific communities of most natural sciences, engineering and agricultural disciplines, social sciences and humanities. The expertise that these scientific and engineering practitioners have is duly recognized in Indian society and Indian policymaking and politics.

This Manifesto will argue that other forms of expertise— often pejoratively labelled as non-scientific—need to be incorporated into scientific policy making when aiming for a long-term sustainable culture and society. Without such incorporation societies will develop tensions and schisms that threaten their sustainability.

Experts versus laypersons?

The standard, modern image of expertise makes a distinction between expert and layperson, and most often equates the expert with the scientist and the layperson with someone without scientific knowledge and expertise. Increasingly this standard image of experts and expertise is producing problems. The problems partly arise because scientific knowledge proves not to be sufficient to solve societal problems, and partly because the general public does not always trust the scientists anymore, even if it continues to respect them as a matter of habit. An important reason for this erosion of trust is an increasing wedding of interests between the experts and commercial interests. This erosion of trust seems to have progressed further in the north and west than in the south and east; we will return to the specific Indian situation below, after sketching the general issue.

Knowledge from the natural and technical sciences is not sufficient to deal with societal problems because every large technological project has many aspects that are beyond the narrow confines of engineering and science. Let us consider the example of water resource management. In addition to technical aspects of design and construction, irrigation systems also have

Plurality of Indian Knowledge

Indian society has a long history of recognizing that there are spectra of expertise. The *first* instance of recognition goes centuries back to when a broad spectrum of philosophers, mathematicians, astronomers, and ayurvedic doctors built up the body of Indian knowledge. A *second* source of recognizing that expertise is not a monolithic, mono-dimensional concept is the tension between the roles of specialists versus generalists. This tension settled into Indian modern scientific culture during the colonial period and the first decades of independence. The question is who should head a government department? Sometimes a simmering dissatisfaction emerges about an IAS officer—who is a generalist—presiding over, say, the Department of Agriculture, which otherwise consists of highly qualified agricultural scientific specialists. Should we not have a really knowledgeable agricultural specialist as director of that department? Most of the time these debates conclude in favour of a generalist as director, who is expected to decide on specialist advice but is able to weigh and evaluate this advice and then take responsibility as a generalist. It was also considered that this goes with the spirit of democracy where an elected person is in overall charge. Nothing should be so esoteric that it cannot be broken down to essentials that can be understood by an intelligent generalist. There was also an anxiety that if a specialist had a final say, (s) he would tilt in favour of his/her speciality which may not be what is needed to further common good. Yes, there is a need for specialists but they need to be kept on leash by generalists who are intelligent and educated enough to keep abreast of science and technology.

agricultural aspects of matching the irrigation plan to the farming styles, social aspects that may affect relations in the villages, economic aspects that influence the distribution of the benefits, and legal aspects of ownership, compensation and regulation. The mentioned aspects call for social science or humanities expertise to supplement the natural scientific and technical. However, there are even more kinds of knowledge and expertise that need to be included—these are not scientific or scholarly, but can be labelled ‘experience-based.’ Increasingly, for example, European advisory institutions on health and medicine include representatives from patient organisations on their committees; industries involve users in their design process; and infrastructural projects consult with citizens. So, a variety of forms of knowledge—scientific, scholarly and experience-based—needs to go into the design and implementation of any large scientific-technological projects. These committees do not only exist in Europe. India has similar committees, but somehow the European ones seem to work better. If the members of Indian committees do not listen to each other as well as the members in European committees, this is probably caused by a deeply engrained standard image of expertise that creates a deep divide between scientists and non-scientists, exacerbated further by language barriers that make communication difficult in India between experts and citizens.

The second problem is that increasingly the general public does not trust scientific advice as unhesitatingly as it used to do. Citizens and consumers have more sources of knowledge, also on matters scientific and technological, than the official spokespersons of science and technology: these may come from non-governmental organisations (NGO’s), the mass media, or a variety of Internet sources. In Europe genetically modified crops and food were banned when the general public felt that some of the risks associated to GM had been underestimated or misrepresented by the scientists and the industry. At this moment there is hardly any GM food on the European shelves, and scientific statements that argue the safety of GM crops are mistrusted. The Dutch government has now concluded that to avoid a similar chain of events in nanotechnologies, other forms of knowledge and expertise need to be involved early on. Various programmes have been created in Europe and the US to tap the expertise of social scientists, philosophers of ethics, stakeholders, users and citizens in policy making about nanotechnologies and in implementation of nanotechnologies research and development programmes.

The situation in India seems different, at least for the time being. The post-independence “priesthood” of specialist engineers and scientists still seems to be held in high esteem. It is too easy to conclude that this implies that the Indian general public has an exceptionally high trust in scientists and scientific knowledge. It is also possible that the trust is primarily in institutions and in the given hierarchical order. The debates on Genetically Modified crops in India indicate how encounters between science and democracy have played out. Requests by citizen groups using the enabling Right To Information (RTI) Act for scientific information on field trials have often been denied under the pretext of citizens lacking expertise in these domains. The scientific establishment and regulatory authorities have had difficulties being independent and have often demanded scientific evidence from these groups. Nuclear power and space technology are totally different categories in India, which seem exempt from normal political or public evaluation. This Manifesto will not follow that line of reasoning: we see no reason why these or any technologies should not be subject to political, democratic governance.

