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SOCIALLY USEFUL PRODUCTION

In January 1976 workers at Lucas Aerospace in the UK published an Alternative Corporate Plan for the future of the company. This was an innovative response to management announcements that thousands of jobs were to be cut in the face of industrial restructuring, international competition and technological change in design and manufacturing. Instead of redundancy, the workers argued their right to socially useful production, and in so doing spawned a grassroots movement.

Industrial restructuring and relocation by the owners of capital threatened many manufacturing livelihoods and communities in industrialized countries in the 1970s. Workers in the UK were fighting closures and redundancies at factory level through strikes, occupation and work-ins (Coates, 1981). The Lucas Plan was unusual in that, through careful analysis of their skills, machinery, work organization and economic potential, the workers proposed innovative alternatives to closures in manufacturing.

Around half of Lucas Aerospace's output supplied military contracts. Since this business area depended upon public funds, as did many of the firm's civilian products, workers argued that state support would be better put to developing more socially useful products. Arms conversion arguments attracted interest from the peace movement and social activists more widely. Additional proposals in the plan, such as for human-centred technologies that enhanced skills rather than displaced labour, caught the attention of some on the Left, and broader arguments for socially shaping technology for community benefit resonated with the emerging radical science movement.

The *Financial Times* described the Lucas Plan as 'one of the most radical alternative plans ever drawn up by workers for their company' (*Financial Times*, 23 January 1976, cited in Wainwright and Elliott, 1982). Or, as the Minister for Industry, Tony Benn, put it in an Open University film at the time, 'one of the

DOI: 10.4324/9781315697888-3

most remarkable exercises that has ever occurred in British industrial history'. The plan was nominated for the Nobel Peace Prize in 1979.[1]

Despite this attention, the workers themselves, and especially their leaders in the Shop Stewards Combine Committee, suspected (correctly) that the plan in isolation would convince neither management nor government (Lucas Aerospace Combine Shop Stewards Committee, 1979). In the meantime, and as a lever to exert pressure, the workers embarked upon a broader political campaign for the right of all people to socially useful production. As one of the leaders put it afterwards, the Lucas workers wanted to 'inflame the imaginations of others' and 'demonstrate in a very practical and direct way the creative power of "ordinary people"' (Cooley, 1987, p. 139).

Links were forged with workers adopting similar initiatives elsewhere in the UK, and also in Germany, Scandinavia, Australia and the USA. The plan also found willing support among newer social movements in radical science, community activism and the environment. Arguments in the Lucas Plan 'went far beyond the confines of the company, industry, trade unions and even the country concerned' (Pelly, 1985, p. 107). The plan became symbolic of a wider critique of mainstream policy towards technology and economic development (Bodington et al., 1986). Over the next few years, initiatives for socially useful production emerged from the bottom up, in shop floors, in polytechnics and in local communities (Blackburn et al., 1982; Collective Design/Project, 1985). It is in this sense that socially useful production was a grassroots innovation movement. However, it was also a movement that, with hindsight, was swimming against the political and economic tide. The alliances struck, the spaces created and the initiatives generated were ultimately swept aside by the rise of Thatcherism and the installation of neoliberal ideology.

Analysis begins in the next section by explaining the economic, political and social background from which the movement emerged. The following section analyses the movement's framings of technology and development. Analysis then moves to movement spaces and strategies for socially useful production. Specific initiatives provide further illustration, before the penultimate section discusses critical features in pathways towards socially useful production. The chapter concludes by reflecting on some lessons for grassroots pathways.

The industrial background to the Lucas Plan

The 1970s were a turbulent and transformative period in the UK socially, economically and politically (Beckett, 2010; Sandbrook, 2012). Heightened international competition, technological change and the restructuring of capital were placing UK manufacturing under increased pressure. Changes in investment practices and ownership brought manufacturing under additional pressures. Industrial policy reliant upon state-directed development through nationalizations, and upon loans and subsidies to industrial champions, was in difficulty. Plant closures were growing. Unemployment passed one million in 1972 and kept rising.

