Common Voices

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Understanding Openness and Battling Simony

Public Debate on Nanotechnologies

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Cover Illustration:
Adapted from: Rene Descartes’ *Treatise of Man* (1664); “Pursuit of Knowledge Under Difficulties” by Alfred Wordsworth Thompson; illustrations on the Pioneer Plaque; and a picture of wild rice.

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Some debates never give up their ghost. Ideas related to ‘knowledge’ for instance command a high premium in rhetorical, philosophical and political realms and are deliciously evergreen in their appeal, both to the lay and the expert intellectual. We too happily succumbed to the temptation to revisit, discover, represent and share with our readers ideas of knowledge through a fascinating collection of articles.

The most exhilarating aspect of producing this issue has been the difficulty in setting limits to what exactly we could cover. Discarding the earlier approach was the only way to do it. Rather than describing this issue of Common Voices as one that focused on ‘knowledge commons’ or on ‘new commons’, we invited articles on a diverse range of subjects linked to knowledge, technology and governance to see what bearing their views held for an audience interested in the commons. What would be the relevance of highlighting these views and debates? One needs only to contrast these articles with the official view on knowledge. India’s Knowledge Commission and its reports are attempts to live up to our putative obsession with knowledge as a nation. These official policy documents spring forth from a rigid foundation of ideas that assess the knowledge stock of the nation with progress in the field of high science—which deifies the educational edifice, and more importantly the privileges, of the physical sciences over other disciplines of knowledge.

Setting aside the quest for a universal truth within the debates on knowledge, the articles in this issue challenge the notion that one form of knowledge alone will enable progress in that quest. Social scientist, columnist and science critic, Shiv Visvanathan, whose article on the logic of knowledge commons inaugurates this issue of Common Voices, likens the official reports of the Knowledge Commission as proof of this nation’s burden—its responsibility to inject (‘as in a vaccine’) a move towards a knowledge economy rather than a knowledge society. He draws us towards a ‘self-reflexive epistemology of knowledge’ and emphasises the appreciation of cognitive justice as a guiding principle—a concept which helps enliven pallid ideas of development and poses a challenge to obsolescence of various knowledge systems. He stresses the need for a new imagination of democracy through embracing a political epistemology of knowledge.

The Internet has turned many ideas related to controls over information and knowledge generation upside down. In his article, David’s Bollier traces the history of knowledge control and access—from the idea of copyrights as benefiting creativity to the present day tensions caused by an abuse of copyrights by content owners. Bollier’s Great value shift speaks of the resistance to copyright, the emergence of open access platforms and the eventual values that such forms of knowledge creation offers for groups such as cybercitizens. We also feature in this issue, other non-digital steps towards a democratisation and socialisation of knowledge and science. The ideas contained in Visvanathan’s article find resonance in the SET-DEV project’s attempts towards producing an Indian Manifesto for Knowledge Swaraj.

The idea of progress has often meant embracing a shift or a change. Technology and innovation are seen as facilitating such change often towards effecting widespread policy shifts. Harro Maat warns us of the dangers of ‘gazing towards the top’—of mirroring our understanding of progress as embracing advanced technologies and engaging with ‘higher level politics’. His analysis of the promotion of the System of Rice Intensification (SRI) in India helps us question the value of ‘change’ as a positive outcome.
The series of articles in this issue are not arguments against science but come as a collective effort to recognise the value of a plurality of knowledge and a call for its democratisation. Wiebe Bijker gives us a glimpse of his experiences with such a democratisation initiative in The Netherlands. He outlines the engagement of the Societal Dialogue on Nanotechnologies and its engagement with the public—hitherto seen merely as people fearing science. The Netherlands experience with public debates on nanotechnologies provides an interesting contrast to the events unfolding in other countries over public dissent on matters of energy security, nuclear power and even health choices.

The hierarchies in science and technology are reflective of what is considered valid and invalid knowledge. The values embedded in these hierarchies are not necessarily holistic or fair assessments. Pankaj Sekhsaria’s article on jugaad highlights a form of commons familiar to many Indians, shedding light on its criticality not just in daily life but also in very sophisticated science. The dismissal of such commons renders us poorer in our judgement of human ingenuity. The idea of jugaad as a commons perfectly resonates with the characteristics of mutability and dynamism in Visvanathan’s logic.

A criticism of the official approaches for the promotion of knowledge is the absolute emphasis towards facilitating the knowledge-based economy rather than facilitating the development of richer knowledges. Doing so ignores the freedoms that pluralistic knowledge forms can entitle us to. Lawrence Liang’s paper takes us beyond the dangers of knowledge commercialisation to the perils of intellectual property taking root in academia. The sense of freedom and the spirit of collegiality are not limited to the academic field alone, and Liang’s suggestion that a loss in these areas spells serious trouble for the very generation of knowledge rings true for all commons.

As a converse to the freedoms it generates, our final article looks at the controls over knowledge systems and institutions. Drawing from the experience of interactions between people, technologies and institutions in the formation of ‘supersystems’—best described as ‘sociotechnical’, the article by Ravi Shukla gives us a peek into what happens when a shift in the controls over these systems takes place. Playing with the idea of using centralised state generated databases as digital commons, Shukla elaborates on his idea of harnessing databases such as the Universal Identification (UID) scheme into democratic digital commons, allowing us to revisit notions of identity and processes of empowerment.

We welcome your feedback and hope you enjoy this issue of Common Voices.
The Logic of Knowledge Commons

Shiv Visvanathan

Shiv Visvanathan is a social science nomad.
There is something about words that is magical. No word exhausts its possibilities in terms of current definitions. There is always the humus of future possibilities present in irony, ambiguity, jokes and the availability of new contexts. Etymology becomes the mark of the origin of the word. It says little about its promise or its future inventiveness. One such word is the commons.

The idea of the commons goes back to areas around the village which allowed for general access. The commons was a space, a place where a subsistence society could find that little vision of surplus in terms of food, fodder, medicines and raw materials for housing. A commons could be a pond, an ocean, a forest, even a bit of grazing land. It was a place of common access and common control. Its grammar was different as it operated according to community logic and not the norms of industrialism or the market. The commons as a rule game defied enclosure and the market. Viewed materially, the commons provided that bundle of resources that made subsistence a more flexible game. One of the great tributes to the idea and functioning of the commons came from the great Scottish biologist and sociologist, Patrick Geddes, who observed that if Karl Marx had understood better the idea of the commons, the fate of socialism would have been different.

A commons in that sense was more than its materiality. It was more than the availability of natural resources. It was a place where certain skill sets were retained, where certain forms of knowledge could survive. A commons is also an imagination, a dream of cognitive possibilities. It smells more human and constructs a social which is more humane.

A commons resists the hegemony of any form of knowledges, even science. A commons thus has a place for knowledges and refuses to marginalise them. A commons in that sense is always a compost heap of knowledges.