This Manifesto argues for an India that uses science and technology for its own agenda; for a certain style of doing science and technology and for a science and technology policy that both transcend the dichotomy between experts and non-experts, that recognises alternative S&T domains. It will argue for using science and technology for the benefit of the people, and it will argue for including the rich variety of expertise, knowledge and experience available in Indian culture and society into that science and technology. This immediately raises the question how the non-scientific forms of expertise are given a voice; how expertise from outside the scientific establishment is given influence inside; how the “citizen” will converse with the “scientist.” The larger project of which this Manifesto forms the starting point is specifically aimed at these issues. Reviews of democratization experiences in other parts of the world, and experimentations in India with this Manifesto, will hopefully lead to making better use of the broad spectrum of expertise that exists in Indian society.

Exploring expertise

Expertise has many components and can be evaluated along many dimensions. It thus is not only about competences but also about social status. Having an English education, having a degree, and coming from a high caste and class make an Indian expert in terms of social status. Having inside expertise of a certain domain amounts to expertise in terms of competence.

Such inside expertise can come in different forms. We distinguish two forms: (1) expertise to understand and follow discussions and (2) expertise to actively contribute to the further development of the inside knowledge or to the design of a particular technology. The first is easier to acquire than the second. The first kind of expertise is typically sufficient for interaction with scientists and engineers about policy choices or about balancing risks and benefits of a specific scientific or technical development. The second kind of expertise is needed to actively contribute to the making of scientific or technical knowledge. The mistaken opinion that citizens, users, patients, or stakeholders cannot be consulted on issues scientific and technological results from confusing these two forms of expertise. Since most of the time non-scientists indeed cannot contribute to the substantive scientific work, it is erroneously assumed that neither can they interact on choices of priority, policy and ethics.

Taking the multifaceted character of modern science and technology seriously makes it inevitable to adopt the previously introduced broad view of expertise. It does not make sense to talk of “scientific expertise” per se, as was already recognized in the debate on specialists and generalists. A nuclear physicist does not have expertise in dam building and *vice versa*. The dam building engineer is in no better position when discussing a nuclear power station than any other well-informed citizen. The only sensible way to conceptualize expertise is as a spectrum of different forms of expertise. There is no ground for prioritizing the expertise of a certain domain, at least not in a general fashion. For certain questions you need expertise of physics, for others of sociology. For some questions you need expertise that can actively contribute, for other questions the expertise that allows you to interact is sufficient.

For a “scientific audit” or a peer-review assessment of a project you need contributory expertise in that specific domain. For a “social audit” such expertise would not be

enough and perhaps not even necessary. For a social audit you need a variety of interactional forms of expertise. Depending on the precise question of the social audit, you will need citizens, stakeholders, scientists, and/or engineers. And, of course, not any citizens, stakeholders, scientists, engineers; but those with the specifically required interactional expertise for that particular social audit.

From all experts we expect a form of critical self-reflection, knowing where the limits of their forms of expertise are and where and when to involve other experts.

Social dimensions of expertise

Once the need to involve other forms of expertise in policymaking on science and technology is recognized, there are more implications than merely pertaining to the set-up of advisory committees and the inclusion of citizens and stakeholders in certain fora. Some of these implications address fundamental characteristics of Indian society. It is one thing to argue for the recognition of the expertise of citizens in addition to the expertise of scientists. But what about Scheduled Castes and other radically marginalized people? who are not recognized as citizens in any practical and plain meaning of the word? These are so marginalized that they will not claim, for a considerable time to come, space to be heard unless they are encouraged to do so. The members who can speak on their behalf need to swell yet, though a good number are now ready to speak to support them.

Recognizing the spectrum of expertise implies the need to also recognize the spectrum of identities, of people; and to recognize that identities are context-dependent. One may be a physicist, or a Brahmin, or a citizen, or stakeholder—or some of them together. Caste identity, for example, implied a clear structure and guarantee of livelihood. Caste also represented a knowledge hierarchy. Social relations were clearly laid out and social movements were structured; by birth it was determined what you could and could not do. But politics of caste—in terms of questioning the hierarchies of the caste system—was not possible. This is changing to some extent, but much of these characteristics of Indian society are still in place.

Enacting expertise

The new view of expertise has far-reaching implications for the politics and management of science, technology and society. The standard image of expertise caused an externalisation of all problems, conflicts and dissent: such problems were not part of science, but belonged to the outside, non-scientific world. If something went wrong—like a chemical plant explosion or an unaccepted irrigation scheme or a lower yield of a crop than promised—this was due to bad management, wrong political decisions, or unprofitable market conditions. With the new view of expertise the blame cannot be diverted so easily anymore. When things go wrong now, more fundamental characteristics of society, knowledge and technology need to be addressed. The cosmology of how we see the world in relation to fundamental sense-giving views will inevitably come into play: one cannot, for example, ignore the deeply religious character of Indian society, even though it combines with a secular consumerism of the middle class.

The different forms of expertise affect all stages of scientific and technological development. This is evident and already discussed in the stages of production, implementation and evaluation of scientific and technological knowledge and design. But an earlier stage is at least as important: the stage of problem definition. A problem is not intrinsically and *a priori* technical or economic or scientific or political. During the stage of problem definition the problem is given its key characteristics, depending on how the relevant forms of expertise play out. And once a problem has received its main characteristics, these will also determine which kinds of expertise can claim to contribute. Examples abound of how civil society groups have reconstituted expertise and continue to offer informed choices to communities in areas such as sustainable agriculture, water and energy.