Investment decisions by capital were central to restructuring, but so too was state power through tax breaks, grants and subsidies to enterprises 'rationalizing' their operations and investing in new technology. Indeed, Lucas Aerospace emerged from a series of mergers in the industry in the 1960s that were supported by government grants. The relocation and consolidation of factories onto larger sites, the introduction of new working practices through technological change, and outright closure of facilities, were reshaping the industrial landscape. Workplace resistance manifested in shop stewards organizing occupations and work-ins aimed at overturning restrictions on pay and work, and plant closures (Coates, 1981; Darlington and Lyddon, 2001; Ferris, 1972). Workers were also concerned about the consequences of new technology for employment, work rates and skills, particularly with computer-controlled and automation technologies. New forms of worker awareness and initiative were required in order to negotiate new technologies (Thompson and Bannon, 1985).

Politically, the post-war consensus over Keynesian economic policy was fragmenting between a rising new Right and a disoriented Left. The Right was increasingly laissez-faire towards economic restructuring: management should be liberated to make profitable choices, and 'lame duck' firms should be allowed to fail; unburdened enterprise, especially in services, would generate new jobs. On the Left, alternatives were sought in renewed interest in popular economic plans, industrial cooperatives and workers' control (Tuckman, 2011).

Out of this industrial background emerged the Lucas Plan. In an attempt to coordinate and strengthen responses, shop stewards transcended historic divisions of role, craft and profession and were 'combining' workers from across trade unions and industrial sites. Early victories over pay and redundancies enabled the Lucas Aerospace Shop Stewards Combine Committee to demonstrate the advantages of coordinated solidarity. The Combine Committee began discussing socially useful production among the workforce as an alternative to redundancy. It was hoped that government intervention (forthcoming in past industrial rationalizations) would bring management to negotiations along these lines.

Input to the Alternative Plan was solicited initially through a letter to leading authorities, institutions, universities, trade unions and other organizations that the Combine thought would be sympathetic to developing alternative products. Only three responses were received. Dave Elliott, from the Open University, proposed renewable energy and energy-efficiency product alternatives that the workers might develop. Meredith Thring, from Queen Mary College, proposed that Lucas should redeploy its capabilities into telechiric products (devices for working remotely). Richard Fletcher, from North East London Polytechnic, proposed a hybrid road–rail vehicle. Each proposal was incorporated into the plan, but the Combine was disappointed in the low response rate (Wainwright and Elliott, 1982). When it turned to its own workers, with a wide-ranging questionnaire distributed via shop stewards, the response was much stronger. The questionnaire prompted discussion about the equipment, skills and organization available at Lucas plants. It led to ideas way beyond the development of alternative products and into considerations of

the planning and organization of production, issues related to labour processes and training, and economic management.

It took a year to put the plan together. The plan ran to six volumes of approximately 200 pages each. Designs and descriptions for over 150 products were accompanied by market analyses and economic considerations. Proposals were made for employee training that enhanced and broadened skills, and suggestions were put forward for restructuring work organization into less-hierarchical teams, breaking divisions between practical shop-floor knowledge and professional engineering knowledge. The plan challenged fundamental assumptions about how innovation and business should be run. Senior management rejected it. Meetings with the Combine were delayed, cancelled and evaded. National trade union leaders were similarly unhelpful when it came to practical, material assistance. There was opposition to the idea of grassroots initiatives upsetting the conventions of union demarcations, hierarchy, procedure and activity – even though grassroots trade unionists were interested and actively organizing. Similarly, despite government continuing to provide public money to Lucas in the forms of deferred taxation, grants and public financing for new factory infrastructure, the Lucas Plan was consistently overlooked.

A tripartite meeting was finally initiated by the government in February 1979, but made little headway (Wainwright and Elliott, 1982). Senior industrial managers, the presidents of trade unions and civil servants were not open to the idea that workers and grassroots agendas should shape the criteria and directions to which technical know-how and manufacturing should be put.

However, the plan attracted a great deal of attention and discussion beyond the company. The *New Statesman* claimed (1 July 1977) that 'The philosophical and technical implications of the plan are now being discussed on an average of twenty-five times a week in international media' (cited in Forrester, 2012, p. 12). After several years of campaigning, a debate on the plan was held in the House of Commons. As Bob Cryer MP[2] put it in opening the Commons debate:

> It took the shop stewards three years to meet the management to discuss the corporate plan, because they were challenging the hierarchical nature of our society, which is that the bosses shall make the decisions and the workers shall accept them, and woe betide workers who question those decisions and perhaps even produce better ones. That sort of attitude challenges the whole nature and structure of our society.
>
> *(Bob Cryer MP,* House of Commons Debates, Hansard*, vol. 962, cols 899–932, 12 February 1979)*

More than the practical, socially desirable products it contained, the plan symbolized a radical reordering of industrial processes and purposes in society. For elites on all sides, that vision seemed simply incredible, or, more seriously, was discomforting, unwelcome and even threatening.

