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GRASSROOTS INNOVATION MOVEMENTS

Lessons for theory and practice

Taking their periods of activity in sum, the case studies across the previous six chapters provide over a century of grassroots innovation experience. What can we learn from such experience? The aim in this chapter is to look across the case studies in order to identify recurring features and appreciate key differences that, amid the diversity and complexities of any particular movement, might nevertheless be instructive. Each of the case studies was motivated by the same three questions (Chapter 1).

1. Why did this grassroots innovation movement emerge?
2. How did activists mobilize support and activities in grassroots innovation?
3. What dilemmas confronted the movement when constructing alternative pathways, and how did it negotiate those dilemmas?

In Chapter 2 we suggested a framework for answering these questions based on an approach that looked at grassroots innovation as a technology-oriented social movement. We developed the concepts of contexts, framings, spaces and strategies, and pathways in order to help us look consistently at each case study while remaining open to its particularities. In this chapter we use the framework to analyse our grassroots innovation movements. Thus the chapter is structured in order to look in greater depth at framings, spaces and strategies, and pathways, and in so doing to provide answers to our research questions.

Each of the case studies demonstrates how the specific historical context is important to understanding the emergence of a grassroots innovation movement. Contexts were generative of each movement and provided opportunities for them, but contexts simultaneously presented limitations and challenges to movement developments. Emerging movements made sense of these contexts and sought to act in and upon them through the adoption and development of different framings.

All case studies saw movements opening up and occupying a variety of different spaces, and leveraging diverse strategies, in order to do innovation and contribute to sustainable developments. Dilemmas came in the form of strategic choices over what kinds of spaces to occupy and how to make most effective use of them.

What we find overall is that grassroots innovation movements emerge variously for the purposes of promoting grassroots ingenuity, empowering innovative communities and seeking to transform wider social structures. This proceeds through a variety of spaces supportive towards these aims and where resources can be furnished, but a major dilemma confronting movements is whether to realize their aims by trying to insert themselves into prevailing institutions for innovation, or to seek to mobilize support for transforming those institutions.

Framing grassroots innovation movements

In Chapter 2 we introduced the concept of framings in order to analyse how grassroots innovation movements form a collective self-understanding of their purposes and a coordinated interpretation of the worlds in which they act. Frames are seen as a fundamental part of the affirmation of collective identity, values, motivations and visions of change, and a reference point for action, as well as being shaped through action. Framing is understood to be a process negotiated among activists, in which commitments towards the promotion of grassroots innovation are given more specific form. Such negotiations seek to prioritize different motivating factors; suggest different roles for grassroots groups; guide activity towards different opportunities and possibilities in a society; emphasize different kinds of knowledge production and parts of innovation processes or expected outcomes; identify and promote certain exemplary artefacts and technologies; and manifest in contrasting strategies for promoting grassroots innovation.

The work of framing was usually triggered by contradictions in society on issues such as economic development, sustainability, employment and social inclusion or access to certain technologies, but also ideas and opportunities for overcoming these problems. With our case studies arising through different socio-historic conditions, cultural ideas and problems in a variety of locations, we expected each of our movements to frame its approach to innovation and mobilization in different ways. Moreover, Chapter 2 anticipated framings being under pressure to evolve over time, in the light of experience and social learning within a movement, and also in response to changing circumstances in the wider world.

Our case studies identified a need for flexibility in movement framings and a degree of plurality in order to accommodate heterogeneity of motivations, values and interests among the alliances making up the movements; but the flexibility and plurality of these framings had, at the same time, to retain sufficient coherence and consistency to hold movements together and keep them working effectively. Table 9.1 summarizes the contexts and framings for each of the grassroots innovation movements that we studied. While the comparison affirms some of the variety and context sensitivity of framing that we expected, there are also broad similarities

TABLE 9.1 A summary of the context and framings for grassroots innovation in each case study movement

<i>Movement</i>	<i>Context</i>	<i>Framings</i>
Socially useful production in the UK (mid-1970s to mid-1980s)	Manufacturing decline, new automating machine tools, job losses Restructuring and relocation of industrial capital in services, finance and overseas Grassroots socialism in trade unions, municipalities, communities and polytechnics New social movements for peace, environment and women Gradual rise and institutionalization of neoliberal ideology	Design, innovation and production for social purpose and environment rather than profit and military application Workplace democracy and skill-enhancing, worker-centred technologies Participatory design, community involvement, democratization of technology development Technological agitprop, alternative economic strategy, state support
Appropriate technology in South America (1970s and 1980s)	Political upheaval, social mobilization, state repression Structuralist ideas for autonomous development cede to neoliberal ideology Debt crises, economic restructuring, loss of industrial sectors Rise of development NGOs and environmental concerns Activism in social projects, in contrast to full-out political mobilizations	Technology of a form and scale appropriable as a tool for autonomous development by local communities Practical projects as site for developing social conscience and solidarity Community participation, traditional knowledge and indigenous rights Technology as a tool for development with attention to resource use/environmental impacts
People's Science Movement in India (1970s to present)	Indian freedom movements, Gandhian village self-sufficiency, Nehruvian heavy industrialization Science policy for 'weaker sections' in society Debates about opening Indian markets and introducing intellectual property regimes Social movements of urban and rural poor, environment	Enhancing indigenous resources and capabilities with introduction of appropriate science and technology Cooperatives and collective production systems at district scale Local area planning, organization and coordination Upgrading traditional production sectors and organizing their workers (e.g. food processing, handicrafts, construction, energy)

(continued)

TABLE 9.1 (continued)

<i>Movement</i>	<i>Context</i>	<i>Framings</i>
Hackerspaces, fablabs and makerspaces (2000s to present)	Free software movement and later, hacker and maker movements Accessible digital fabrication technologies Silicon Valley entrepreneurship and technological optimism Precarious employment, co-working, freelancing and social entrepreneurship Horizontality, peer-to-peer collaboration, openness	Open source, peer-to-peer collaborative design and fabrication Personalized manufacturing, mass customization, skills and entrepreneurship Democratizing technology and the right to hack, fix and repurpose Mobilizing for sustainable developments Decentralizing manufacturing
Social Technology Network in Brazil (2000s to 2010s)	Social movement links to Workers Party, Lula presidency from 2004, and ensuing state support for participatory development and solidarity economy Debt crises, uneven economic growth, persistent inequalities Corporate social responsibility funds and programmes Awareness of earlier generation of appropriate technologies	Moving beyond isolated appropriate technology projects Social technology as participatory process of empowering communities for local development Redesigning science policy agenda to include a programme for social technology Portfolio of specific social technologies suited for wide-scale replication and appropriation
Honey Bee Network in India (1980s to present)	Inventiveness and wealth of traditional knowledge among India's grassroots Frustration with development professions appropriating knowledge from grassroots Neoliberal opening of India in 1990s and 2000s New innovation discourse and institutions in India	Democratizing technology and developing tools for solidarity Giving due recognition to grassroots inventiveness and knowledge Prevailing innovations institutions repurposed for individual grassroots innovators Scouting for inventions, attribution of IPRs, resources for commercialization, support with marketing Fair and just rewards for grassroots inventiveness

in the extent to which framings address grassroots innovation as an act of ingenuity, empowerment or transformation.