Implications of this new view of expertise

Accepting this new view on expertise has far-reaching implications for an Indian science and technology Manifesto.

The first issue is to recognize that science and technology play crucial roles in relation to violence and inequity. They cause violence and inequity—sometimes as the result of strategic use of power? to oppress the less powerful and to control the marginalized, sometimes as unintended side-effects, and sometimes as inevitable consequences of the very character of that science and technology. Science and technology are also called upon to harness violence, to provide alternate forms of non-violent intervention, and to redress inequity and lack of justice.

Recognizing not only the existence of a broad spectrum of expertise, but also the roles of science and technology in mitigating violence and inequity, the next question then is: which societal arrangements are needed to make science and technology relevant for the development of India. How is the ownership and management of resources related to commercial markets and democratic governance? To secure a balanced and adequate input of all relevant forms of expertise, new regulatory frameworks need to be developed. In the current dominance of regulatory liberalism and market economy, the state seems to be on retreat. This leaves a gap in balancing the various interests and stakes—a gap that often is occupied by private corporations. New institutional frameworks should better guarantee a balanced input of all forms of relevant expertise. Such new institutional frameworks will also pay explicit attention to ethical issues, and in a broader and more explicitly political sense than mere research ethics or medical ethics.

In this section only the plea for citizens' participation in the regular science and technology process was explicated. This, however, is only a first step towards a recognition of the plurality of knowledge systems and the implications for justice and sustainability. The next section will make this next step in the argument and outline need for a new form of knowledge democracy.

Towards a new social contract of science in India

Science policies in India in the past, irrespective of the government in power, have predominantly seen the contract of science with society as the remit of the experts, or a domain where the 'scientific elite' have sought to vision the future of science and technology for development. This elite is narrowly constituted in a formally democratic society, and science and technology policies have often been out of sync with the rest of the sectors, so much so that the elite is not representative of even the large scientific manpower such as that India has. The only experiment with a participatory process of informing science and technology planning involving over 2000 scientists, the National Council for Science and Technology (NCST) Plan as part of India's Fifth Five Year Plan (1974-79) was short-lived and not completely seen through. The absence of democratic discussions on science and technology is an aberration post-independence and needs to be re-examined, considering that Indian debates on science and technology were rich throughout the Indian National Movement to provide grist for even a few decades thereafter.

We believe that there is a need for fresh thinking on science's contract with society in India by re-examining and reversing the engagement of science with society. How can India draw upon its rich and diverse traditions of understanding this contract between science and society, both from within and outside the scientific establishment? This requires openness to critiques of science (from scientists, social scientists, citizens, activists, ...)—not to demonize science and technology but to inform future practice and engage with these critiques. Specifically the relation between science, violence and inequity on the one hand and science and social movements in India on the other can be examined as a rich source of lessons.

Science, (non-)violence, and knowledge democracy

Hind Swaraj was a manifesto that aimed to promote love and non-violence. It was no naive call for peace but based on a deep understanding and even personal experience of violence and its origins by Gandhi in Europe, South Africa and India. This fundamental understanding needs updating since Gandhi's times as societies have enhanced the capacity for violence manifold, which has become scientific and collective as well. There is an obvious, banal, monolithic and technocratic side to violence in the form of war and genocide; but violence also appears in an unexpected everydayness. Genocide today is no longer confined to the holocaust camps, but also to the realms of development, globalisation, modernity, progress, and disasters: every large-scale innovation has its underside in obsolescence, triage, waste and erasure. Knowledge societies like those in India, which have a continuing tradition of several indigenous knowledge systems, have to contend with the underside where science and technology could also lead to large-scale obsolescence because of market, corporatisation, or a technocratic roll-out of techno-scientific master plans. Yet, given the new science of complexity and climate change and its implications, these very 'obsolete' knowledge systems have the ideas and hopes of human survival. We believe that answers need to be open-sourced—not just from modern science

and technology, but produced in knowledge dialogues with these hitherto 'defeated' knowledge systems that the sub-altern has a unique way of keeping in memory.

Recognising violence in science and the scientific method is not to vilify science but to suggest that science needs a theory of culture in which it should be located. The violence of science begins when science becomes separated from culture. It was Ananda Coomaraswamy who during the debates of the national movements articulated the opposite point of view when he claimed that a proletarian is a man who is disconnected from his culture. Once culture reconnects to science we retrieve its complexity, its sustainability, its playfulness from the reductionism fetishized by years of state politics and industrialisation.

The violence of science is carried through a network of key notions. These include the idea of rationalisation and rationality; the idea of progress and the notions of time that accompany it; a method's violence, especially when the experiment is on the other or on another people; the idea of science as a movement of victorious gestalts that leaves no place for defeated knowledge systems; a mono-logic notion of knowledge that regards other forms of knowledge as non-knowledge and locks them away in a museum; and finally the notion of a progressive science that has no place for mourning as it echoes the social Darwinian rhetoric of the survival of the fittest. What is presented here as a list, sadly becomes a litany and a dirge for other cultures that failed to cope with the hegemony of modern western science. The political project of democracy is clear: democratisation of institutions without the democratisation of knowledge is futile. Here again the insights of Gandhi merit attention—both in understanding the violence in the scientific method and in working out alternative scientific imaginations through his work on khadi and village industries. The All India Spinners Association (AISA) and its sister All India Village Industries Association (AIVIA) need to be seen as experiments in creating alternative institutions of science, democracy and culture, and not just as economic experiments or as vehicles for India's freedom.