For others, the plan resonated with their aspirations for social change. The demands of new social movements for peace, the environment, community activism

and women were becoming increasingly prominent in social and political life. The Lucas Plan came to the attention of these different social movements in various ways. The peace movement's demands for disarmament generated debate about converting the arms industry to civilian production. Environmentalists sought alternative technologies for an ecological society, especially in response to the energy crisis. Radical scientists wanted socially responsible technological development. Feminists were interested in less-patriarchal technologies. Community activists in manufacturing towns were linking neighbourhood deprivation to economic decline. A broader coalition of groups began discussing and promoting ideas for socially useful production.

Institutional support came through the leadership of a handful of radical Left local authorities, including the Greater London Council (GLC), who provided resources and facilities for putting ideas into practice. They hoped that socially useful production combined with popular alternative economic strategies could present a platform for challenging a rising right-wing agenda nationally.

The resulting movement flourished only briefly. The election of the Conservative Thatcher government in 1979 and the emergence of an eventually hegemonic neoliberalism over the 1980s took politics and socio-economic development in a very different direction. The economic and manufacturing fate of the country was to be left to the market and not to popular planning. The industrial recession of the early 1980s saw trade union bases decline sharply, and legislative measures restricted trade union practices and emboldened management. Local authority autonomy over economic development was restricted severely through new legislation, and metropolitan authorities such as the GLC were shut down completely. The struggles that helped to forge the movement ultimately overwhelmed it. But not before it had demonstrated the importance and possibility for democratic technological development.

Framings for socially useful production

Reflecting upon workers' plans at a conference on Alternatives to Unemployment in 1978, Mike George, from the Centre for Alternative Industrial and Technological Systems (CAITS), summarized the framing of socially useful production:

> These workers maintain that manufacturing industries need to be revitalized through the conversion of the productive apparatus to achieve a number of aims:
>
> - to fulfil social needs, products or services which are not exclusive to the rich or any other elite, which maintain or promote health, welfare etc;
> - to use technologies which are interactive with human skills, which enhance those skills, which can be controlled by the worker;
> - to design for need, to stress maintenance, re-use, re-conditioning – against high-volume, obsolescent products;

- to work on products which can be 'sold' in a socialized market, e.g. design and production of medical equipment with direct contact with medical staff and patients.

(George, 1978, p. 176; see also Cooley, 1987, pp. 154–155)

Activists from social movements fed ideas into this framing, and their elaboration through practice evolved over time. As such, activities in socially useful production were informed through a variety of intersecting framings:

- arms conversion, alternative technologies and community activism;
- human-centred technology and the labour process;
- industrial democracy and participatory design;
- alternative economic strategy and social audit.

In this section, each framing is elaborated in turn.

Arms conversion, alternative technologies and community activism

The Lucas Plan had obvious attractions for the peace movement. The Plan not only made salient the movement's moral critique of violence, but also addressed the thornier issue of unemployment arising from government cuts in military spending. The swords-to-ploughshares conversion argued by defence workers themselves was fantastic (Pelly, 1985). Peace activists promoted the development of alternative plans at other defence firms too, including Vickers and British Aircraft Corporation.

The Lucas Plan also resonated with activists in radical science, centring on the British Society for Social Responsibility in Science, who were questioning the vested interests that were setting scientific priorities in society (Asquith, 1979; Levidow, 1983; Reilly, 1976). Whether informed by Marxist analysis of the structures of science and technology or by the cultures of science in society (Asdal et al., 2007), the radical science movement shared with the Lucas workers an interest in developing an alternative framework for science and technology. The movement for socially useful production was consequently not framed solely as a campaign for jobs and products but, rather, about the culture, structure and direction of technological change in society. Such attention provided philosophical and analytical resources concerning the importance of plural knowledge, including tacit and practical expertise, public decisions about the funding of product research and development and participation in the processes that shape technological agendas (Cooley, 1987).