We return to these common issues in framing later. Here we briefly summarize some of the more particular details of the framings in each case study. We do so in a way that highlights issues raised by the case studies and which those movements have to confront, including: the breadth and ambition of movement framings; whether to align with opportunities presented by institutional changes or to oppose their limitations; how movements reluctant to adopt explicit framings risk imposition of de facto framing; and how framings that may not achieve all their ambitions in practice nevertheless generate innovative practices that do endure, because they make sense to others beyond the movement. Framing issues are also important because they inform the choice of spaces and strategies pursued by movements for the development of grassroots innovation.

As explained below, movement framings went far beyond narrow and technical matters of grassroots innovation, and situated immediate and practical activities within broader visions for alternative pathways for economic and social development. While these gave purpose, meaning and motivation for supporting grassroots innovation, the realization of these broader visions involved an ambition and agency that was much harder for movements to attain. Movements contained both idealistic and pragmatic framings whose mutual accommodation was not easy.

Framing appropriate technology

The appropriate technology (AT) movement in South America illustrates how a narrow framing of technology development that had been circulating internationally was adopted and fleshed out within broader framings for social change in some contexts. While the framing of appropriate technologies as development interventions to be adopted by poor, rural communities existed, another of the AT frames (one of autonomy and economic self-reliance) resonated well with activists seeking to develop new forms of social activism that avoided a direct confrontation with the state. In this case, an international framework for technology and development resonated with the particular situation of networks of activists in the region; and then the domestication of these ideas led to a reframing that emphasized participation, autonomy and ideas of direct democracy, which were emerging among social movements in the region more generally under conditions of political and economic crisis. Moreover, many proponents of AT in South America sought to combine the rejection of mass industrialization as a pathway to development and the subsequent design of small, low-cost technologies with the need to retrieve indigenous knowledge in rural development. Largely operating away from urban centres, these framing ideas found particular expression in the development of agroecology, although housing and energy for rural communities were also foci of activity.

Some of the regionally inspired aspects to framings of AT have tended to be forgotten with time. What is recalled, if anything, is emblematic AT objects and

guidebooks, and less the attempts at cultivating, say, participatory processes for empowering communities. There may be something in an easy caricature that casts appropriate technologists negatively, as seeing solutions to the complexities of development in simple technology fixes (Smith et al., 2014). But Chapter 4 also points to an overlooked aspect to the movement framing; one that sees grassroots innovation as requiring processes of community participation and empowerment to adapt tools and develop meaningful solutions locally, precisely because specific technology projects reveal and make tangible the complexities of development. This became increasingly apparent to many AT activists as the movement developed.

Framing social technologies

Attention to process and empowerment, as much as designed objects, is something the Social Technology Network (STN) picked up and tried to emphasize from the outset in its framing of grassroots innovation. Some proponents had direct experience from prior AT efforts. They were aware of the pressure to frame grassroots innovation as appropriate devices for diffusion among poorer communities, and they sought to resist this by emphasizing the social processes of building commitment, input and organization in each community where a social technology (ST) would be developed. Such a framing required a programmatic approach for publicly supporting grassroots innovation, rather than isolated development projects led by experts; which meant winning substantial backing and support from the state. For a period, during the early years of the Lula administration, this seemed possible. However, support did not extend as far as reorienting science, technology and innovation agendas and institutions towards the aims, approach and methods of the ST movement. A different framing for the STN became dominant, held by government and corporate associates, which saw ST as installing technologies for specific social development projects (rather like earlier international framings for AT). Tensions between these different framings led to the fragmentation of the network, and support for STs reduced to the development of devices, with much less emphasis on the social processes of community development and empowerment.

In neither the AT nor the ST cases were the broader, more radical framings of grassroots innovation able to hold. They mobilized insufficient power for instituting new social and economic relations in innovation. They were unable to garner support with sufficient reach and duration to change institutions. Rather, narrower framings that appealed to key financial backers, and which did not challenge or disrupt too much, were the ones that dominated in practice. That said, there was recognition of the more radical framings, and these did at least motivate considerable achievements of a more modest kind (such as helping to establish principles and practices for agroecology in the case of AT, or the adoption of participatory construction for rainwater harvesting in the case of social technologies).

The difficulties of finding autonomy from donor agencies in the case of AT, or state politics in the case of STs, ultimately meant that narrower framings had to

be accepted as part of the conditions for supporting projects. Activists could still pursue their own framings within the scope permitted by support programmes, but the parameters were nevertheless defined for them and required negotiation and compromise. Putting into practice the more radical frames for grassroots innovation requires powerful allies, capable of restructuring the social, economic and political relations of innovation. Whether, as in some of the other cases, we are talking about collaborative peer production, more democratic control over technology development and use, or freely available goods and services for people to access and make livelihoods from – all these framings raise challenging questions about the ownership or control of critical resources, access to institutions, control over investment decisions and the ability to shape markets and distribute the value created in grassroots innovation.

Framing people's science

The framings for grassroots innovation in the People's Science Movement (PSM) emerged amid charged political debates about the directions of development in post-colonial India, as well as critical reflections among scientific activists upon the shortcomings of public programmes promoting both high- and low-technology pathways for development. Gandhian visions for village self-sufficiency contrasted with Nehruvian images of modernizing India through high-technology industrialization. Meanwhile, policy programmes for engaging science for poverty reduction were disappointing. Whether through knowledge to upgrade traditional village technologies or by cleverly downsizing industrial high technologies, science and technology programmes were finding the sustainable diffusion of innovations to be elusive. The PSM recognized a failure in both approaches to build the 'social carriers' for pro-poor technologies: the groups who would actually put technology designs to productive, sustainable use. It was this idea that informed the way it framed the articulation of science, technology and innovation with development. The viable practice of any innovative technique (upgraded, downsized or entirely new) simultaneously required a coordinated construction of local economic linkages upstream and downstream of the technique, in order to create a production system at district scale. And, given the social values of the activists, the organization of these necessary social carriers was sought through cooperation among workers in the districts that saw their future in such technology systems.

India has transformed dramatically in political and economic terms during the period in which the PSM has been active. Gradually, the hold of Gandhian and Nehruvian development models has given way to policies that align with the global rise of neoliberalism. The context for grassroots innovation has been changing. Markets for the kinds of goods and services provided by rural producers have become increasingly competitive. Foreign investment promotes more concentrated industrial production and services. Indian economic leaders look to develop activity overseas. And intellectual property regimes exist for knowledge production and use. Yet the issues motivating the PSM persist, whether in terms

of continuing rural and urban poverty, insufficient attention to local development needs by science and technology institutions or environmentally destructive development pathways.