Science in India needs to be seen as a site for various struggles. We need to challenge the opposition of crowd and expert, and renew the idea of the citizen as a person of knowledge. By reworking the idea of the citizen as possessing a repertoire of knowledge, the secluded spaces into which modern knowledge has condemned the nomad, the tribal and the informal economy are opened up. This will liberate and enable their craft consciousness as a domain of survival, their improvisation of tacit knowledge, their ecologies of memory and technology that science today only recognises as ethno-science. By understanding the logics of these other knowledge systems we pluralise the logic of science and technology. It demonstrates that the rationality of game theory could not have survived without the playfulness of the make-do, the muddling through, and the bricoleur.

Time becomes the next site of progress. Both history and progress have become deeply problematic for a nation state that is deeply committed to industrialisation. Development, as Mahashweta Devi once said, becomes the rape of the countryside justified in the name of history. To pluralise time is to pluralise the possibilities of life and living for cultures that do not follow modernity calendars. If time becomes unilinear and historical, the tribe might remain only as oral memory and the craft may only survive as an archive. The challenge here is mutual and reciprocal. The poetics of modern science lies in the multiplicity of time that it offers. The sadness is that the prose of policy may not accept this opportunity.

The brutality of scientific violence goes beyond face-to-face violence. It might impinge on the body but the long-term violence lies in the logic of its world-views and its concepts. This Manifesto proposes a reverse anthropology where the world-views that were destroyed or museumised by science can re-enter into a dialogue. The violence of science is in its being the vehicle of the nation-state. The future of science may lie in allowing alternative civilisation metaphors to domesticate it. And it is just not a question of civilisation—other alternative imaginations are equally necessary. Science and technology have erected the myth of masculinity and of an impersonal machismo. To rephrase a UNESCO manifesto, since wars began in the minds of men the defences of peace must be reconstructed in the minds of women and children.

Social institutions and science in India

Ever since the rise of the nation-state in India, the social has been dominated by state, bureaucracy and partisan unions. There were a whole set of issues that never got articulated and innumerable voices of protest which were ignored or never heard. Democracy as an imagination was caught in a grid of institutions which produced the same predictable voices at election times.

The struggles of Telangana, Naxalbari, North-East and even the peaceful efforts of Bhoodan in the first few decades after independence reflected what was deeply wrong with the body politic. It was very clear that we had elected a state that was ready to battle its own people. The social contract we had created was one where the nation state was committed to science, security and (technological and economic models of) development. India had created more refugees from development than from all the wars we had fought. By the 1980s, we had one million troops of para-military control for the maintenance of internal order. According to the distinguished psychologist Ashis Nandy, there were about 23 million Indians toying with dreams of seceding at any point of time.

It was at this moment, almost as an act outside history and political scripts, that communities in India mushroomed into an effervescence of cephalous movements. History does not record all of them as subaltern expressions.

A Spring of Creative Movements

History has not recorded all movements that sprang up in India in the 1970's and 1980's offering alternative imaginations to mainstream politics, science, technology and development. But one can immediately recollect the movement against the IRMBs (Intermediate Range Ballistic Missiles) in Balliupal, the forest and ecological movements of CHIPKO in the Himalayas and APPIKO in the Western Ghats, the struggles against development at Koel-Karo, the anti-nuclear struggles at Rawat Bhata. Apart from the explosions at the community level, this period also saw the rise of NGO's—not as extension counters of the state but as separate voices of political protest. One thinks in particular of the PUCL (People's Union for Civil Liberties), and of the varieties of Science movements, the KSSP (Kerala Sastra Sahitya Parishad) and the PSMs (People's Science Movements), PPST (Patriotic and People Oriented Science and Technology), the various voices of the non-party political process articulated by groups like the Lokayan. Political movements like Navnirman in Gujarat and the JP-inspired students' movement in Bihar, the Dalit movements struggling against systemic inequality and dovetailing into the formal political process.

This roll-call of political struggles collectively made three separate arguments. First, the party, the union and the electoral process could no longer exhaust the possibilities of the political or might not even be called genuinely 'political'. Second, while Gandhian struggles might have ended, these social movements attempted to invent new traditions of Swaraj. Third, it pluralized the world constructed between the real presence of the naxalite movements and the nostalgia of the Gandhian movements. The social movements not only tried to bring in the new subaltern voices but also highlighted the variety of alternatives not available to the technocratic imagination of the state.

The fate of these movements has to be understood at two levels. First in terms of the reaction of the state and second in terms of the memory and nostalgia they still inspire. As an example, one can consider three separate struggles. First the fisher folk struggles in Kerala, secondly the anti-dam movement, and thirdly the struggle of the survivors of Bhopal. The fisher folk's struggle, which initially began as a battle between traditional fishermen and motorised trawlers, raised the inability of the movement to look at exploitation and suffering outside the leftist definition of struggle. As a world-view the fisher people's struggle, partly because it was led by dissenting Jesuits, had a world-view close to liberation theology. Starting as a set of local contestations, it became the most globalised of struggles articulating the role of marginal fisher people everywhere. But eventually what began as a movement narrowed into a methodology where the emphasis was on green fishing and ecological standards and not a search for equality and justice. The Narmada struggle was once again defeated on the ground; the Supreme Court has in fact ruled that the dam was an 'outstanding example of sustainable development.' The impact of Narmada despite the attempt to forge a wider anti-development umbrella of alliances was once again global. All it leaves behind are the reports on the world commission on dams and the confusion between those who fought against displacement and those who argued for compensation and rehabilitation. The Indian state and its middle-class still dream of energy based on coal, atomic energy and hydro-electricity. The struggle in Bhopal could also not assure genuine rehabilitation or any sense of justice. The final compensation was, at least initially, roughly equivalent to Union Carbide's insurance for such matters. UC was also able to waive any charge of criminal neglect.