Ideas for alternative technologies were also salient among environmentalists. However, environmentalist interest in smaller-scale technologies appropriate for a decentralized, ecological society was ambivalent towards trade unionists interested in jobs arising from the industrial production of eco-friendly technologies

(Smith, 2005). Even when technological artefacts were essentially the same, such as wind turbines, heat pumps and solar panels, tensions arose in the way these technologies were related to different kinds of production, use and ways of living; and that further complicated interaction across differences of class and ideology between environmentalists and workers (Brachi, 1974; Elliott, 1975). Nevertheless, as a social issue, the environment, and especially energy, became included within the ambit of the socially useful.

In similar respects, women's perspectives and gender issues were raised as important absences in the initial framing of socially useful production and which arose in the male-dominated sector of manufacturing. Feminists pointed to gendered perspectives within industry and urged socially useful production to look beyond manufacturing settings, arguing the importance of consumption activities, as well as production in other sectors. Furthermore, they contributed ideas that went beyond 'products' to consider the undervalued social production already going on in homes and through care work (Huws, 1985; Liff, 1985). These important perspectives broadened the movement's framing and presented a view on production that drew on its relations with different forms of consumption (Blackburn et al., 1982).

A final broadening beyond the impetus of the Lucas Plan arose through connections with community development. Activists were increasingly seeing community problems in structural terms of class and economic relations (Community Development Project, 1977). A strategy of integrating community and industrial struggles and forming alliances between local trades councils and community groups 'was a central part of the strategy of the new radical community work' (Loney, 1983, p. 150; see also O'Malley, 1977). Socially useful production needed to direct industrial, technological and economic resources to needs identified and defined by local communities. At the Coventry Workshop, for example, shop stewards' committees and grassroots community groups joined to 'explore the links, in concept and practice, between industry and the community, the economy and the state, production and consumption, home and work' (Coventry Workshop, 1978, pp. 6–7; see also Field, 1985).

Human-centred technology and the labour process

The movement found its first expression in manufacturing workplaces. Here, technological changes, particularly computer-integrated manufacturing, were impacting on work skills, quality and jobs (Brödner, 1990). Influential studies argued that automated technologies introduced by capital, such as computer-aided design systems, production controls and numerically controlled machine tools, were reshaping the labour process to the disadvantage of workers (Braverman, 1974; Cooley, 1987; Noble, 1979). There were fears about dehumanized workplaces and workerless factories (George, 1978).

Technological change was conventionally seen as an evolutionary process relatively autonomous from society (Winner, 1977). Policy efforts for working people

ought therefore to promote the best accommodation around inevitable developments towards automation (Freeman and Soete, 1994; Kaplinsky, 1984). Workers' leaders saw their task predominantly in first resisting changes and then negotiating a share of the productivity gains in terms of redundancy payments for those laid off by machines, retraining packages for work in the services sector and better pay and conditions for those remaining to tend the machines (Thompson and Bannon, 1985; Wainwright and Elliott, 1982).

However, the movement saw nothing automatic to automation. A plurality of technological pathways were plausible, including more flexible and skill-enhancing uses of computer-assisted machine tools (Piore and Sabel, 1984; Rauner et al., 1988). Workers and radical researchers argued that computer-controlled machinery should allow programming on the shop floor, machines should enhance rather than substitute operator skill and initiative and production should be organized by teams of workers who schedule the work required (Rosenbrock, 1989). Significantly, workers themselves should be involved in the design of new socio-technical systems (Ehn, 1988).

Not all automation was necessarily advantageous to management and capital. Automation required oversight, debugging and adaptation; systems designed without thought for user skills resulted in serious failures, as well as resistance; and production programming in centralized offices could be inflexible and lead to slow and costly retooling that was unresponsive to customer demands (Brödner, 1990; Cherns, 1976; Senker, 1986). The practical know-how underpinning any complex task provided a potential lever for increasing creative input from workers.

As such, the socially useful framing expanded to argue democratic control, and direct participation was required over the design and social use of technology (Cooley, 1987; Ehn, 1988; Murray, 1985a). The movement articulated opportunities for workers and communities to become involved in new forms of production (Mole and Elliott, 1987; Thompson, 1989).