Persistent problems under changed circumstances raise the question of whether, deeper down, the surface changes are reinforcing the same old structural injustices and development traps. Unsurprisingly, the PSM is critical of the structural changes under neoliberalism. Nevertheless, its framings for cooperative organization in district-scale grassroots innovation have to address these changing circumstances (Kaplinsky, 2011). The PSM can draw on long periods of practical experience in working with grassroots innovation, yet the way it frames that work has to continually remain valid for the new realities and stay persuasive for the social movements, smaller-scale producers, political leaders, public administrators and scientists and technologists that the movement seeks as allies.

Framing honey bees

Experience in the contrasting framing of the Honey Bee Network (HBN) indicates different dilemmas in flexibility towards new contexts. India during the 1990s and early 2000s was not alone in experiencing cultural, political and economic disruption under the increasing reach of neoliberal ideology, which extended to ideas for commercially oriented science and technology in market-based developments (Moore et al., 2011). Institutions for patents, venture capital and commercial innovation gained broader recognition within science and technology institutions in many countries. Some grassroots innovation movements have seen opportunities in these transformations, such as in the case of the HBN, but also hackerspaces, fablabs and makerspaces. Ideas for socially entrepreneurial activity have emerged that emphasize the capacity (and the right) of the grassroots to secure ownership over their own innovations. Some grassroots innovation movements have framed themselves within the new institutions for science and technology and used the associated institutional legitimacy to demand recognition and space for grassroots innovation.

A key framing for the HBN, for example, has been to recognize the wealth of local and indigenous knowledge among even the poorest populations, which are capable of creating ingenious tools for improving their lives, and whose wider social and market value justifies an economic return to the innovator. A central thread in the network is to see grassroots entrepreneurship as boosting local development through fostering ingenuity, which can be supported by providing proper recognition to local inventions and by turning them into marketable innovations. The HBN created new possibilities by aligning with policy discourses favourable to innovation. Founder Anil Gupta saw new potential in the economic and institutional reforms of his country for realizing long-standing and deep-seated commitment to traditional knowledge communities and grassroots inventiveness in rural India. That potential meant reframing ideas for commercializing intellectual property, promoted by an emerging political and business establishment as something relevant for India's rural populations, and through which their rich knowledge base could prosper. In this

view, the grassroots had a right to benefit from new innovation policy based in intellectual property, incubating innovation and marketing support.

The HBN made strenuous efforts to catalogue grassroots inventiveness and demonstrate the knowledge that pervades rural India, building impressive databases. Skilfully combining the extensiveness of this resource with inspiring individual examples, the network persuasively framed this activity in a way that gained institutional support for grassroots innovators. The National Innovation Foundation (NIF) and regional organizations aim to link promising grassroots innovators with the apparatus for securing intellectual property rights, incubating product development and expert help with marketing. This framing for grassroots innovation has proved popular with policymakers.

Yet research suggests that grassroots inventors are just as motivated by intrinsic concerns for self-realization and family and community well-being; they do not always wish to become entrepreneurs (Bhaduri and Kumar, 2011). Not all grassroots innovation is enclosed within utility-seeking motivation. Moreover, in going with the grain of prevailing innovation institutions, and undoubtedly winning extraordinary recognition for grassroots inventiveness, the framing is nevertheless susceptible to criticism similar to that attached to the institutional approaches with which it aligns. Questions exist about the extent to which any benefits trickle out to the wider community and just how socially inclusive the reliance is upon individual entrepreneurship. While the Honey Bee framing of grassroots innovation has unlocked the inventiveness of individuals, it is open to argument how this will lead to local development gains beyond the beneficiary innovators. The HBN recognizes the challenge. A more community-oriented framing of grassroots innovation also exists within the movement. The movement is trying to keep the collaborative and collective features of grassroots innovation in the frame also, by talking about peer-to-peer networking among innovators in some of its manifestos (Smith, 2013). However, this framing of innovation within the movement, seeing grassroots knowledge and creativity as a commons, sits awkwardly with the framing that is institutionalizing more conventional marketing activities through the supportive measures of the NIF and others.

Framing hackerspaces, fablabs and makerspaces

At the heart of the HBN is a quite straightforward, immediate and alluring idea: that there is a wealth of knowledge, creativity and inventiveness in rural India. The heterogeneous collection of hackerspaces, fablabs and makerspaces holds in common another straightforward, immediate and alluring idea. This time it is the idea that giving tools to people can unlock radical capabilities for self-development and social change, and especially the increasingly accessible and networked tools of digital design and fabrication. A variety of framings are brought to bear in trying to work out how to make the most of this potential. What is striking is how many of those framings take their point of departure from the same analogy, namely the origins of personal computing, free software and open, networked culture. Yet that

common genesis in free software and open culture is framed in different ways and taken in different directions.

For some, the buzz about being able to make almost anything in these *unstructured* spaces, and getting involved in all sorts of fun projects that participants deem to be important, is the whole point. Any further framing of the purposes of these workshops, beyond their being open-ended spaces for experimentation, collaboration and prototyping, risks forcing them into particular moulds and pushes them in specific directions. Framing the purposes and potential of workshops too strongly imposes structure upon an unstructured space. There is much to this argument. Ironically, many of the framings of hacking, making and fixing identified in Chapter 6 depend on an ability to keep things open and free from structures. People need the freedom to play with issues, designs and technologies in order to be able to engage in the debating and doing of any further possibilities, whether those possibilities are framed as democratization of technology, peer-to-peer collaborative production, participatory design in digital futures, sustainable developments or becoming entrepreneurs and workers in new, decentralized webs of manufacturing.

Yet we live in a structured world. Inattention towards these 'external' social structures could mean that it is they that ultimately come to frame community-based workshops by default. Clearer, more articulate framings of grassroots innovation have the advantage of providing a measure against which to continually open up activities to critical reflection about possibilities, limitations and challenges. In the case of hackerspaces, fablabs and makerspaces, new-found popular accessibility to versatile design and fabrication technologies in societies has the feel of an answer looking for the right question. Access to these tools has historically been the privilege of manufacturing enterprises; and under circumstances where the terms of access to capital for development, the availability of infrastructure for prototyping, the ability to influence the forces that shape markets, the channels forming aesthetic sensibilities and so forth all present a highly uneven terrain whose structure is simultaneously cultural, organizational, economic, political and technological, and in which some innovating actors find themselves better positioned than others. Arguably, if the goal is transformative change, it is important for this grassroots innovation movement to better articulate framings that push against these structural conditions, and orient its activity towards broader purposes, such as democratizing technology and trying to insert the normative goals of cultivating sustainable developments, and to thereby structure workshop activities accordingly. Otherwise any potential in giving tools to people risks becoming just another consumption activity within the consumer societies where makerspaces are proving popular.