The promise of the movements ironically lies in their performance. But their real contribution was not to the politics of civil society but to the politics of knowledge. The NGO's showed the insufficiency of technical and natural sciences. They emphasised the importance of design and construction, of technology itself as a cultural style; the importance of considering technology as socio-cultural system; and the need for a cost-benefit analysis that goes beyond technical assessments to the wider requirements of justice and sustainability. They called for a world-view where a humanistic and social science imagination would supplement a technocratic world-view. They demanded a world that would pluralize science as understood and practised, resulting in a diversity of knowledge systems that were both knowledge-based and experiential. They also demanded an emphasis both on participation and representation and a systemic connection to health, education and ecology, connecting tradition and future. All these movements were not merely local struggles but cosmopolitan at the same time. They connected the worlds of subsistence and sustainability much before the Brundtland report. Unfortunately, they were caught by the twin processes of globalisation and liberalisation. The liberalisation gave the state an excuse to withdraw from key

responsibilities in the market within India, while globalisation undermined its regulatory role from without. The NGO's as dissidents suddenly did not have a credible opponent to argue against, but neither had a positive alternative ready.

Two events highlight the failure of this imagination as an alternative form of citizenship which could add to the logic of the Constitution. First Gujarat and second Singur. Singur captured how a political party brutalised a countryside in the name of the people. It could emasculate all existing social institutions in a mock display of just development. And at the same time use the official language of ideology to suppress dissent and freedom of the citizen. The irony was that one form of totalitarianism was upstaged by another while the corporate houses saw them on the same indifference curve. The problem was that both media and the general will saw it as a part of the process of democratisation. The transparency that was lost in the articulation of the contract generate a debt that the future generations will have to pay. The corporation concerned does not begin its debt payment in the first two decades of production. One point ignored in the general rhetoric is the overall neglect that the state of Bengal has been subject to. The sadness is that the current framework of politics was unable to articulate the variety of voices that joined the Singur struggle.

Gujarat compounds one's fears of the upstaging of democracy by development. The silence of the NGO's and the social movements is loudest here despite the fact that Gujarat has probably the highest density of NGO's for development. The need for urbanisation, globalization, and the strange sanctity of progress in each of these places shows that the victim of violence—whether of riot or development—is not a part of the stakeholder globalisation. The defeat of the NGO's and the social movements is clearest here. What could have added justice, diversity and democracy stands impotent and silenced. The politics of praxis that the NGO's have reinvented has now separated theory and practice, banalising the politics of politics.

This Manifesto proposes to forge a new social contract between Indian science and society. Only with such a new social contract we can hope for a socialisation of research and technology as called for by the larger project. As was argued in this section, a broad notion of the social needs to be rooted in a politics of alternate imaginations. Dissenting views, rather than being silenced or ignored, need to be engaged with in a dialogue aiming at a greater democratisation of science. Carrying out this challenge not only needs a new expertise on science, technology and society, but a fundamental reworking of the very idea of expertise as elaborated in the first section.

Sustainability, plurality and justice

Scientists, policy makers and citizens need to renew their responsibility in decision-making about India and the role for science and technology in its further development. A new social contract between science and society will take into account the marginalised people who have not benefited and in fact suffered from science and technology. Examples were discussed in the previous section where science and technology have unthinkingly caused violence and inequity and amplified existing inequities to people who continuously are at the receiving end of science. This Manifesto argues for learning from India's own history, from the strength of its local institutions and dissenting science movements.

What should be the implications of a new social contract? How to move forward? Which role for science and technology in shaping the future of India? Firstly, an understanding of sustainability is needed that goes beyond functionality by including diverse forms of subsistence and survival. Secondly, a democratic politics of science and technology is needed that understands how a society becomes unduly vulnerable when it does not celebrate its plurality of knowledge systems. We imagine new citizens who carry within themselves the confidence of identity and of diverse forms of expertise, craft and knowledge. Thirdly, this Manifesto makes a plea for cognitive justice—for a justice that builds on and gives shape to knowledge democracy.

Re-defining sustainability

The world today is facing multi-faceted crises: a resource crisis, a climate crisis, an institutional crisis, and an economic-financial crisis. Speaking from the margins of this crisis, this Manifesto urges the new commons to turn these crises into opportunities. It is time to re-visit our definition of sustainability to include survival and subsistence. A new conception of sustainability will plan for everyone's needs and for strengthening local institutions. This reconceptualisation will question the blind faith in technocratic institutions and the dominantly financial criteria to evaluate sustainability.