Industrial democracy and participatory design

In the mid-1970s a union's right to negotiate wages and working conditions was a standard feature in industrial relations (Coates, 1981). Rights to negotiate product design, including decisions on technology investment and the organization of production, were not part of mainstream union, corporate or government policy. Yet this was key in socially useful production. Design, development, investment and marketing decisions were a matter for participation, debate and negotiation. Workers and communities had to be involved. Brian Lowe, at the Unit for the Development of Alternative Products in the West Midlands, explained:

> The central feature of socially useful production is the development of ideas and organisation forms that encourage involvement, generate self confidence and release new-found or rediscovered skills during the examination of how productive resources should be used to meet social needs. Initiatives promoting socially useful production must, in turn, be extremely

> responsible and very supportive throughout the complete process if working people are to successfully take on the tasks and challenges of responding with alternative plans.
>
> *(Lowe, 1985, p. 69)*

In the workplace, this meant involving workers from 'all levels of staff from the high-level designers and engineers through to the skilled craft workers on the shop floor' (Cooley, 1981, p. 54). A departure from conventional notions of industrial democracy was the argument for extending participation outside the workplace into local communities and social movements. Wider participation in the development of alternative design criteria, organization of production and R&D for social use was envisaged as arising through local branches of trades councils needed to build alliances with community groups, organizations of the unemployed, pensioners and consumers and socialist, feminist and anti-racist bodies (Blackburn et al., 1982). The desire to produce in a socially useful way, and to place skills and production technologies at the service of communities rather than capital, became a key framing.

Alternative economic strategy and social audit

Arguments to invest in socially useful products in terms of use values rather than exchange values were well and good; but how to secure these investments in practice? On this matter, framings focused on the direct and indirect social costs of unemployment, and argued that it was more cost-effective to put people to socially useful work than to pay them benefits on the dole. The government was spending billions in direct grants, subsidies and deferred taxes in order to help large firms restructure and shed jobs, and then further billions in unemployment payments and social benefits to those laid off. Moreover, it was society, and not the producer, that bore the externalities of harmful and dangerous technologies, such as weapons, and the escalating defence costs associated with their development. Why not redistribute public funds to designing, making and marketing socially useful products? A variety of bodies used these 'social audit' arguments to justify public investment in socially useful production (Barratt Brown, 1978; Eastall, 1989; Murray, 1985b).

Sympathetic left-wing local authorities adopted this alternative economic strategy for jobs and created enterprise boards for investing funds into product prototyping, the development of cooperatives and rescuing failing enterprises (Greater London Enterprise Board, 1984b). While socially useful production became framed within these alternative economic strategies, the strategies themselves were not specifically promoting socially useful production (Bodington et al., 1986; Palmer, 1986; Rowthorn, 1981). These strategies introduced questions of economic calculation into socially useful production (Rustin, 1986). How was one to prioritize development efforts between the wide varieties of socially useful proposals that were emerging through alternative plans and community activism? And, crucially, how could initiatives leverage the very large

investments needed to move from prototyping and demonstration and into full-scale production? While alternative economic plans were operating 'in and against the market' (Murray, 1985b), they were, nevertheless, public programmes under pressure to demonstrate value for money.

Some attempts were made to formulate socially useful production economically (Bodington et al., 1986; Rustin, 1986). However, activists were reluctant to go too far because they feared that calculation would distort founding ideas about grassroots participation and turn the ideals for democratic decision into codified, technocratic procedures little better than existing industrial production. Under this view, what constituted social use was left to open and accessible considerations through locally specific deliberation in ways that allowed more tacit understandings to come into much more socialized processes of innovation. However, the lack of an alternative institutional framework for economic investment in products consistent with socially useful criteria left activities susceptible to selective dismissal and capture under more conventional economic criteria (Palmer, 1986).

Spaces and strategies for socially useful production

Spaces for socially useful production were created within grassroots trade unionism, research institutes and radical local authorities. Each provided distinct strategic opportunities. However, they were also spaces that were being squeezed by the wider political and economic changes underway in the UK.

Grassroots trade unionism

Working conditions at Lucas Aerospace were conducive to the development of an alternative plan. A large proportion of workers were highly skilled, accustomed to working with (unionized) design and technology professionals and where research and product development were important components in complex batch production that retained craft elements. Work on new products involved mixed teams where the tacit knowledge of operatives, fitters and so forth was apparent to the more propositional and codified theories of attentive engineering design professionals. Developing alternative designs and proposals was something that workers were confident could be organized effectively. Less-organized workers in smaller firms, or workers on mass production lines, less familiar with product development, had further to travel.