Think of knowledge commons. A commons of knowledge is a store house of cognitive possibilities. Firstly, it is both diverse and plural; that is, it allows for a variety of knowledges and practices to co-exist. A commons challenges the monoculturalism of knowledge. Secondly, it is panarchic rather than hierarchic. A commons resists the hegemony of any form of knowledge, even science. A commons thus has a place for knowledges and refuses to marginalise them. A commons in that sense is always a compost heap of knowledges. It does not museumise knowledge but allows marginal and exotic cultures to reinvent themselves. The idea of language can be seen as a model for how the commons operates. A culture of languages is an assemblage of official languages, dialects, pidgin, creoles, and slang. It allows for tremendous flexibility and variation and transformation on the basis of a minimal set of norms and rules. A commons, unlike a museum, is continuously transformative.

Thirdly, a commons should not be seen only as a spatial entity or a map of natural resources. It works space as place and in doing so evokes time. An intellectual commons allows for a multiplicity of time. This is essential for three reasons. One, a commons provides a tacit theory of justice by resisting obsolescence, especially that of cultures and the knowledge forms they contain. Secondly, a commons has to have an ethics of memory. It cannot store information in one order of time. Myth, folklore and legend are as valid as any other attempt to scrutinise history. A knowledge commons recognises that while the truth might be one, its forms and cultures are many. The idea of the commons also realises that the multiplicity of knowledges requires a plurality of times to encode them. For example, the logic of shifting cultivation cannot be enacted in linear time. The diversity of rice in India needs a diversity of time, including the time of myth and festival to sustain it. You cannot build diversity on secular homogenous time. A theory of sustainability built on linear time is almost oxymoronic.

A knowledge commons combines both a theory of resistance and the dream of alternatives. A knowledge commons is not merely a dream of defiance, denial and resistance or a subaltern sense of possibilities challenging hegemony. It is also the availability of alternative paradigms which offer plural grammars and practices. Plurality is central to a knowledge commons where knowledge is neither hierarchic nor centralised. The notion of problem solving is present but solutions are seen as panarchic rather than hierarchic. There is a realisation that while the commons is a bundle of solutions, there is recognition that such solutions cannot be universalised. A solution may be inoperative in a different context or at a different scale. A panarchic commons allows for an ethics of scale. In that sense, a global commons is not an ode to planetary size but to the poetics of scale as wisdom. The local and the global confront each other not in terms of physical geography but as rhizomes in an evolutionary sense. The unexpected and the emergent are critical for the commons.

I provided the above catechism of the knowledge commons to argue that the idea of the commons is itself a mode of
thought and a code of conduct that challenges current models of knowledge and its hegemonic codes. Any commons needs a self-reflective epistemology of knowledge. Three principles in particular become critical.

A knowledge commons articulates the principles of cognitive justice. The idea of cognitive justice goes beyond the material notion of distribution of justice. It refers to the right of any society or social fragment to pursue its forms of knowledge, especially if these are critical to its forms of livelihood. Cognitive justice provides the fundamental rules for the ecology of the knowledge commons. Several principles follow from this. The first is an ethics of medium wherein a McLuhanese predominance of one medium will not work. A knowledge commons needs all three mediums of communication. The oral is as critically life giving as the textual and the digital.

The digital commons seeks to resist the propriety nature of knowledge as a commodity. It shows that innovations are more invertebrate than suggested by the idea of the innovation chain...

Secondly, the commons of multiple time challenges the linearity of development. The tribal and the peasant do not represent backward modes of knowledge but contemporary possibilities and a future heuristics. Thirdly, the epistemology of plural commons disallows the obsolescence of defeated marginalised knowledge. Craft and folk knowledge do not disappear before the onslaught of industry and science. Such epistemologies create new affinities between knowledge and democracy which go beyond the added theories of representation, participation and electoralism.

Currently, the digital idea of the commons has become topical. The idea of knowledge as a public space is now visualised in three forms. There is first, the idea of the network as a decentralised connectivity challenging the nation state as a form of surveillance. There is also the idea of public space as articulated by Jurgen Habermas. The public space epitomises the norms of communicative rationality. Beyond network and public is the idea of the digital commons. Unfortunately, the metaphor, while welcome, is an uneven one.

The digital commons seeks to resist the propriety nature of knowledge as a commodity. It shows that innovations are more invertebrate than suggested by the idea of the innovation chain...
The ongoing copyright wars in our age of digital media are really a political struggle over how creative works and culture should be generated. Does creativity require that authors have strict, exclusive control over their works, so that they can be sold in the marketplace? Or is knowledge and culture better served by people enjoying greater legal rights to share, re-use and copy works, especially via the Internet? While there is no single or simple answer, it is clear that the Internet and other digital technologies are encouraging open access and sharing. A brief history of copyright law can give us some perspective on current events.

The first copyright law, the Statute of Anne, was enacted in the United Kingdom in 1709. It gave authors an exclusive property right to print, reprint and sell their books for fourteen years. After that, the author could renew copyright protection for another fourteen years. The Statute of Anne made it illegal to make or sell copies without permission of the copyright holder.

The law was a major advance in challenging the monopoly of the Stationers’ Company, a trade guild of printers that enjoyed a monopoly on book production. The Statute of Anne diminished this monopoly by vesting rights in authors. The rationale for this shift was that an author ought to be able to protect the fruits of his labour and originality. In practice, however, book publishers typically purchased copyrights from authors, using their superior market power to great advantage.

In our times, copyright law is generally seen as a bargain between authors and publishers on the one hand, and the general public on the other. The public, via the legislature, grants limited monopoly rights to authors and publishers so that they will have the incentive to create and distribute original works. In return, the public enjoys certain benefits: not just the availability of new works for purchase, but the fair use rights (sometimes called “fair-dealing” rights) to excerpt copyrighted works for private, non-commercial and educational purposes. The public gets another benefit from the copyright bargain—free, unfettered access to the work after its copyright has expired. This is why the limited length of copyright protection is so important. It means that works “enter the public domain” and be freely re-usable at a certain point.

Growing tensions between copyright law and the “sharing economy”

The copyright regime served its intended purposes fairly well when creative works were embedded on vinyl disks, celluloid film or codex of paper. Borrowing or sharing tended to occur within fixed geographic areas, and did not significantly undermine market sales. However, with the arrival of digital technologies and especially the Internet, which make copying and sharing easy and inexpensive, the balance of traditional copyright law has been harder to sustain. The monopoly rights conferred by copyright have also come at a steeper price to culture. Instead of necessarily expanding knowledge or stimulating competition, copyright law in the digital age has, in many instances, served to artificially limit the circulation of valuable creative works.

As digital technologies helped create new markets, content owners have become more intent on controlling and profiting from newly invented “downstream” uses of their products. In the 1980s, for example, Hollywood studios fiercely fought the introduction of the videocassette recorder as a mortal threat, a battle that they lost in the US Supreme Court. The videocassette went on to become a major ancillary source of revenue for film studios.
Nonetheless, content industries continue to try to control ancillary markets as much as possible, to the extent of trying to control how people use copyrighted products. Film studios and record labels use “geographic coding” on DVDs and CDs, for example, to prohibit their usage on electronic equipment on other continents, and thus prohibit their resale elsewhere. Digital rights management (DRM) is a similar attempt to prevent users from copying works or using them in unauthorised ways.