Putting the criticism crudely, people come to the workshops, adapt a design accessed freely over the web, use open hardware tools, but only to make a plastic object that essentially serves little purpose beyond being a memento of a fun afternoon in the workshop. Other makers are developing enterprising technologies and products, and workshops are cultivating grassroots ingenuity that could lead to economic activity – but it is viewed as entrepreneurship within a conventional start-up business frame. Many firms are noticing maker activity too and are

marketing targeted materials, designs, guides and tools for that activity. Other firms seek to appropriate outputs by linking with more entrepreneurially inclined makers and helping them to get to market. There are also education and training institutions interested in adapting these workshops to training people for work and entrepreneurship. Seen in this light, framings for hackerspaces, fablabs and makerspaces appear really important because they situate access to tools within a social frame of reference. In Chapter 6 we saw examples that were trying to frame workshops in that way as hubs for cultivating sustainable developments locally – a framing relevant to this book. In trying to pursue their goals, however, these framings struggled to articulate the cultural, social, economic and political relations implied.

Framing socially useful production

The movement for socially useful production had a relatively strong framing of the structural issues it was addressing. Informed by the socialist political commitments of core activists, the grassroots innovations it promoted were framed within alternative industrial and economic strategy. The state was positioned as playing an active role, whether through legislating for workplace democracy, administering popular planning, socializing markets for products or instigating participatory design. At the municipal scale, sympathetic leaders at the Greater London Council (GLC) were able to implement these roles, most noticeably with the London Technology Networks and the Enterprise Board's commitment to cooperative enterprises. Movement framings were informed by an unusual amalgam of grassroots trade union activity, organizing the shop-floor insights of skilled manufacturing workers, and social demands from movements for peace, environment and community activism. The root causes to their varied problems were identified in capitalist economic relations, whose insatiable demand for accumulation did not appear to align with social good and environmental sustainability, alienated people from their own labour and were mired in a self-serving military-industrial complex that, in the context of the Cold War, had a self-interest in perpetuating insecurity through weapons development.

The technological agitprop of socially useful production rested in developing devices, practices and facilities that anticipated more directly democratic social, economic and political relations: popular prototyping, community workshops, cooperative enterprises and participatory economic planning. Realization of the broader, structurally aware framing required support, commitment and alignments from more powerful social actors in politics, the state and society. But sufficient support did not materialize. The Labour Party hierarchy, both when in government and in opposition, did not embrace the grassroots movement, neither did leaders in the established trade unions; and, ultimately, neither did the electoral system, which brought the Conservatives to power in the general election of 1979. Popular as the movement may have been, it was not powerful enough to shape political and economic transformations in the UK, which were eventually won by the forces of neoliberalism.

Despite being overwhelmed by wider social changes, the framings of socially useful production nevertheless contained very practical elements that enabled people to get on and do things and be innovative. There were tensions between those who were pragmatic towards the opportunities available (and which narrowed over time) and those who wanted to continue with a political programme of resistance to structural changes (see Eglash and Banks, 2014). Ultimately, however, the movement found itself exhausted by swimming against the political and economic tide. Activists moved on. The ideas, arguments and examples they provided – for participatory design, socially useful products and thinking about social questions of work, gender and environment in technology development – did not disappear. Rather, they dispersed and morphed into other spheres, whether in academia, community development, local economic development or elsewhere, and the earlier expression within socially useful production became a distant memory, forgotten and overlooked.

Framing grassroots innovation: ingenuity, empowerment, transformation

A remarkable and gratifying aspect of research on these diverse framings and histories of grassroots innovation has been the positive reception, whenever and wherever we presented the case studies, among audiences with different backgrounds, involvements and interests. Always the curiosity shown in the experiences we have reported from elsewhere has been heartening. We have publicized these cases in blogs, articles, presentations, events, radio interviews, talks and workshops and through social media. One particularly striking example has been the case of the movement for socially useful production, which seems to have struck a chord with hackers, makers and fixers today. We have received many invitations to talk about this history and it has been cited in articles about hackers, makers and fixers (e.g. Holman, 2015). Our impression is that the familiarity of the practices being pursued back then, as well as some shared ideals, albeit framed in different ways socially and politically speaking, all works to provide an enchanting and informative story. There is, simultaneously, recognition of shared struggles, connection with similar social roots and visions, interest in the differences, and also questions about what lessons diverse experiences hold for activities today. The same has been true for discussions about the AT movement in South America, and with the PSM and the HBN in India. Each provides beneficial vantage points from which people can take bearings and reflect on their own involvement in grassroots innovation (see also Chapter 10).

Part of this appetite, we think, derives from deep-seated features of framings that are common to all the grassroots innovation movements we have studied. Those features are the extent to which grassroots innovation activity is framed by a movement as a question of promoting ingenuity, community empowerment or structural transformation. That is to say, whether grassroots innovation is framed principally as the generation of novel initiatives, as a process for empowering local

communities or as pointing to structural problems in conventional innovation institutions that require wider transformation. Drawing on our case studies, we finish our analysis of framings by elaborating these common fundamentals.

The *grassroots ingenuity* framing emphasizes processes that generate novel initiatives, products and services, and aims to develop and diffuse the objects produced. Support is framed and organized in a way that works to such ends. Grassroots innovation is seen mainly in a technical light, and the concern is with improving performance in such a way that the innovation can be rolled out and scaled up beyond the original grassroots setting, whether through commercialization in markets, as a good development practice in public programmes, or as an emblematic activity and symbol for social changes sought by social movements. Under the ingenuity framing, innovations move from inside grassroots activity outwards: it is in the ingenuity and knowledge of individuals and groups with respect to specific issues and solutions that the process begins; and support seeks to build on that ingenuity, improve the specific innovation and help it spread.

A *grassroots empowerment* framing is more interested in cultivating the enabling social relationships and material conditions in the local communities where grassroots innovation takes place. Innovation is seen as an opportunity for inducing a broader range of capability building among local communities that can be deployed for subsequent local development activities beyond the specific issue and innovation activity. With an emphasis on empowerment, so the framing may also draw in tools and resources whose origins may have begun outside a grassroots setting, but whose appropriation and adaptation is in the hands of local communities, and with those local communities retaining control over the process and decisions on how to distribute the benefits.