When talking of growth or scale, sustainability is seen as a function of productivity and efficiency. It is a reductive term that does not challenge market economics and which sees nature as a resource to be exploited. This Manifesto proposes that for a society to be sustainable in the long term, the concept of sustainability needs to be broadened by looking at nature as having agency of its own, by going beyond industrial factory time, and by incorporating diversity. Societies that traverse linearly through time have different realities along a time line. In India such realities exist alongside each other. The linear time line splits into multiple realities that exist simultaneously. The reality of that part of society that benefits from science and from the "progress" it offers exists parallel to the reality of other groups of people who are marginalized and excluded from this "progress."

New notions of sustainability that redefine livelihood force us to define the problem of our society's margins differently. People living in the margins, pushed away from mainstream discourses, emerge with strength from this re-definition. What do we learn from our

margins when we recognize how large they are? In what way do our margins survive? Can we use science to benefit marginalised people and to stop creating new forms of violence and exclusion? To be sustainable is thus to have a theory of non-violence.

To see how science and technology can help to re-define sustainability, the question of energy, which has been central to so much scientific enquiry as well as social developmental policies, can offer an example (see also the text box below). Science and technology are pre-occupied with the large electricity systems, with fuels, and with production and distribution. Electricity companies largely work from a supply perspective, catering to economic needs that are easy to quantify. A more decentralized perspective that looks at use in the context of social needs will necessarily include long-term benefits to balance the older notions of economics. As opposed to the current supply-centric growth-oriented paradigm, an alternative perspective would advocate an end-use centric, development-oriented paradigm. Prevention and end-use efficiency are central criteria, rather than cure and consumption. Promoting equity and democratic institutions then necessarily becomes high priority and education should support initiatives to achieve these goals. Such a perspective would work simultaneously towards catalyzing a societal transformation.

Plurality and democracy: experiments from civil society

When acknowledged that there are different kinds of experts, the next step is to aim for a plurality of knowledge—plurality is an engagement across differences. When we include notions of survival and economy of subsistence into sustainability, we recognize plurality in ways of living and knowing such as in the existence of craft and tribal communities. When we understand multiple oppositional realities—of rural and urban, of agricultural and industrial, of traditional and modern—which truncate large sections of our society into the margins, we can re-examine the linear notion of time and recognize the parallel realities that this Manifesto wants to celebrate.

But what benefits are to be expected from the co-existence of diverse realities that seem to exclude each other? Whether through traditional occupational and social classifications such as caste, or through more modern segmentations through class and scale—differences exists in our society. Every society has a structure through which it defines an optimum scale and builds a logic of governance. Traditionally the caste system worked on socio-economic transactions, with no space to negotiate the political. One was borne into a lifestyle, or an occupational choice, and the structure and hierarchies enforced by these became the foundations for Indian society. Any movement out of this structure became impossible and thus oppressive to some. The modern state tries to address this imbalance through giving equal political rights to every citizen. But how can Indian society ensure this equality, given the diversity that exists within it?

To define equality without falling into a bland language of homogeneity, a new language is needed of heterogeneity and differences. Is it possible to move beyond a slogan of “unity in diversity” that makes the Indian plural identity disappear? What is being different: diverse, or alternative, or dissenting? Diversity can come from isolation of ways of living and across geographies. When these alternatives engage with each other in a modern context, this will typically happen within some kind of constitutional spaces in which secularism facilitates their interaction through erasing their identities.

No Identity without Recognising the Aesthetic

If foot-loose technologies forget in their globally migratory trajectories that their concentration gets directed towards the maximum gratification of senses within an 'instant order' time, they mount, without knowing it for themselves, an assault on the ability of the senses to seek pleasure, something that the Greek language called 'aesthesia', and that which forms the very basis of aesthetics. In their ability to provide instant relief from pain, within the biological and psychological regime of 'anaesthetics', the technologies proving the 'instant time order' solutions to the experiential challenges hamper and stunt the aesthetic instincts of a society. The Manifesto shall look at the question of the responsibility of science and technology towards the erosion of the aesthetic implicit in the logical visions of the world and rational versions of truth.

Does science create alternatives; does it allow for cultural alternatives? When tribals in Narmada valley are displaced in the name of scientific and technological development and are offered work in the factories, can this offer be considered a cultural alternative? When cultures built during centuries are destroyed for someone else's irrigation and electricity, as in the case of displacement of communities living close to the river, this seems more a case of denying plurality than creating alternatives. For a society to be sustainable it is imperative that people participate in the choices that will impact them, and that there is recognition of knowledge plurality. A plurality of knowledge and craft is the best guarantee that there will always be alternative solutions available in a society. Democracy as a theory gives voice and as a practice it allows for participation; but it is still incomplete if it does not allow for alternatives that challenge the status quo and celebrate the margins.

Cognitive justice

There have been various dissenting peoples' movements in recent history that challenged science policy. These asked for reform and change against the violence that dominant forms of knowledge and politics cause to other forms of knowledge and science. These dissenting movements were strongest where the survival of a marginalized few was being eschewed for the sustainability of the greater common good. Does science as it is being practised today allow for different ways of knowing to co-exist? Can science become more tolerant to allow for plurality of ways of knowing? Can science reflect at the violence it engenders and amplifies by creating a dominant paradigm that marginalizes people through centralizing of wealth and resources, while privileging its own ways of knowing over other so-called "non-scientific" forms of knowledge? What are the implications of this Manifesto's plea for plurality for today's science policy? If we have to reduce the vulnerability of our technological choices, it can only be done with a multiplicity of expressions that exist on an equal basis, valued by Indian society for their contribution to reduce the risks of the dominant paradigm over time.