Besides such technological locks, film and record industries have sought longer terms for copyright protection. In the United States, for example, Congress enacted the Copyright Term Extension Act of 1998 to extend the terms of existing copyrighted works by twenty years. The law represented a major giveaway to copyright industries and authors’ estates because a retroactive extension of copyright protection could not possibly incentivise deceased authors (e.g., Robert Frost, Walt Disney, George Gershwin, etc.) to create new works. It was not a coincidence that the Disney Company’s Mickey Mouse character was due to enter the public domain a few years later.

Following the lead of an American law - the Digital Millennium Copyright Act of 1998, many countries have made it legal for copyright holders to unilaterally pre-empt the public’s fair dealing/fair use rights in digital content. Citizens cannot excerpt portions of digital works, reverse engineer software or make modifications not authorised by the seller. Critics regard the law as a serious assault on consumer rights, innovation, competition and cultural freedom. Internationally, content industries have also stepped up their efforts against unauthorised copying by “pirates”. Unfortunately, these industries often use this term to try to criminalise many perfectly legal forms of private copying protected under the fair use doctrine.

The “Great Value Shift”

Much of the political and social struggle over the terms of copyright law can be traced to the disruptions caused by the Internet and the economic logic of “open platforms”. Essentially, the Internet provides an infrastructure that enables distributed innovation and sharing to occur at a much lower cost than that of conventional mass media. Television and radio broadcasting, for example, require large amounts of centralised capital, corporate management and professional control. Their business models depend upon distributing a limited spectrum of content choices to large, fairly undifferentiated audiences. “Sellers” are seen as the prime source of expertise, innovation and production.

The Internet has disrupted the centralised mass media apparatus by enabling disaggregated individuals to come together to create, collaborate and curate their own content. Whether through blogs, listservs, collaborative archives, wikis, social networking sites, or online gaming communities, Internet users have been able to control their own creative and cultural production. Much of this happens entirely outside of the marketplace, without cash transactions, legal contracts or corporate structures.

As digital technologies helped create new markets, content owners have become more intent on controlling and profiting from newly invented “downstream” uses of their products.
This new paradigm of creation has been called “the commons” by a number of commentators. “What we are seeing now,” wrote Professor Yochai Benkler is his landmark book, *The Wealth of Networks*, “is the emergence of more effective collective action practices that are decentralized but do not rely on either the price system or a managerial structure for coordination.” Benkler’s preferred term is “commons-based peer production.” By that, he means that systems are collaborative and nonproprietary, and based on “sharing resources and outputs among widely distributed, loosely connected individuals who cooperate with each other.”

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Peer production on open networks enables people to self-organise themselves into communities, and to devise their own rules for granting access, use and control of resources. Commons-based peer production is what drives Wikipedia and open source software projects such as Linux, the computer operating system. It can also be seen in many scientific disciplines that use wikis to amass pools of shared data, and in academic disciplines that publish their articles in open-access journals that can be shared, at no cost to readers. Such sharing and collaboration on open platforms are beginning to change economic production and culture. Instead of needing markets and money to incentivise people to create valuable information, social relationships can be coordinated on a mass scale to produce significant economic (and social) value. I call this deep structural change in how valuable things are created online *The Great Value Shift*.

On open networks, strict proprietary control over works tends to diminish, not enhance, the value of a work. This in turn alters the value of traditional copyrights. Copyright scholar Siva Vaidhyanathan has quipped that “The only thing worse than being sampled on the Internet is not being sampled.” His point is that “value” in Internet contexts increasingly comes from being socially accessible and circulated, and not from being closely held as private property. This shift has far-reaching implications for business strategy and organisational behaviour, and for the very definition of wealth.

On the Internet, wealth is not just financial, nor is it necessarily privately held. It is often “socially created value” that is shared, evolving and non-monetised. It hovers in the air, so to speak, accessible to everyone. Thus, the value of a creative work *grows* as software code is collaboratively developed by online communities (enhancing its utility and eliminating bugs); as songs and videos are remixed and shared on the Internet (stimulating public exposure and sales); and as academic books and articles are more easily discovered online and cited (enhancing their authors’ reputations and the circulation of their ideas).

As these trends suggest, the commons is becoming a powerful incubator of creativity and knowledge. Non-market sharing on open platforms is increasingly “out-competing” traditional business models—which is spurring record labels, film studios and book publishers to try to expand the scope and terms of their copyright monopolies. It is a technological, legal and political struggle that is likely to persist for years to come.

All images from http://wikipedia.org
The Socialisation of Science: 
India’s Knowledge Swaraj
Today’s ‘knowledge society’ places great value on ideas, innovation, information and knowledge—and rightly so, as the developments in science and technology over the decades have greatly affected our quality of life. However, this knowledge or science is shaped by a few experts; a situation that many feel should be rectified.

There is a call in many countries for a socialisation of knowledge: taking it from the hands of a few and giving it to the masses (De Assumpção 2005; Bijker & D’Andrea 2009), allowing for diversity in opinions and development of alternatives. The SET-DEV project is one such experiment in socialisation.

SET-DEV (Science, Ethics and Technological Responsibility in Developing and Emerging Countries), a project funded by the European Commission and coordinated by the Italian National Research Council, aims to encourage the socialisation of science and technology research (STR) in India and Kenya. A number of organisations from Europe, Kenya and India, including the Centre for Knowledge, Culture and Innovation Studies (CKCIS), located in the School of Social Sciences, University of Hyderabad, and the Knowledge in Civil Society (KICS) network, promoted by the Centre for World Solidarity (CWS), India, came together to participate in planning and implementing the project. Through dialogues between European, Indian and Kenyan researchers, two national manifestos on science and technology have been generated. Both manifestos emphasise the need for including a more varied group of participants in the dialogue on knowledge systems and in shaping a shared vision of the countries’ science and technology.

**Knowledge Swaraj**

The Indian manifesto, titled *Knowledge Swaraj*, calls for self-rule of India’s science and technology, independent of the dictates of multi-national actors and external research systems, and for the development of knowledge systems that draw their agendas from the needs of the people (KICS 2011). In the sections that follow, we present the core ideas and issues of this landmark document.

**Whose expertise counts?**

Conventionally, a distinction is made between experts and lay people—with the expert usually being a scientist and the lay person labelled as unscientific, his/her knowledge thus being deemed inferior or irrelevant. Such a division is problematic, since societal faith in experts and their motives does not always go unquestioned. The fact that science often does not have answers for problems that are societal in nature does little to mitigate the situation. While conventional thinking may provide the leeway to supplement the knowledge from the natural and technical sciences with expertise from the social sciences and humanities in order to address such issues, it is other kinds of expertise—expertise which is not scholarly but experience-driven—that is often overlooked. Lay people often cannot actively contribute to creating new scientific or technical knowledge, but they frequently possess the expertise to understand and discuss scientific policies and ethics. The key is to differentiate between these two types of expertise, and based on the nature of the issue, decide which type is required. Even the usage of the term ‘scientific expertise’ is not entirely appropriate as an expert in one field, say genetics, is in the same position as the average educated person when discussing an unrelated topic such as nuclear energy. A more appropriate view would be to understand that there exists a spectrum of expertise and, in a very generic sense, there is no one discipline which is more important than the other. In order to ensure the participation of this spectrum of expertise, the manifesto calls for new regulatory frameworks that will guarantee a more inclusive approach and pay greater attention to questions of ethics.