Framing grassroots innovation as *transformation* is borne of recognition that, in trying to do things differently, these activities actually confront and make visible structural issues of economic power, uneven development, political inequalities and social standing. The grassroots innovation activity is seen as pointing to alternative possibilities, were such structural limitations to be overcome. The grassroots innovation deliberately challenges norms and expectations. For example, there is resistance to the enclosure of the innovation through intellectual property, or its reduction to a good or service to be scaled up. Instead, there is an insistence upon the innovation, however imperfectly, to be an exploration in, say, a more democratic way of developing technology, or more inclusive innovation processes, or creating a knowledge commons that is accessible to everyone. Moreover, in pointing to limitations under conventional innovation institutions and incumbent development pathways, this framing emphasizes critical reflection with regard to the criteria against which good innovation performance is assessed, and the attribution of limitations to conditions in the wider institutional and social context rather than inherent to the grassroots innovation activity. Alternative institutional arrangements are informed and conceived by these wider transformational aspirations for the grassroots innovation that would enable it to flourish. This framing identifies the operation of power in setting the terms for innovation, and mobilizes

alliances that contribute to transformational political programmes for structural change and that open up alternative development pathways of the kind that the more critical grassroots innovators anticipate.

Obviously, these three basic framings are elaborated, specified and expressed in different ways by each grassroots innovation movement. Each movement also has to negotiate how to balance its emphasis and focus between these basic framings. In principle, each complements the other. Empowered local communities ought to be better able to express their ingenuity and may seek to restructure institutions, while restructured innovation institutions responsive to grassroots criticism would be in better shape to support plural alternative development pathways. In practice, as we have seen in our case studies and in the discussion above, negotiating these framings in ways that build alliances and draw in institutions is not straightforward. We also see in the cases that science, technology and innovation institutions tend to have great affinity with the ingenuity framing, due to its greater interpretive flexibility, compared to the more demanding empowerment and transformation framings. The balance between these different framings will also influence where and how movements try to create spaces for practical activities, or the spaces into which they get invited. Business and policy spaces promoting inclusive innovation, for example, are likely to be much more open to movements that emphasize ingenuity, and even empowerment, compared to those seeking structural transformations. Movements that seek the latter are likely to look for spaces elsewhere. On this point, we now turn to consider the spaces and strategies that grassroots movements create and through which they seek to realize their framings.

Spaces and strategies for grassroots innovation

Spaces and strategies are those locations and coordinated actions that movements use to promote and cultivate grassroots innovation. While broader contexts were found to be generative of grassroots movements, in the sense that they were problematically failing to attend to some need or social value that grassroots innovators were addressing, our concept of spaces looks for situations conducive to the grassroots development of responses and solutions. In Chapter 2 we anticipated these situations arising across different physical, institutional and discursive spaces. We also considered the various kinds of action repertoires that might strategically open up and claim more space for practical grassroots innovation activity. Table 9.2 provides a summary of the various spaces and strategies we found in each of our case studies.

Obviously, an important space for all the case studies is the grassroots: the spaces that local communities inhabit and where activists operate. The grassroots spaces we came across included villages, factories, farms, neighbourhoods, community centres and street corners. These spaces are not simply physical, but are also social: the community relations and cultural resources that can be harnessed for the purposes of grassroots innovation, and through which supportive movements can find a base and develop. It is in these spaces that needs are identified and aspirations arise, but it

TABLE 9.2 Spaces and strategies for grassroots innovation

<i>Movement</i>	<i>Spaces opened up</i>	<i>Strategic activities</i>
Socially useful production in the UK (mid-1970s to mid-1980s)	Trade union facilities, events, organizational apparatus Factory shop floor – borrowing tools and resources Neighbourhoods Polytechnics – staff and buildings Local authorities – policies and funds Community workshops	Prototyping – technological agitprop, product banks, designs Media publicity – TV programmes, newspaper reports, books Trade union organization – motions, policies, conferences, visits, meetings Lobbying government and industrial action Linking to social movements and community activism Training people into new technologies, e.g. women into computing
Appropriate technology in South America (1970s and 1980s)	Dedicated development centres for appropriate technology Villages and field trials International development conferences, programmes and networks Support from public research institutes Links with university research groups	Prototyping Consultancy and production services Training appropriate technologists in the region Student research projects Community development initiatives Manuals and guidebooks Publishing magazines Grants from international development agencies Centre visits by high-profile national and international figures (Colombia)
People's Science Movement in India (1970s to present)	Research institutes and technology development centres Villages, field trials and cooperative systems Voluntary organizations Sympathetic governments and departments (e.g. programmes in Kerala) Annual conferences and regional meetings Processing facilities	Creating social carriers, e.g. through resource mapping, assessing village capabilities, organizing for cooperatives Project grants and public rural development programmes Consultancy and production services Product development and social marketing Science literacy campaigns

(continued)

TABLE 9.2 (continued)

<i>Movement</i>	<i>Spaces opened up</i>	<i>Strategic activities</i>
Hackerspaces, fablabs and makerspaces (2000s to present)	Community workshops Neighbourhoods Online networks of makers, hackers and geeks Education institutions – universities and schools Libraries and civic organizations Co-working spaces and innovation incubators Public programmes	Collaborative design and prototyping Meet-ups, conferences, events Training activities and networks Online networking, offline meet-ups Emblematic projects and specialist fields, e.g. open source furniture
Social Technology Network in Brazil (2000s to 2010s)	Villages Universities Local authority programmes Field trials and extension services Corporate social responsibility	Funding programmes from government and corporate foundations Awards and databases of social technologies Research, development and training in reapplication of technologies Emblematic initiatives (e.g. One Million Cisterns, PAIS) Meetings and conferences for network members
Honey Bee Network in India (1980s to present)	Villages Academia and student volunteers Research institutes International conferences and regional networks Business interested in licensing inventions and marketing products	Scouting and databases Product development and intellectual property provision Media publicity Challenges for engineering and science students Competitions and awards for innovations Micro-venture capital and business partnerships

is also where innovative ideas are discussed, and where initiatives develop through prototyping, field trials and the mobilization of results. Grassroots media for communicating and sharing knowledge and practices were important in all the cases, whether operating through newsletters, public meetings, noticeboards, meetings or internet-based social media.

We also saw protagonists in all the cases taking advantage of opportunities beyond the grassroots and seeking to open more space by forging alliances with sympathetic actors, whether working in research centres, trade unions, social movements, companies or local authorities, for example. The forms and level of supportive protection for grassroots innovation in these spaces are the result of the relationships negotiated with allies beyond the grassroots. Extra space for doing grassroots innovation was also sought by aligning activities with institutions in order to benefit from potential opportunities, such as positioning grassroots innovation as a worthy recipient of support through public policy programmes, or corporate social responsibility funds, or NGO campaigns, university research or business investment.