Workers at Lucas were proactive in supporting workers in the trade union movement and sharing their ideas and experience. The Combine Committee helped to create CAITS for these purposes (see below) and helped workers' plans at Vickers, British Aircraft Corporation, Dunlop, Parsons and Chrysler (North East Trade Union Studies Information Unit, 1980; Speke Joint Shops Stewards Committee, 1979). Support worked through the grassroots trade union activity, including local trades councils, and created space by organizing teach-ins among the workers, distributing information and analysis, publicizing activity through the

labour movement press and seeking help from motions of support, funds and policy proposals at trade union meetings (North East Trade Union Studies Information Unit, 1980).

The movement for socially useful production was also noticed internationally (Rasmussen, 2007). Metalworkers in West Germany used UK experience to inform Alternative Product Working Groups in a number of firms, including Blohm & Voss, AEG, VFW, MBB, Krupp and MAK. They proposed combined heat and power systems, transport systems, and, at Voith in Bremen, designed tyre-recycling equipment. Innovation and Technology Centres were set up in Bremen and Osnabrück in collaboration between trade unions, universities and local authorities.

Research and education institutes

The Lucas Combine Committee created CAITS in October 1977 with funding from the Joseph Rowntree Foundation and support from North East London Polytechnic (NELP). The initial idea was to use NELP facilities and worker input to develop prototypes proposed in the Alternative Plan and furnish economic and industrial analysis. It was believed that this would strengthen the bargaining position of workers. CAITS facilities were extended to workers at other companies and in other industries. CAITS was joined by other research units that could provide union members with access to independent analysis about firms, sectors and technological trends.

Conferences and projects coordinated research, educational and campaign activity in socially useful production (e.g. Open University, Coventry Polytechnic, NELP). Movement activists at a variety of polytechnics linked their facilities to local communities, including through student projects. Ideas and initiatives for socially useful production also featured in educational programmes at the time. Open University materials, for example, explained the Lucas Plan to thousands of design students.[3]

Activists attended European conferences and, in turn, hosted overseas union researchers at UK events (CAITS, 1978). In Bremen, for example, a symposium on Work and Technology brought together academics from the humanities and engineering with trade unionists, managers and politicians (Rasmussen, 2007). Notable among these links were those with Scandinavia. Worker research projects in Denmark, Sweden and Norway were exploring how computer-based technologies could be designed and introduced into the workplace in ways that both extended democratic control over the labour process and enhanced the skills of the workers involved. Pelle Ehn, a key figure in this 'Collective Resource Approach', wrote how:

> As a political commitment our tradition shares many of the values and ideas of the alternative production movement; we have especially been influenced by the strategy of quality of work and product developed by workers and engineers at Lucas Aerospace in Britain.
>
> *(Ehn, 1988, p. 25)*

Left local authorities

A few local authorities supportive of socially useful production provided space for putting movement ideas into practice. Activity at the GLC was particularly intensive. With unemployment heading towards one in eight workers, and manufacturing in steep decline in the city, Londoners had voted an avowedly socialist Labour council into power in 1982. Its manifesto noted:

> Groups of workers such as the Lucas Aerospace Shop Stewards' Committee have, with the support of the Labour Party, begun to develop ideas on alternative production – using technologies which interact with human skills; making goods which are conducive to human health and welfare; working in ways which conserve, rather than waste, resources.
>
> . . . We believe that these initiatives – which constitute a fundamental rejection of the values inherent in capitalist production – must be supported by a Labour GLC. We shall therefore be prepared to assist groups of workers seeking to develop alternative forms of production, with finance, with premises, or in other ways.
>
> *(Labour Manifesto, Greater London elections, 1981, quoted in Mole and Elliott, 1987, p. 81)*

Once in office, council leaders created the Greater London Enterprise Board (GLEB) to implement this policy, with an annual budget of £32 million (Eastall, 1989). Recipients of GLEB support were encouraged to promote worker involvement and seek cooperative business models (Greater London Enterprise Board, 1984a; Murray, 1985b).

Mike Cooley, sacked by Lucas Aerospace in 1981, was appointed Technology Director at GLEB, where he was able to use the resources, including political commitment, to enable others in the movement to network and make the case for aspects of socially useful production. It was through his creation of five Technology Networks, with a GLEB budget of £4 million, that facilities were provided for socially useful production (see below). Thames Technet was based in the south-east of the city, and the London Innovation Network (LIN) in the north-east. The other networks were the London Energy and Employment Network (LEEN), the London New Technology Network (LNTN) and Transnet (focusing on transport issues). The aim of these Technology Network workshops was to bring together the 'untapped skill, creativity and sheer enthusiasm' in local communities with the 'reservoir of scientific and innovation knowledge' in the polytechnics (Greater London Enterprise Board, 1984c, pp. 9–10). Similar initiatives were created elsewhere. In the West Midlands, the council opened the Unit for the Development of Alternative Products (UDAP); further north, Sheffield Council and Sheffield Polytechnic created the Centre for Product Development and Technological Resources (SCEPTRE) (Lowe, 1985); and a Centre for Alternative Products was proposed by Cleveland County Council and Teesside Polytechnic.