**Democratisation of science**

By and large, the vision of science and technology in India has been shaped by experts who may often be disconnected from the needs of the average citizen. Despite this, there are few challenges to this voiced today compared to the many debates on science that occurred during the freedom movement. Critiques of science—not just by scientists but also by citizens, activists and industrialists—are necessary to inform future science and democratic practices. Dissenting views, instead of being silenced, should be included in dialogue as a step towards a more effective democratisation of science. The various social movements in our country have already highlighted the inadequacy of technical and natural sciences and the need for an analysis that goes beyond technical assessments to include broader questions of justice, equity and sustainability.

Given that neither science nor society can exist independent of each other, scientists should be encouraged to think of themselves not as being engaged in battle over ownership of knowledge but as trustees who hold knowledge on behalf of society. As long as stewardship remains in their hands, they are called upon to use and develop knowledge not to meet personal ends but to generate benefits for various sections of society. Such an arrangement would naturally need to be protected to prevent the misuse and exploitation of knowledge and to improve the eroding relationship between science and society.

**Sustainability, plurality and justice**

In order to take this idea of trusteeship forward, the manifesto advises us to root our science in the values of sustainability, plurality and justice. Sustainability needs to be redefined to include subsistence and survival methods, which focus on risk minimisation rather than profit maximisation. We need to
broaden the definition of sustainability by looking at nature, going beyond industry and by incorporating diversity. This redefinition will change how marginalised sections of society are viewed, empowering and enabling them to benefit from this ‘new’ science.

By including survival and subsistence into the definition of sustainability, the manifesto urges us to recognise the different ways of living that exist and acknowledge the plurality in knowledge systems. Scientific progress currently displaces these alternate knowledge systems and the survival of the people that subscribe to it, for the so-called greater good. To be truly democratic, science needs to provide spaces for engagement with dissenting opinions and allow for alternatives that will challenge existing notions. For such a democracy to arise, the manifesto states the need for cognitive justice. Such a form of justice would not only recognise the rights of various parallel knowledge systems to co-exist but also take an active recognition of the need for such diversity. Cognitive justice pre-supposes everything that the manifesto argues for, as only with such justice will there evolve a space in current scientific thinking that could accept the ideas of plurality and sustainability.

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**Improved ethics**

If socialisation of science is to take place, a new ethical approach is necessary. This approach would need to understand the needs of all sections of society and ensure that the techno-scientific activity does not adversely impact the marginalised and weak. In the manifesto, this new ethical approach is illustrated using energy generation and distribution as an example. Just as swaraj, or self-rule, needs to address the concerns of all people, an energy swaraj would need to examine not only energy service and energy supply but also the democratic processes of decision-making and energy governance.

**Moving towards a knowledge swaraj**

The manifesto disclaims being anti-science in any way but challenges us to change the present paradigms of STR by adopting the language of swaraj, which would lead to a fundamental change in societal institutions and the role of science therein. This paradigm change calls for renewal of traditional knowledge, transparency in the discussion of the economics of science and technology, and for a policy that invests in quality over quantity.

Knowledge swaraj calls for the self-rule of science and technology by the people of India. It is not only a question of recognising the expertise of all citizens but also protecting the weak and the marginalised so they may enjoy their traditional way of life and knowledge systems. The manifesto paints a vision that should interest policy makers—where science and technology nurtures a plurality of knowledge which in turn fuels the nation’s move towards a sustainable future.

**References**


**Online resources**

- KICS: http://www.kicsforum.net/
- Prasad, S. Presentation on Knowledge Swaraj: http://www.youtube.com/watch?v=BjDheYevxKY
- SET-DEV: http://www.set-dev.eu

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Given that neither science nor society can exist independent of each other, scientists should be encouraged to think of themselves not as being engaged in battle over ownership of knowledge but as trustees who hold knowledge on behalf of society.
The current financial crisis in Europe brings out politics as we know it. The political leaders of nation states deliberate lessons from the past and negotiate solutions for a new future. We are intrigued by the moves of presidents and prime ministers and expect their decisions to affect our personal economic situation. Reversely, we blame the politicians for the loss of jobs, increase of rent or governmental restrictions. It helps to express anger and frustration, but does it help in negotiating with our employers, landlords or administrators?
The gaze towards the top is a common feature in our understanding of political processes. The politics of knowledge and technology is no exception. What is peculiar here is that the fascination applies to both politics and science and technology. The dominant image is of ‘big science’ and top-notch technologies dealt with by high-level politics. Think nuclear energy, hydro-electric dams, biotechnology or nanotechnology, and the association is political leaders and ministers confronted by protest and opposition. This is not just an image evoked by the media. It is also engrained in theories and concepts that we use in our understanding of the politics of science and technology. The dominant focus on advanced technologies and higher-level politics, I argue here, has limited value for understanding crucial elements in processes of technological change that take place in society, therewith touching upon key democratic values. This is illustrated with introduced changes to rice cultivation.

Technological change is often associated with innovation. Driven by images of progress and an urge to outstrip competitors, the only way forward is to get rid of old ideas or cranky tools and embrace novelty and rapid change. This, it seems, is the course of history. Just as steam locomotives replaced draught animals, a better future lies in advanced scientific knowledge and technical novelties. By definition, innovations are unfamiliar to the wider public. This is why financial support from investors and patronage from ministries and political leaders is required. The pattern is visible in the introduction of short-straw, fertiliser-responsive rice varieties (known as high-yielding varieties or HYVs) in the late 1960s. HYVs are innovation. Indeed they were, back in the 1960s, radically different from the rice types grown in most places. Thus, it was thought, HYVs would quickly replace existing (old) varieties simply because what was there could never compete with HYVs. However, HYVs have not fully replaced other rice varieties because in some places they never arrived, in other places they lost to competition with the old (but apparently better) varieties, and even in those many places where HYVs did yield well, other varieties never entirely disappeared.

Currently, the HYVs of rice have lost some of their grandeur. The high output is based on high input of fertiliser and water, making farmers dependent on economic factors, largely beyond their control. Environmental concerns increase the pressure to find alternatives. One alternative currently promoted is the System of Rice Intensification (SRI). Comprising of the use of young seedlings, wider-spaced square planting, reduced water requirements and mechanical weeding, SRI offers a set of techniques that is supposed to increase rice yields with less dependency on external inputs. Moreover, SRI is introduced mainly by civil-society organisations and less so by research institutes. SRI thus seems to move away from too high expectations on advanced science and novelty. However, SRI promoters are not entirely void of the pitfalls of innovation thinking. There is active lobbying for political and donor support to promote SRI.

Currently, several governments of states in India and elsewhere are actively engaged in its distribution. Besides SRI being presented as innovative, farmers are commonly considered as traditional or stubborn when expected higher yields do not occur or when they disregard (parts of) the SRI method.