Each of these spaces was offered different kinds of resource and opportunity. The facilities made available at a research institute, for instance, are first and foremost dedicated to improving a prototype and validating its technical performance standards, but grassroots innovation groups also might reciprocally provide experimental spaces for student research and training (e.g. the case of the eco-community Gaviotas with various universities in Colombia). Innovation incubation centres provide services for developing business plans and marketing strategies. A local development programme might provide platforms for coordinating links with related economic sectors. The campaigns of social movement organizations provide a platform for advancing broader framings concerning, say, social inclusion, alternative economic development or democratization of technology (e.g. the motions at trade union conferences for industrial democracy framings of socially useful production). Social movement platforms provide political and social resources which are supportive towards grassroots innovation that is emblematic of the social values of concern, and which work to advance the social performance of grassroots innovation in ways quite different from the resources of, say, a research laboratory, which serve to validate and improve technical performance. It is the breadth and variety of resources that is important.

Rarely are the spaces for cultivating grassroots innovation found readily. They have to be actively opened up and occupied through negotiation, persuasion and validation. Some of the activities by which this is realized include prototyping; media campaigns; research, analysis and demonstration; scouting, documenting, awards schemes and other forms of recognition; community development and mobilization; education and awareness raising; and lobbying.

Such activities involve listening to needs, articulating ideas, mobilizing capabilities and resources, and spreading awareness about grassroots innovation. These activities work through networks of actors that seek to operate across these different spaces and that connect different actors. Indeed, it is this activity – pushing

beyond the grassroots – that transforms isolated grassroots innovation initiatives into a movement for grassroots innovation. What we find across the cases is just how closely spaces and activities for the provision of material resources and opportunities for doing grassroots innovation are intertwined with arenas for promoting ideas, analysis and arguments about grassroots innovation. In this way, practical and symbolic commitments can be mobilized for working on grassroots innovation across a greater number of locations or to develop activities and processes for helping to spread grassroots innovation.

However, the activities listed in Table 9.2 do not really indicate their strategic *purposes* in terms of what precisely these strategic activities are seeking to achieve for grassroots innovation. Here the framings of the grassroots innovation movement are important – in giving purpose and direction. So, for example, a strategic activity that we see in some cases is to forge links with educational institutions and bring grassroots innovation into training activities. But strategies vary in terms of whether they furnish grassroots innovation as an ingenious project for learners in existing courses, or whether they are training to empower the community involved, or whether a framing is being followed that is trying to transform training for entirely different purposes and processes for training. Even prototyping, common to all grassroots innovation movements, is put to varied strategic purposes, and consequently takes on different forms. We have seen in the case of the HBN, for example, the development of sophisticated processes for taking an initial grassroots innovation from the field and through to product development. Prototyping here is informed by a grassroots ingenuity framing and consequently focused in product development for marketing. Activists in the movement for socially useful production, in contrast, included a technological agitprop strategy towards prototyping: in seeking technologies neglected by industry, activists were pointing to the deeper causes of that neglect, which they believed to derive from production for profit rather than social use. Technology network managers in the movement saw prototyping as much about building awareness and local alliances over social issues. They wanted to transform manufacturing as much as prototype the development of a physical artefact. The PSM similarly pursued more expansive prototyping strategies, in this case for developing regional systems and social carriers around the technology as part of local economic development. In both these cases, while the development of the prototype into a product remained a goal, activists saw prototyping more politically, as anticipating alternative production systems and building cooperative alliances for their realization.

The variety of strategies has implications for the kinds of spaces that movements seek out for grassroots innovation, and the ways they occupy those spaces effectively. As with framings, however, it is possible to discern across our cases some deeper patterns amid the diversity, and which underpin and give dynamism to that variety. We see the fundamental choice resting between the pursuit of deeper strategies of *insertion* within existing institutions of science, technology and innovation or strategies of *mobilization* to transform institutions (see also Fressoli et al., 2014). These two strategic orientations are contrasted in Table 9.3. In practice, all grassroots innovation

TABLE 9.3 Insertion and mobilization strategies for grassroots innovation movements

<i>Salient features</i>	<i>Insertion</i>	<i>Mobilization</i>
Relationship with institutions	Fit and conform to institutional requirements	Stretch and transform institutions for new goals
Core spaces for activity	Institutional spaces, e.g. laboratories, marketing, standards institutes	Activist spaces, e.g. social movement arenas, campaigns, community projects
Sources of validation	Performance to established innovation criteria, e.g. competitiveness, market diffusion, scale or even environmental impact	Demonstration for alternative criteria, e.g. social inclusion, community development, sustainability – as defined by a community
Kind of work emphasized	Technical work: improving conventional standards of performance, economic efficiency, codified knowledge, best practices	Political work: embodying social values in the innovation, building supportive alliances, articulating a social vision
Underlying logic	Proprietary: enclosure and attribution of innovation to a group or individual	Commons: cooperation and sharing of innovation through open networks
Expression and ordering of grassroots innovation framings	Ingenuity is embodied in individuals; empowerment through entrepreneurial activity; transformation of grassroots into something more formal and business-like	Transformation of institutions is the aim; empowerment works through collective and cooperative activity; ingenuity is distributed across networks

movements have to negotiate an uneasy combination of strategies of insertion and strategies for mobilization to varying degrees.

Strategies of insertion seek to make grassroots innovation legible, useful and appropriate for existing institutions. The aim is to align with dominant development paths. The strategic work rests in moving the outputs of grassroots innovation activity into existing innovation systems and product markets. That involves making grassroots innovations more like conventional innovations. Looking across the case studies, we find various strategic activities for doing this work; these include fitting into conventional innovation spaces and playing by the rules of dominant institutions, whether that is meeting the requirements of standards agencies, satisfying the expectations of investment, conforming to cultures of credibility, aligning to the demands of market consumers and so forth. Strategy brings the innovator into contact with more conventional development and technology institutions, where expertise helps to formalize the innovation into a product that can diffuse more readily, or to transform it into a scaled-up form.

Strategies for mobilization seek to use grassroots innovation in the cultivation of alternative institutions for innovation and the transformation of conventional ways of addressing experimentation in development. The aim is to develop alternative

pathways. The strategic work rests in building influential alliances that are capable of challenging dominant technologies, innovation practices, power relations and discourses, and able to advance the grassroots alternatives. That involves making grassroots innovations meaningful to the agents pursuing alternative developments, whether in social movements, government, research, education or business. From the case studies we see that various strategic activities are open to doing this mobilization work. These include the promotion of specific innovations as emblematic for social values marginalized in existing institutions, engaging grassroots innovation in the transformational spaces where social movements operate, demanding a rethink and a reordering of criteria and processes for socially selecting and shaping innovation, questioning the assumptions within existing institutions for innovation, providing training materials in the new approaches or recruiting support from heterodox scientists and technologists.