It is this diversity of scientific imaginations that Indian knowledge society needs to take seriously. Such diversity has been made possible by the co-existence of plural knowledge systems in health, textiles and many other sectors in India. Rather than mimicking ideas of universalistic science, Indian scientists need to recognise and be empowered to

engage with plurality, in order to create and celebrate the diversity of knowledge based on a nuanced understanding of expertise outlined in the first section of this Manifesto.

Taking such knowledge democracy seriously implies a new form of justice—cognitive justice. Cognitive justice recognizes the right of different forms of knowledge to co-exist but adds that this plurality goes beyond tolerance or liberalism to an active recognition of the need for diversity. It demands recognition of knowledge: not just as method but as culture and a way of life. This presupposes everything this Manifesto has argued for: that we need a pluralistic view of expertise, of science and technology, of knowledge and craft; that we recognize that knowledge is embedded in culture, that every knowledge has its own cosmology; that we need a new social contract between science and Indian society to own up to India’s rich plurality of parallel knowledge systems; that we need new engagement of civil society to build a social democracy with the knowledge democracy. The plurality that cognitive justice presupposes and builds on demands the diversity of time that this Manifesto mentioned previously. Current citizenship is built on the instant time of global financial markets and local industrial manufacturing plants; other varieties of time such as tribal time, body time, festival time need their place on the timetables of new citizenship to allow for cognitive justice.

Technoscience, ethics, politics, and expertise

It would be a strange juxtaposition that science surrounds itself with immaculate innocence while technology holds the burden of guilt, irresponsibility and irony. The modern praxis demands a new integration of science and technology and a nuanced harmony of theory and practice that goes beyond the current integration of the innovation chain and technology transfer. Hence the concept of technoscience has been used. Techno-science is a hybrid entity. Being a hybrid, it is quite different from technology and from science as we normally conceive of these. Yet, techno-science is constitutive of technology and science.

One of the key exemplifications of technoscience has been the increased interaction, if not a seamless transition, between the spaces occupied by science and technology. This is clear in the industry-university relation. Values and norms of industry and academia are changing as a result of actors moving from one space to the other and back. That different sets of norms are emerging is not disputed; what new norms are replacing the old ones and whether that is desirable *is* an issue for dispute. One example of this is the evolution of the IPR norms and the accompanying discussions.

An efficient system may be construed as a supply-side desideratum. An efficient system is a system that is technically and/or economically efficient. The demand side—the people who “receive” the system and its output—is inadequately represented in the construal of the efficiency. The best form of representation at the demand side (or user side, or societal side) resides in utilitarian calculations and arguments, often provided by the supply side. The standard argument then becomes that the system’s output serves the greatest good to the greatest number.

A Gandhian response to this is that such utilitarian ethics may not be the best way. Remembering Gandhi’s talisman for pursuing any activity—that the activity should ameliorate the condition of the weakest and the most needy individual—the utilitarian view becomes ethically in disputation. Remember Gandhi’s critique in *Hind Swaraj* of railways, hospitals, and law qua profession. Gandhi’s point was that all these institutions may help some, but may also create the possibility and increase the probability of wrongdoing. And this was unacceptable to Gandhi.

Energy Swaraj

The quest for Energy Swaraj could begin by revisiting the pioneering work of Prof. Amulya KN Reddy and others on energy for sustainable development. The other members are: Jose Goldemberg from Brazil, Thomas B Johansson from Sweden and Robert H Williams from USA. In the mid 1990's, they advocated a paradigm shift in energy from the current GROSSCON (Growth Oriented Supply Sided Consumption directed) paradigm to the DEFENDUS (Development Focused End Use oriented Service directed) paradigm. They had attributed seven sins to GROSSCON: unwise – consumption emphasis; unfair – bypasses the poor; unclear – non transparent; un-frugal – ignores efficiency improvement; unbalanced – has supply emphasis; uneconomic – has an exorbitant capital requirement; and unsustainable – has negative environmental and societal impact.

This could indeed be a starting point, but the framework needs to be modified in today's context that is marked by high impact of liberalisation-privatisation-globalisation policies, increasing neglect of the poor, weakened institutions and the impending fuel - climate crisis. The approach would have an integrated resource planning approach which maximises the area of intersection of the three E's, the key aspects of the catalysing role of energy – Economic growth (support income generating activities, increase purchasing power), Equity (explicit focus on access, targeting of subsidy, fairness in quality of service) and Environmental sustainability (internalising environmental and livelihood impacts, promoting end use efficiency & renewable energy sources, ensuring climate justice). The approach will mark a shift from the current approach, which largely has a short-term focus on the energy utilities (minimising cost and maximising profits) to that with a long-term focus on all actors - energy utilities, consumers and society (minimising costs and maximising benefits).