**The dominant focus on advanced technologies and higher-level politics, I argue here, has limited value for understanding crucial elements in processes of technological change that take place in society, therewith touching upon key democratic values.**

**Depending on folk wisdom or existing techniques therefore is not about being backward or not being able to escape old patterns. It is simply asserting that change is not about throwing away everything and starting all over again.**

The introduction of SRI reveals the shortcomings of innovation thinking. Innovations need venture capital and institutional support to quickly access markets and convince customers. Science, technology and democracy in this context implies using the leverage of political power and donor money to offer users a simple choice: innovate or remain backward. The organisations pushing the HYVs for rice were good in making a political case for innovation. Persuasion was labelled as ‘training and visit’. SRI is introduced in very similar ways in some places.

In several states in India, we see newly emerging partnerships between organisations promoting SRI and state governments. This, it is thought, helps to distribute SRI and thus improves rice farming across the country. Leaving aside the question of what we can expect from politicians and ministers, taking the route of high politics drags us further into innovation thinking. Preliminary findings from a research programme on SRI in India suggest that farmers in many places are instructed to take up SRI in very similar ways as they were instructed to plant HYVs in previous decades.

Analyses of processes to enhance public engagement in science and technology in various parts of the world have shown that under the label of participatory processes, powerful actors like governments, companies or other large
organisations push for certain decisions or solutions. Not only are views and preferences of people disregarded, there is also underestimation of the knowledge and solutions people have developed themselves. The science and technology of the people are usually adequate for context-specific challenges. Depending on folk wisdom or existing techniques therefore is not about being backward or not being able to escape old patterns. It is simply asserting that change is not about throwing away everything and starting all over again.

What is the role of science? It is not helpful to oppose scientific knowledge and local or indigenous knowledge. Nor is it useful to oppose innovation and stagnation. Science can help to understand what works where and how. This requires a social science understanding of technology-in-use as well as an understanding on how processes of change work. An on-going research project between our university and several partners in India has taken up this challenge for the changes in rice cultivation induced by SRI. Changes in rice cultivation taken up by farmers are not about rejecting or accepting an innovation. Nor is the politics of rice about meetings and consultation processes on what methods or varieties farmers want. Understanding science, technology and democracy in rice cultivation is about understanding the very changes in the techniques and derived insights from farm-based experimental practices as employed by the farmers.

**Recommended reading**


Experimenting for a Knowledge Commons: Public Debate on Nanotechnologies in The Netherlands

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What could it mean to plead for a new commons on knowledge and technology? One (I will argue) erroneous meaning is to imply that knowledge and technology should be made commonly available to all. However nicely democratic this may sound, the almost inevitable assumption behind such interpretation is that there is one best type of knowledge; and this one best type is then invariably assumed to be the natural sciences’ type. This may be democratic, but only on the knowledge consumer side.
In Knowledge Swaraj—An Indian Manifesto on Science and Technology (published by University of Hyderabad and Knowledge in Civil Society Forum [KICS], see http://www.set-dev.eu/), Indian and European researchers have proposed a democracy on the knowledge producer side. A new commons of knowledge would then mean: sharing a variety of knowledges, including those of ‘commoners’ like users, patients, citizens and others with ‘practical’ or ‘experiential’ knowledge. This is not an argument against scientific knowledge; it is an argument to recognise the value of a plurality of knowledge systems that exist in parallel, and science being one of them.

Knowledge Swaraj, though formulated as an Indian manifesto, is not pitching Indian against western science either. In this article, I will report on what can be seen as an experiment with a knowledge commons in The Netherlands; an experiment with Dutch democracy; an experiment to give voice to a plurality of views about nanoscience and nanotechnologies.

On January 27, 2011, the Dutch public’s agenda on nanotechnologies, titled “Responsible forward with nanotechnologies”, was presented to the Government of The Netherlands. In this public’s agenda, the people of The Netherlands spoke out about their priorities for nanotechnologies research and development: what to do and what not to do, what they fear and what they hope for, and how to balance risks and benefits? This public’s agenda resulted from the Societal Dialogue on Nanotechnologies, held between January and November 2010.

The standard views about the “public’s understanding of science” and the need for better “risk communication” are that the general public does not understand science and technology sufficiently to appreciate its benefits, and that because of this lack of knowledge, it irrationally fears new science.

Nano science and technology deal with the very small: building blocks smaller than one millionth of a meter are used for new materials and instruments. Several products in the market such as sunscreens, anti-bacterial surfaces, automobile tyres, and some anti-cancer drugs already incorporate them. The promised benefits are many, and there is no field of science and technology that does not have potential applications of nanotechnologies. But there are possible hazards too. Scientific evidence points to toxicological risks. Nanoparticles of gold and silver seem to be seriously toxic, while gold and silver as bulk materials are inert and safe. This is worrying: there is scientific evidence of toxicity, but not yet absolute scientific certainty about that nanotoxicity. Unlike in the cases of asbestos or radioactive radiation, where we have absolute scientific certainty about the risks, nano-scientists do not yet have the complete story on nano-risks, but we know enough to be worried about the application of especially synthetic nanoparticles.

The most striking result of the Dutch Societal Dialogue on Nanotechnology is that now, after the dialogue, the general public in The Netherlands is more aware of the risks of nanotechnologies, and at the same time more supportive of further nanotechnology development. At first sight, this is surprising and in sharp contrast to the long-held views on the relation between the public and science. The standard views about the “public’s understanding of science” and the need for better “risk communication” are that the general public does not understand science and technology sufficiently to appreciate its benefits, and that because of this lack of knowledge, it irrationally fears new science. We now know however, that the Dutch people are more fearful of a government that hides potential risks of nanotechnologies than of those risks themselves—when monitored and researched well.

Let me give an example. Several hundred 10th grade students in schools around Maastricht worked during three months on nanotechnologies, often in their physics or chemistry classes. They started with lab experiments related to nanotechnologies and did literature studies using the Internet. They then broadened their agenda to also address questions of benefits and risks. Project groups prepared reports and films about the future of specific nanotechnologies, which finally were presented in a conference attended by students, teachers, and some politicians, industrialists and scientists. As a physicist and teacher, I was impressed by the level of knowledge displayed in these presentations; I was equally excited by the students’ well-informed personal positions on the future of nanotechnologies. They certainly did not all agree with each other. Some were suspicious of the multiplier effect that nanotechnologies might have on existing power relations: “most developments are spurred by commercial aims, and multinational companies will acquire even more unchecked influence than they already have.” Others especially valued the promises of better medical diagnosis and treatment. But the latter group asked for prudent studies of risks, as much as the first group concluded that nanotechnologies research should proceed.

Four elements were crucial in the set-up of the Societal Dialogue on Nanotechnologies: 1) An independent committee was responsible for the organisation of the dialogue. This clearly added to the credibility of the process, since the Dutch government could not interfere and push its own agenda; 2) The committee created a three-step process of providing information, raising awareness and having the dialogue. This was necessary because knowledge about nanotechnologies amongst the Dutch people was weak. First, information had to be given and awareness raised, before a proper dialogue was possible; 3) Most of the substantive work was outsourced, to keep the organising committee...
credibly independent. Almost 40 projects performed the information, awareness and dialogue activities. The committee had a budget of 4.5 million Euros (28 crore Indian Rupees) and selected these projects after an open call for proposals. A broad variety of scientists, NGOs, firms, and individuals thus took responsibility for these projects; 4) The use of a broad spectrum of media (from TV and Internet to science cafés, theatre plays and teaching materials) and the participation of a wide range of people (from children to scientists, fundamentalist Christians to Muslims, and patient organisations to industrialists) contributed to the solidity of the resulting public’s agenda.