What we find in the cases is that these broad strategies are fine-tuned and used dynamically, depending upon the degree of openness and risks of capture presented by mainstream science, technology and innovation institutions. These strategies are also used in combination and dynamically to different degrees in the light of experience. In practice, grassroots innovation movements navigate between the poles in Table 9.3. So, for example, the HBN worked for many years at the careful mobilization of interest, legitimacy and commitment towards grassroots innovation framed as grassroots ingenuity. Such mobilization challenged the norms of conventional institutions by arguing and demonstrating that innovation was not the exclusive preserve of the scientific establishment, and that creative solutions with immediate development benefits existed amid the wealth of overlooked knowledge in rural India. Having pursued its mobilization strategy successfully, the HBN was then able to strategically insert grassroots innovation into innovation institutions, through the creation of organizations that secure intellectual property, product development and help with marketing for specific grassroots innovators.

Similarly, hackerspaces, fablabs and makerspaces have mobilized around enthusiasm for digital fabrication and making, and the grassroots ingenuity so revealed has attracted considerable attention and interest. However, there is no clear strategy across the movement over where to take developments and interest, with some organizations, such as the Fab Foundation, following an insertion strategy, while others, such as hackerspace networks, are concerned to retain autonomy. There are groups and activities interested in the more transformational possibilities anticipated in community workshops and accessible design and fabrication tools, including the decentralization and democratization of design and production, but mobilization strategies for doing this remain underdeveloped. Indeed, the capacity for different currents of activity within movements to switch from mobilization to insertion, or to pursue combinations at the same time, even contradictorily, can be regarded as a deliberate attempt to retain autonomy yet progress activity. In the case of the One Million Cisterns Programme supported by the STN, for instance, earlier episodes of mobilization resurfaced when the insertion of rainwater harvesting into policy programmes threatened to close down community development features. This

involved turning back to activist spaces in order that policy aspirations to accelerate roll-out did not come at the expense of local participation.

In the PSM and the movement for socially useful production we have cases that are attached strongly to transformation framings, and so more inclined towards strategies of mobilization than insertion. Nevertheless, when opportunities arise there is willingness to enter institutional spaces and use ambiguities and flexibilities in those programmes to pursue more transformational strategies, as the PSMs did with technology and rural development programmes in India, and as socially useful production activists did with links to polytechnics. However, strategic options and conducive spaces can and do close down at times. The AT movement in South America struggled to outlast the decline in international donor funding for its projects, centres and networks. Arguably, regional autonomy was won through dependency on international programmes and spaces, and an inability or unwillingness to become more inserted into regional institutions left the movement vulnerable. Wider social, economic and political forces eventually closed down spaces and strategic options for the movement for socially useful production too.

The fate of some of the case studies reminds us that both the ability to open spaces and the strategic choices available will always be constrained by wider developments as well as being shaped by the movement framings in play. Grassroots innovation movements exist in a dynamic and recursive relationship between contexts, framings, spaces and strategies. In the final section of this chapter we consider what this means for the kinds of development pathways that grassroots innovation movements are able to open up.

Pathways

The pathways concept recognizes that for any given situation there exist a plurality of directions in which sustainable developments can be pursued. There can be dominant development pathways, whose framings of the world and alignment with institutions give the pathway considerable momentum, and which tend to draw upon and reinforce wider power relations in societies. An example is the pursuit of a green economy led by business leaders and political elites and reliant upon market-based approaches and a neoliberal ideological apparatus (Scoones et al., 2015). As such, dominant pathways become locked in to certain directions of development (Leach et al., 2010). When confronted with pressures for change, such as demands for more sustainable developments, then incremental reforms along the historical pathway are usually easier, as compared to wholesale redirections of development. A corollary of this is that these widely institutionalized pathways tend to lock out other, more radically different pathway directions. These alternative pathways may be no less viable, perhaps even more viable under certain sustainability criteria, but they are at a structural disadvantage as compared to the privileges of dominant pathways. Concerted and enduring pressure for change can reorder these situations and open things up to alternatives by eroding the efficacy and legitimacy of the institutions and power relations reproducing dominant pathways.

We have seen in our case studies how grassroots innovation movements become involved in pathways in a number of ways. This may happen by their own design, or through other groups beyond the grassroots co-opting solutions for incremental repair work to dominant development pathways, or through groups committed to more radical pathways seeing in grassroots solutions an embodiment of social values that bolsters momentum for the development directions they seek. In Chapter 2 we explained how this pathways concept was useful for analysing the contributions of grassroots innovation movements to alternative directions for sustainable developments.

In the preceding sections of this chapter we considered the different framings held by grassroots innovation movements and how they informed the kinds of development activity towards which the movements considered their innovations to be contributing. We subsequently looked at movement spaces and strategies for realizing these framings in material activity that contributes to development pathways. Table 9.4 brings the analysis together by indicating the spaces and strategies most evident under different framings of grassroots innovation movements, as well as their primary focus and emphasis of pathway activity. These affordances are not deterministic: indeed the cases point to dynamic coexistence.

The final row in Table 9.4 considers how grassroots innovation movements contribute to development pathways. To an extent, the development pathways that the movements seek for themselves can be discerned in their core framings: for example, regional economic systems based in cooperative relations of production (PSM); autonomous local development (AT movement and STN in South America); recognition and reward for grassroots ingenuity (HBN); commons-based peer production of goods and services (hackerspaces, fablabs and makerspaces); workplace and community participation in technology development and production (movement for socially useful production). However, the plurality of framings evident in each movement also introduced ambiguity over the precise directions. This was perhaps most evident in the case of hackerspaces, fablabs and makerspaces, where considerable difference exists in the directions in which one can take the core idea of workshops for giving tools to people. Departing in a direction less

TABLE 9.4 Framings, spaces and strategies, and pathways for grassroots innovation movements

<i>Framing</i>	<i>Grassroots ingenuity</i>	<i>Grassroots empowerment</i>	<i>Grassroots transformation</i>
Focus	Objects	Communities	Structures
Spaces	Spaces for prototyping	Spaces for building social capabilities	Spaces for social change
Strategies	Insertion: fit and conform	Mobilization for insertion: fit and stretch	Mobilizing for change: stretch and transform
Pathway activity	Contributing specific grassroots innovations	Contributing skills and capabilities to innovative communities	Contributing critical awareness and social organization for alternatives

radically visionary than commons-based peer production were those makers, hackers and fixers using the facilities to kick-start their own enterprises, or to build alliances with educational institutions and training programmes, and so become inserted into supplying future technology workers into labour markets. Much more radical are those framings that envisaged a democratization of manufacturing; through tools that lowered entry barriers for debating, prototyping and participating in key design decisions, and more directly through decentralized, commons-based production facilities. Others envisage such restructuring becoming suffused with the principles of sustainable development. However, the alliances for mobilizing these framings in the wider social world, and for building a strong social and economic base, remain unclear. Ambiguity was also evident in the STN, this time between a pathway seeking to empower and equip communities with the tools for their own self-development and a pathway focused more in the development of pro-poor technologies. Alliances in social development were appreciative of the former, but alliances with actors in science and technology institutions looked more to the latter.