What would be the components of Energy Swaraj? Swaraj, or self-rule, has to address the concerns of the majority. This implies emphasis not just on energy service and energy supply, but also on the process of decision making and energy governance. Hence they are covered under three broad heads: energy service, energy supply and energy governance.

a) Energy service

- Energy *service* is the key, not energy *supply* as an end in itself. Identify the major energy service that has a transforming impact on the majority and focus on improving it: for example, in countries like India, it is cooking, drinking water pumping, irrigation pumping etc.
- First priority to provide the energy service to meet the basic social needs (household lighting, cooking, community drinking water supply etc), which may require small in quantities of energy, but would result in a significant improvement in the quality of life for the poor.
- Next priority to meet the economic needs (irrigation pumping, cottage industry etc), which enhance the purchasing power and help overcome factors which keep people poor
- Research, development and field implementation to improve end use efficiency. For centralised systems, one unit of energy saved is equivalent to one and a half units of energy generated

b) Energy supply

- Internalise livelihood, social and environmental impacts while planning large centralised conventional energy supply options (coal, gas, large hydro, nuclear). In a similar fashion, internalise the positive socio-economic impacts of decentralised systems, while planning
- Ensure equal treatment to centralised and de-centralised systems, which would result in much higher allocation of resources to decentralised systems
- Promote renewable to the maximum extent - solar, wind, small hydro, bio-mass etc

c) Energy governance

- Democratise planning, implementation and monitoring of energy systems, with informed participation of the majority
- Internalise and strengthen the linkages to other aspects – including livelihood issues, fuel & climate constraints as well as the gender dimensions of energy
- In the context of withdrawal of the State and increasing role of de-centralised energy systems, strengthen participatory regulatory mechanisms at National, State and Local levels
- Collaborate with pro-public interest groups not just in India and other countries to improve the praxis – linkage of theory, production and practice

Towards a science policy by and for the Indian People

The high profile 'India everywhere' campaign at the Davos economic summit of 2006, the recent launch of *Chandrayaan* (India's mission to the moon), the recognition that India has the second largest consumer market in the world and that it has more degree-holders than the population of France—these are all indicators of India's scientific and technological prowess. This celebration, however, is tempered by the embarrassing Human Development Indicators of India and the evident disconnect of large sections of the Indian population with science and technology. What do the Indian people get from science and technology? What are their priorities? Do the policy makers of today have the capability and patience to engage in a dialogue with citizens to find answers to this? Should Indian people only be seen as passive recipients of the "blessings" of science and technology; be grateful for its short term mercies; silently bear the damages it inflicts in the name of social development?

This Manifesto posits a new social contract between science and India as a critical touchstone to guide the use of science and technology for the development of India in the 21st century, for the reinvention of a true democracy built on knowledge democracy and cognitive justice. This Manifesto is not written by or for the scientific establishment, nor even by scientists on their social responsibility, but it is written on behalf of citizens, arguing for opening up the science and technology processes in India to enable citizens democratically engage with science, technology, knowledge, craft, identity and culture.

This manifesto needs to be translated into a science and technology policy by and for the Indian people. Some elaboration of this is expected through pilot studies in specific sectors in the coming year but more broadly the manifesto needs to be seen as a dynamic thought process, owned by all who contribute to its quality – it will be a Common Property Resource to be left in the public domain.

Elements of a science and technology policy

This Manifesto is not anti -science or anti -technology, but it does imply a change of the dominant paradigms of science and technology and it challenges liberal democracy by using a language of swaraj and self reliance of the Indian people leading to a fundamental renewal of societal institutions and the role of knowledge therein.

The change of paradigms calls for innovative ways of celebrating the rich variety of parallel knowledge cultures in India and of renewing the relevance of "traditional" knowledge and craft. The inevitable consequence is that space will be given—within this science and technology policy!—to religion and multiple cultural identities.

Ethical dilemmas now reappear in new form. Whether intellectual property rights, patients' consent, or the ethics of displacing people for the common good—how can we include the Gandhian option of non-violence in the gamut of strategies that

technosciences employ for the development of the world? Sustainability takes the form of inter-generational and cultural trusteeship, making the original Gandhian trusteeship concept contemporary.

A new science and technology policy needs to be as down-to-earth and rooted in the Indian experience as this Manifesto is. That implies the need for a transparent discussion of the economies of science and technology. Globalisation exists, but it is also continuously remade by the accumulated efforts of a multitude of actors, individual and institutional. Economic and financial relations are important, and sometimes even violent, but not unchangeable. A new Indian policy for science and technology will aspire to quality rather than to quantity, and will invest in infrastructure and process rather than events and products. For instance prevention and service delivery will be prioritised in health care; and value and self-esteem become central goals of education, rather than producing a willing and unreflective work-force in deceptively value-neutral institutions.

Elements of a people's policy

At least as important as a science and technology *policy* for India, is the *self-rule* by Indian people of their science and technology. That not only implies an effort to think from the perspectives of the peoples of India when drafting the policy document, but also an effort to create the necessary accompanying measures by reinventing Indian democracy and its social institutions. The challenge is to dream beyond the boundaries of state politics.

Taking seriously the arguments in this Manifesto reinstalls the citizen as an expert, as an inventor. It not only reinstalls the richness of parallel knowledge systems, but also celebrates the morality of the weak and marginalised. It challenges the current moral base of science and technology as validated by the state, which creates second-class citizens without rights to their way of life and knowledge cultures. A new science and technology policy for and by the people needs cognitive justice. It gives, following Gandhi, an identity of strength to the weak.

This Manifesto set out to rewrite *Hind Swaraj* and explore the meaning of Indian self-rule of its science and technology. As Gandhi reinvented Europe while outlining an independent India in *Hind Swaraj*, this Manifesto argues for reinventing science and technology into a plurality of knowledges and crafts to create cognitive justice and a sustainable future for India and its people.