This set-up worked well. Parallel to the process of the dialogue, the knowledge and opinions of a representative sample of the Dutch population was surveyed. “Having heard of nanotechnologies” increased during the societal dialogue from 54% to 64% of the Dutch population; “knowing the meaning of nanotechnology” increased from 30% to 36%. An analysis of the process brought the committee to conclude that it was especially the heterogeneity of means that proved successful. Rather than a naive belief in the Internet as a “global panchayat”, the committee used a combination of small-scale but specifically targeted activities, with large-scale broadcasting and publishing via TV, printed media, and the Internet (see www.nanopodium.nl).

This dialogue thus yielded an interesting result that is potentially farther reaching in terms of its societal importance than the regulatory governance of nanotechnologies. A decade ago, the Dutch people opposed GM foods. Most analysts agree that this resulted from a public debate that many perceived as biased towards the pro-GM lobby. In contrast, the Dutch people are now in favour of cautiously proceeding with nanotechnologies, while recognising its risks. The general attitude certainly is not anti-science; but the public is not prepared, as in the 1950s, to give scientists a blank cheque either. Instead, a continuous critical appraisal of risks and benefits of science seems to be called for: a new form of democratic risk governance.

The mechanisms to provide such a risk governance of science and technology are not readily available. The Societal Dialogue I described is just one example. Countries need to experiment with such innovations of democracy, as much as scientists experiment with the new technologies that shape our world. It is unlikely that what worked in The Netherlands will work in India, and vice versa: the difference between the proverbial consensus-oriented Dutch and the equally iconic diversity-celebrating Indians may be too large. But the democratic issues remain just as pressing. Can The Netherlands find ways of democratically coping with the oppositions around nuclear power: the ‘new’ benefits of lower CO₂ emissions versus the ‘old’ risks of nuclear waste storage, the ‘old’ benefits of energy autonomy versus the ‘new’ risks of international terrorism? Can India find ways of democratically reaching a well-informed and broadly shared policy on Bt Brinjal by moving the current moratorium to a next phase?

In all these cases we are dealing with questions that our societies can only address when drawing on an input broader than just scientific knowledge. Science is crucially important, but not sufficient. Societies need to experiment with new forms of knowledge commons that draw on the rich plurality of knowledge systems that exist in every society.

Source: http://http://www.nanopodium.nl/CieMDN/
Jugaad as a Conceptual and Materials Commons

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**Jugaad** is a word in many Indian languages such as Hindi, Marathi, Gujarati and Punjabi that does not have an easy equivalent in English. The plasticity of the word and range of its usage is evident in the fact that jugaad can be concept, process and product all rolled into one at the same time; it means reconfiguring materialities to overcome obstacles and find solutions; it could mean working the system to one’s advantage; and it is also used as a synonym in certain contexts for gambling and corruption. Jugaad is not just an inextricable part of local vocabularies in some parts of India. It is an integral part of the way life is lived and the world negotiated. It is a noun as much as it is a verb; an idea and an articulation that has a wide range of meanings and usages that revolve primarily around problem-solving or solution-finding.

**Technological jugaad**

It finds it’s most well known exposition in the realm of what might be called ‘technological jugaad’—jugaad where materials are reused and reconfigured in an effort to solve problems that can be described broadly as technological. Perhaps, the best known product identified with jugaad is an automobile found across northern and western India that is created using a non-standardised manufacturing process, is not registered with the relevant authorities and therefore does not exist within any formal legal frame. Every such vehicle differs from the other and the only thing that binds them together is the fact that they are fabricated locally and by assembling different parts, commonly from other scrapped vehicles—engines, tyres, wooden planks, steering wheels, seats and even water pumps. There is no restriction on what is used and it generally depends on what is available at ‘that place’ at ‘that time’ leading also to names that are varied and different—jugaad and maruta in parts of northern India, and chakela in certain regions of western India. The automobile so created is, generally, a locally crafted solution to an immediate problem such as a bottleneck in transporting agricultural produce to the nearest mandi or to transport people in a landscape of limited connectivity and mobility choices.

Another well-documented though less prevalent form of jugaad is the use of an existing artifact for purposes completely different from what is was originally created for. The best known example of this is again found in parts of north India where washing machines are used to prepare lassi, the popular local drink made from churning yogurt, sugar and water at high speeds. My recent research suggests that this form of jugaad exists even inside modern laboratories in universities and research institutions in India, where scientists and researchers use methods, materials and even the language of jugaad to explain their work. Importantly, this research inside the scientific lab is of very high quality, meets international standards, and is regularly published in leading international peer reviewed scientific journals. Even limited empirical and conceptual engagement with this technological jugaad reveals many parallels in other cultures and parts of the world. If one were to consider a product, the most striking would be the Taiwanese ‘reassembled cars’ also known as the ‘iron cattle’. Researcher C.H. Lin who published a detailed account in 2009 in *East Asian Science, Technology and Society: An International Journal*, describes the iron cattle as “reassembled cars that use single-cylinder motive power such as a water pump, a cultivator prow, or a motorcycle engine.” Reassembled cars that use four-cylinder engines are called siqizai while those using six cylinder engines called laqizai. It is clearly a jugaad automobile, but only in another language.

From a conceptual point of view, an idea that finds immediate resonance is *bricolage*—brought into prominence by the French structuralist Claude Levi-Strauss, in his celebrated 1962 book, *The Savage Mind*. Bricolage, Levi-Strauss states, is made up of “elements [that] are collected or retained on the principle that ‘they may always come handy,’” and where none of the elements has just “one definite and determinate use.” There is an uncanny likeness between bricolage and jugaad. Similar to this is Eric von Hippel’s idea of ‘user driven innovation’. His work over the last few decades has brought to the centre stage the role of the user in design, development and innovation, even inside the scientific laboratory. In a 1988 study of the development in the west of scientific instruments across four instrument families (gas chromatograph, nuclear magnetic resonance spectrometer, ultraviolet spectrophotometer and the transmission electron microscope), von Hippel found that nearly 80% of the development had been done by the users themselves.

Jugaad, siqizai, bricolage, ‘user-driven’ innovation, then, are four terms from four different languages, cultures and histories that span the entire globe and yet there is something that ties them together. They offer cross-cultural evidence of how the social, cultural and economic milieu of technological development influences reconfiguring of material objects in varied, though co-existing worlds—where the junk market, for instance, becomes as important a player in economic survival in rural India as it is in cutting-edge science in the modern physics laboratory. This is a conceptual and materials commons that exists all around—both in its usage and its availability for use. Jugaad, in its multifaceted manifestations, is a crucial tool in India for the survival of disadvantaged majorities who either don’t have access or have been denied access to resources. It can be (and in fact is) much more than just a tool for survival, but the least we must acknowledge is this contention.