An important feature here is that ambiguity over framings, spaces and strategies also opens up interpretative flexibility and practical possibilities for groups beyond the grassroots movement. These other groups become interested in particular features of the grassroots innovation activities and consider forming alliances around those features and getting involved for their own purposes. They also can help to open up new spaces and build different pathways by making use of some of the contributions of grassroots innovation movements. Table 9.5 catalogues in more detail some of the different contributions coming from the grassroots innovation movements studied. What is important here is to acknowledge the varied knowledge, artefacts, methodologies, infrastructures, actors, alliances, concepts and ideas being created by grassroots innovation movements.

The extent to which grassroots innovation contributions are taken up and used in pathways depends on the nature of the alliances forged with others, and even on

TABLE 9.5 Contributions to development pathways coming from grassroots innovation movements

<i>Pathway contribution</i>	<i>Description</i>	<i>Examples</i>
Knowledge	A variety of relevant contextual and technological knowledge is created through grassroots innovation activity	Knowledge about community aspirations and social needs Know-how in providing solutions to problems Critical knowledge about socio-economic limitations on grassroots activity
Artefacts	The development of novel objects and services	Solar heaters, water collectors, non-toxic leather tanning, water-cooled refrigerator, open source book scanner

(continued)

TABLE 9.5 (continued)

<i>Pathway contribution</i>	<i>Description</i>	<i>Examples</i>
Methodologies	Procedures for involving people in knowledge production, design and developments	Participatory design, agroecological techniques, open and collaborative prototyping, grassroots entrepreneurship, scouting, prizes
Infrastructures	Facilities for people to access tools and enter into development spaces	Workshops, training centres, databases of open designs, shared tools, skill-swapping events, mentoring facilities, web platforms
Actors and alliances	New identities and social relations formed through grassroots innovation activity	Grassroots innovator, innovation scout, citizen scientist, empowered community, solidarity through prototyping, mutual awareness
Concepts and ideas	New ways of thinking and approaching innovation activities and their purposes	Appropriate and social technologies, commons-based peer production, grassroots ingenuity, empowerment, transformation, democratizing innovation, socially useful production
Capabilities	The development of different types of organizational, material and social capabilities	Technical and innovation capabilities (e.g. learning to build a cistern, or to teach others to build); capabilities to lobby for institutional change or to claim spaces

co-options by groups uninterested in actually working with grassroots movements. Much depends on the power relations in play. This was particularly evident for the STN, where the ability of sponsors to assert a 'pro-poor' technology framing (as distinct to pro-poor empowerment framing) led to the disintegration and eventual suspension of the network. But even highly sympathetic allies beyond the movement can find themselves constrained. The GLC simply did not have sufficient capital to invest in the manufacture of socially useful products, even though the resources given to its Technology Networks enabled very open and democratic prototyping. Going further required a more powerful social and economic base for challenging the wider political economy of production in the UK.

This is not a criticism but, rather, a description of the situation. Grassroots innovation movements find themselves working within alliances where even better-resourced partners can find themselves constrained. So, for instance, where grassroots innovation movements may struggle to obtain resources to boost activity in the spaces they occupy, so better-resourced actors embedded in more formal institutions are constrained in the way they can open up their institutional spaces towards the grassroots and the terms under which they can deploy the resources available there. A typical example is where there is institutional pressure to focus on only the artefacts generated by grassroots innovation movements, and to scale

up and roll out versions of these artefacts. As a result, other contributions coming from the grassroots innovation activity become excluded from consideration, rendered illegible and invisible by the scaling-up process (cf. Scott, 1999). Some of the knowledge, actors, methodologies and ideas created by the grassroots innovation may point beyond scaling up, for example, to thinking about how to scale down or further open institutions to a deeper, fuller and more extensive contribution by grassroots and other actors, such as through, say, moves to decentralizing innovation systems (Smith, 2014a). After all, an important feature in grassroots innovation is context sensitivity; and going with the grain of grassroots situations when wanting to transform while remaining locally relevant is a perpetual dilemma for grassroots innovation movements. Any abstraction and relocation of innovations to other contexts should be done carefully, lest the recipient grassroots groups lose control and autonomy over the process. Losing sight of this feature can contradict much of what the grassroots innovation was originally about. Despite this, there is considerable pressure among funders, donors, investors, researchers and so forth to diffuse technological innovations widely and rapidly, with less consideration for context-sensitive and capabilities-building processes.

Allied actors can be constrained for institutional reasons. The constraints are thus different, but felt no less keenly. New spaces open up through alliance building, but their characteristics have an important bearing on the kind of development pathway that is possible and just how enduring it is. Much depends on building the social and economic base for the pathway. Where expanding that base proves elusive, so the pathway diminishes. Grassroots innovation movements can have transformational aspirations, and they can contribute to radical pathways for alternative sustainable developments, but their contributions to sustainable developments cannot be judged based solely on whether their sought pathway was realized. After all, such an achievement is beyond the agency of the insertion and mobilization strategies of grassroots innovation movements alone. Instead, it is important to acknowledge the rich and varied ways in which *all* grassroots innovation movements have contributed to opening up new pathway possibilities and that their experiences also help to identify limitations and challenges too. Such multidimensional contributions to opening development pathways can be harnessed by wider alliances and other social actors and, as such, provide an important resource for societies, regardless of the particular pathway dynamics into which they become enrolled.

Conclusions

The contributions that grassroots innovation movements make to development pathways, actual and potential, are much more varied and work more broadly than the provision of specific innovative artefacts or services. Indeed, it is such breadth of potential that creates the pitfall of misattributing limitations exclusively to the grassroots innovation movements, when some of these limitations rest just as much in societal inability to make more use of grassroots innovations. We hope that the frameworks and lessons we have developed in this chapter can helpfully

inform greater appreciation and effective support for grassroots innovations and their movements in societies.

The picture that emerges across the case studies is much more complex than the distinction between grassroots innovation movements and the institutions of science, technology and innovation that we drew initially in Table 1.1 in Chapter 1. Support and opportunities for grassroots innovation open up through much more messy, compromised and hybrid spaces, strategies and pathways. Grassroots innovation movements can be framed as ingenuity, empowerment and transformation, although in reality advocates play off and move through more than one of these framings. Combinations of strategies develop that oscillate between inserting grassroots activity into existing institutions for innovation, or mobilizing to try to transform those institutions. The spaces where this work happens can involve material activity such as prototyping, skills development and marketing; but they can just as importantly be discursive spaces for debate and criticism, or network spaces for organizing autonomous action. What becomes clear, we think, is that approaching grassroots innovation too narrowly and too instrumentally, as the insertion of ingenuity, for example, fails to fully understand these movements and therefore make the most of their social potential. This is a point that we consider more fully in the final chapter.