If jugaad is a commons, no one can claim ownership. The corollary is that it is owned by everyone. However, when some, particularly in a position of power, deny or dismiss jugaad, it can start a process where there will be a denial to everyone of even a conceptual access to it. This we see happening in the academia and in elite circles of science and management schools where jugaad has been dismissed variously as unscientific, unsystematic and of compromised quality. Sweeping generalisations in the absence of empirical or conceptual engagement need to be seriously questioned, particularly where there seems to be compelling and increasing evidence to the contrary.
The pictures shown here are of Scanning Tunnelling Microscopes (STMs) completely developed and fabricated at the Department of Physics, University of Pune by Prof C.V. Dharmadhikari and his research team. Dharmadhikari has been developing a series of these instruments from 1988 onwards that have been then used for research in frontier areas of surface and nano science.

The examples shown here are of two innovative uses of materials to ensure that the sensitive instruments are isolated from vibrations that might affect their performance. In the first case, the STM has been mounted inside a discarded refrigerator (left); the thick stuffed walls of the refrigerator perform the role of a good vibration isolator. In the second case, the instrument has been placed on the tube of a passenger car tyre to achieve the same purpose of insulating the instrument from vibrations (below). The entire set of instruments made in this lab have been from recycled and reconfigured materials that include, among others, stepper motors from scrapped computers, discarded refrigerators, bungee cords and sewing machine bobbins.

Over the last two decades this research team has published over 60 papers in some of the world’s leading peer reviewed scientific journals based on their work on these ‘home-made’ instruments.

Photos: Pankaj Sekhsaria
A Handful of Concepts to Understand Openness and to Battle Simony

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We seem to have come a long way since with the increasing commodification of knowledge in the world, a trend that originated with the rise of knowledge corporations but has dangerously entered the domain of academic institutions and universities. There are various ways in which one could think of the impact that intellectual property (IP) will have on future research and on the question of science itself, and there is also considerable scholarship on the importance of ‘free knowledge’ and ‘open source’ ideas in the academic community, but in this short paper I am interested in asking another kind of question: What has the value of openness meant in the academic world and what accounts of self are mobilised in academic communities; what is the nature of the relationship that one has to one’s work; what is the kind of relationship to others that are invoked by the idea of openness and how do these get affected by the commodification of knowledge production?

Jonathan Kind, a geneticist at Massachusetts Institute of Technology says, “In the past, one of the strengths of bio medical science was the free exchange of materials, strains of organisms and information….. But now, if you sanction and institutionalize private gain and patenting of micro organisms, then you don’t send out your strains because you don’t want them in the public domain. That’s already happening now, people are no longer sharing their strains of bacteria and their results as freely as they did in the past.” His statement suggests a decline at two levels:

i. The loss of a spirit of collaboration or collegiality
ii. The loss of academic freedom

It seems to me that what is at stake is the fact that the two are crucially linked. David Downing for instance, argues that collegiality has been historically linked to academic freedom. The implicit premise seemed to be that we had to be “free” to be collegial: free to pursue truth and knowledge as liberal subjects seeking our own self-development, and free to manage our own time with respect to the autonomy granted our teaching and research efforts. To this extent, collegiality was a non-contractual but widely shared value of respecting those freedoms among our many different colleagues. Downing traces an epistemic shift that we see in recent years with the rise of “academic capitalism” and the rise of Intellectual Property Agreements (IPAs) facilitating Technology Transfer (TT) from university to commercial uses. Since the 1970s, we have seen a rise in policies giving universities the right to seek patents in the same way as private enterprise, which has led to a fundamental restructuring of higher education and publicly funded research (Downing 2005).

And even as the public domain shrinks under the increasing pressures of capital, both collegiality and academic freedom, which have historically provided for the defense of a realm of non-property and non-capital, are now being turned around: the discourse of intellectual property and the ownership of knowledge are now being used “to define and defend academic freedom”. According to Corynne McSherry, “The contest for the meaning of academic freedom is taking place on shifting ground according to novel rules …the conflation of property rights and ‘academic rights’ participates in a set of discourses which offer to replace the hierarchies of the academy with the inequalities of the free market, discourses in which freedom can only be understood to mean ‘individual free enterprise” (McSherry 2003).

I would suggest that the traditional idea of collegiality in academic communities is more than just being nice and polite to each other, it names an ethic of what it means to work together freely. The rewards-based model of the university system in which those who own the largest number of patents are assured of tenures, grants and academic privileges seems like an inversion of actively constructed domains of radical freedom into narrowly conceived domains of passively accepted “academic freedom”. Scholars have questioned this model to argue that genuine forms of freedom are not something awarded after the fact of teaching or research, and freedom is actively produced by inquiry, learning, imagination and interaction.

...we had to be “free” to be collegial: free to pursue truth and knowledge as liberal subjects seeking our own self-development, and free to manage our own time with respect to the autonomy granted our teaching and research efforts.
This idea of academic freedom does not just refer to institutional constraints, but is also centrally linked to the normative structures that evolve in an academic community including the freedom with which knowledge itself is shared. A central idea that has governed scientific communities is that of the ‘gift economy’—evidenced by the common reference to someone as a ‘gifted scientist’. The scientific community was marked by a spirit of hospitality and generosity, both to ideas and to their colleagues. Peer reviewed scientific journals for instance, are valued more than text books which lack the same prestige as a peer reviewed article, since they are paid for, and knowledge from the community is taken and in a sense private gain is accrued. Contributors to a peer reviewed journal on the other hand receive material benefit in the form of prestige, reputation and honor, and this prestige is tied critically to their being a part of a scientific community, as opposed to the scientist working in a company as an employee.

There are various ways in which one could think of the impact that intellectual property (IP) will have on future research and on the question of science itself.

The academic community has been an important gift community organised more on the principles of gift giving than on the principles of a monetised community, with research being contributed to the world of knowledge, the researcher being considered as a gifted academic. A gift economy sustains itself on very important social principles and fictions, where they see themselves simultaneously as recipients, givers and carriers of the gift. This is necessarily a fragile community, with the symbolic fiction guaranteeing the social cohesion of the community, and often there is conflict and tension within the community, with fragmentation, differentiation and dissent (Povinelli 2010).

As a parting gift, here is an interesting etymological coincidence that may perhaps help us in our struggle against simony. The etymology of the word ‘data’ comes from the Latin datum (a thing given) or ‘to give’. The Raqs Media Collective alerts us to its similarity with the Sanskrit word data which is taken to mean “giver”, suggesting that one must always be generous with information, and make gifts of our code, images and ideas. And to be stingy with data is to violate an instance of the secret and sacred compacts of homophonic words from different cultural/spatial orbits (‘dãtã’ in Hindi and ‘data’ in English) as they meet in the liminal zone between languages, in the thicket of the sound of quotidian slips of the tongue.

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The government’s much vaunted Aadhar scheme to provide a unique identification number to every Indian resident received a setback when a designated standing committee comprehensively rejected the National Identification Authority of India (NIAI) bill (Anonymous 2011a). The bill, that would have given parliamentary approval to the scheme, was questioned on several counts, including the viability of biometric technologies and privacy related issues, the implications of the scheme for citizenship and democracy, as also the rolling back of similar initiatives in other countries.

These and other issues had been part of the enduring debate on the scheme and were raised by the standing committee, which also included members of the Congress, the majority political party in the governing United Progressive Alliance. Overall, the panel is reported to have found the Aadhar implementation “unethical and violative of Parliament’s prerogatives” (Anonymous 2011b). While this seems to have had little effect on the ongoing execution of the scheme, it does seem to open the door for further discussion. To this contentious list of concerns, I suggest the possibility of approaching the digital assets involved as community owned and operated resources rather than those under state control1. Clearly, this is a complex and involved task, much beyond the scope of an effort such as this. However, the effort here is to throw the conceptual hat into the ring for further deliberation and consideration.

While the notion of material objects, as the underlying narrative of human history is not new, it has rarely been without controversy2. In the industrial world, this has been seen as the ‘ownership, or the exclusion of ownership of means of production such as factory buildings, machinery, raw materials and the consumers’ goods‘(Schumpeter 2003). The other notable element here is the notion of technology, seen not just as a collection of objects or artifacts, but as technique, from the Greek techne, suggesting it as a way of doing things. In this understanding of technology, objects and institution processes are intricately intertwined with society and its institutions. Thomas Hughes, speaking about the generation of electric power in the United States of America (USA) gives the example of how Edison, well known as the inventor of the light bulb, used all the means at his disposal to promote his own direct-current system of electric power over the competing single phase, alternating-current one. Once the system was adopted and increased in scope, says Hughes, large investments were made in acquiring resources and setting up manufacturing plants.

This is reflective of technological systems in general, he suggests; once they have gathered a certain momentum, as in the case of electric power, “educational institutions [teach] the science and practice ... then research institutions [are] founded to solve its problems.”

As the knowledge and practices get institutionalised, people and institutions “[develop] characteristics that [suit] them to the characteristics of the technology. And the systematic interaction of [people], ideas and institutions, both technical and nontechnical [leads] to the development of a supersystem—a sociotechnical one—with mass movement and direction.”3 In other words, some technological systems use mechanical means to perform individual tasks, while others create new social categories and functions; in yet others, both may occur within the same system.

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1The digital commons, with its origins in the free software movement is generally used to refer to common copyright and intellectual property rights, as well the notion of ‘knowledge commons’; in more general terms, any digital assets may fall under this category (Hess & Ostrom 2007: 3; Bollier 2008: 1–5).

2The notion of ‘historical materialism’ as understood by Marx and Engels has been interpreted by some as suggesting that economic factors such as ‘distribution of wealth, of classes and sub-classes bound together by common interests, and so on’ comprise ‘all concrete social facts’. Others think that the relationships between economics and society—comprising of ‘ideas, science and art and other such non trifling matters’ are precisely what have been dealt with in Marx’s propositions’ (Croce 1914: 27–32).

3Hughes 1983. Words in brackets [ ] added.
In the context of large information systems, this distinction is reflected in systems that automate existing processes and are reflective of different notions of identity, such as the pan card (the tax payer), voter id (the citizen), passport (the traveler), and other database oriented systems such as the railway reservation system. Others, such as the Aadhar scheme, are examples of where the designers of the system imagine altogether new social and institutional entities and processes. The scheme seems to suggest a shift in the role of the state from a controlling authority to that of being a facilitator to corporate ‘efforts to restructure the way in which global capitalism (including consumption) takes place’ (Edward 2002). Connected with this specific implementation is the idea of a consumption based notion of identity as opposed to other notions of identity outlined above (Shukla 2010). Conceptualisation of a different technological design based on a more community centered notion of identity can also open up newer possibilities of community ownership and control.

**The technical basis (aadhar) of identity**

One of the thumb rules in the design and implementation of large technical systems is the inclination to keep the social problem distinct from the technical one. However, since the two are generally interrelated, it often results in efforts to address the social problem by solving the technical one. These efforts may include translating the social problem to the technical sphere, or, as in the present case, in finding a ‘good fit’ between available technical solutions and the social problem(s) (Anonymous 2009).

How, if at all, the technical implementation of a centralised, biometrics based database system can address multiple social and institutional problems such as the problem of leakages in the distribution pipeline, allegedly due to duplicate identities, the problem of ‘inclusion’ of hitherto undocumented people in the scheme, as well as the problem of “empowerment” of people, to name a few, is something to ponder. Of these multiple problems, it is only the problem of “empowerment” that we may possibly address by outlining a different notion of individual and communal identity that may then be translated into a socio technical system. Other problems may be addressed as separate, yet collaborative efforts. Implicit in this kind of ‘systems integration’ approach, which involves building smaller independently functioning systems also capable of exchanging information using standard protocols, is a design or model different from that of the monolithic, centralised systems; one that may also prove to be scalable and robust over time.

One of the thumb rules in the design and implementation of large technical systems is the inclination to keep the social problem distinct from the technical one. However, since the two are generally interrelated, it often results in efforts to address the social problem by solving the technical one.

One of the characteristics of the Unique Identification (UID) system is that it stores a limited amount of data for each individual so that its real value lies in providing the authenticating link to the different sets of data. For agencies seeking and collating consumer data such as banks (credit cards, loans), insurance providers (health and other policies), market research, marketing and advertising agencies and so on, this mapping between databases and individuals has a certain commercial value. However, it is the possibility of being able to access other datasets such as the National Rural Employment Guarantee Scheme (NREGS), various Public Distribution System (PDS) initiatives, the Rashtriya Swasthya Bima Yogna (RSBY) and others, even in a limited manner, which may be
more effective in the long run. Another possibility that opens up is that of increased visibility of producers and produce, based on individual and group identity as ‘producer(s)’.

Some other attributes of identity that seem common across social categories may be the geopolitical origin of the person such as the state, district, village, etc. So too are the notions of gender, family, religion, caste, community, ethnicity, tribe, occupation, and so on. The notion of identity may also change depending on the context, suggesting that all the stored information may not be relevant or required in all contexts. Each of these may well be contentious and debatable issues which the design and implementation of the resulting technological system could consolidate, create anew, or else dissolve. What it would enable however, is the design of a system more in tune with social values and reality, rather than one based on the imagination of technical experts, however skilled they may be.

Technically, while a more detailed feasibility study is in order, given current standards and tools for exchanging information across diverse systems, as well as the extensive mobile communication infrastructure available, it may be more feasible to implement community based smaller, scalable systems. These systems may interface with, and periodically populate, a central database with basic identity information while still retaining ownership of the more detailed data. The role of the state in this case can be to provide the logistical infrastructure, technical training and the setting up and brokering of protocols and mechanisms of information transfer.

A schematic outline of the basic idea that may be used to enable further discussion is shown above (Figures 1 and 2). An actual implementation may lead to a different architecture. At this stage, these diagrams are only indicative of possibilities and no claim is made towards their technical completeness or correctness.
The Adhaar scheme duplicates the effort of well entrenched processes such as the National Population Register (NPR) by initiating its own resource intensive data collection and authentication process. Importantly, it forces an imagination of newer actors and processes. Given the scale and implications of the scheme, a safer and more conservative approach may be in order. Among other things, this approach would involve working in conjunction with existing data and processes, and pursuing a set of clearly defined, quantifiable objectives using available technologies and following well established engineering practices.

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