Illustrative examples

Movement strategy took a variety of forms. Three were particularly emblematic: promoting particular artefacts or objects; the provision of facilities; and the practice of methodologies consistent with movement ideals. Examples of each strategy illustrate the different challenges in the development of pathways for socially useful production.

Objects: the road–rail bus

Included in the Lucas Plan was the proposal from Richard Fletcher at NELP to develop a bus that could run on both road and rail. These affordable vehicles increased the flexibility with which public transport could use infrastructure in both developed and developing-country situations (Lucas Aerospace Combine Shop Stewards Committee, 1978). As with other proposals in the Lucas Plan, the bus went to prototype on 'borrowed' company time and equipment. When Lucas created CAITS the road–rail bus was developed further.

While the viability of a road–rail bus was open to question, an advantage with this prototype was that it could be used in a Lucas Plan roadshow. The press was invited to join the bus as it toured industrial sites, shopping centres and local communities around the country. Other exemplary prototypes and designs were carried aboard the bus. The bus and displays engaged people in discussions, and visitors were invited to propose their own ideas for socially useful products. Prototypes on display included electric bicycles, small wind turbines, loading machinery, storable play equipment, catering services, medical equipment, robotic vision systems, products for people with disabilities and other designs. The idea was for these 'technological agitprops' to prompt discussion and debate about the wider framings surrounding socially useful production.

The road–rail bus was not developed further in the UK.[4] Nor were many of the other prototypes. Reflecting on experiences in the West Midlands, Brian Lowe wrote,

> [investment and marketing] require particular skills which were not available from within UDAP nor from within the other existing support groups. Consultants hired at great expense did not appear able to do a satisfactory job because they did not seem to appreciate the social criteria which were being applied.
>
> *(Lowe, 1985, p. 68)*

It proved difficult to align investor interest in returns on capital with the social goals that activists were realizing in their prototypes; and few people had the skills and capabilities to negotiate across these two worlds (Palmer, 1986; Rustin, 1986).

Nevertheless, the designs were considered an indicator of the untapped ingenuity residing within the grassroots, as well as being emblematic for issues of concern to people. Prototyping objects openly, through practical activities at places of work or in community life, engaged people in social issues differently, as compared to discussions at public meetings (Cooley, 2007). A GLEB leaflet about Technology Networks explained, 'Already there is no shortage of proposals for products and services . . . to excite interest, widen horizons, and ensure a continuing flow of practical and job-creating *challenges to economic fatalism*' (Greater London Enterprise Board, 1984a, emphasis added). This quote is quite typical in blending practical, object-oriented activity with political aspirations to rise to social challenges (Linn, 1987).

Facilities: Technology Networks

Technology Networks facilities considered the prototyping of alternative technologies to be a significant activity. Each workshop developed differently, but the broad aims were similar. They provided physical spaces, access to shared machine tools and assistance from technical staff in the service of local communities, enterprises and cooperatives. Attempts were made to recruit staff who 'appreciate the tacit knowledge of local residents and workers' (Greater London Enterprise Board, 1984c, p. 12). Workshops were governed by representatives of local communities, trade unions, tenants' groups and academia (Cooley, 1985). In an attempt to break down barriers between workshop staff and local communities, the London networks were sited away from 'alienating' educational campuses. The facilities provided walk-in venues intended for anyone wishing to get involved. Training was provided to boost access, inclusion and involvement. LNTN undertook training initiatives, for example, exploring how communities could network information and communications technologies (ICTs) to generate and share information, to engage with expert systems and enable groups to communicate and coordinate more effectively. A women's cooperative was established to address gender bias in microelectronics. Technology Networks hosted visits and machine-tool training for visitors. Mary Moore, from the London Innovation Network, described Technology Networks as:

> making sure that what you do is going to be of real use to the intended users which means somehow getting them to take part in the design process . . . You'd actually get them in the workshop and enable them to learn more about how such things are made and designed and repaired and modified.
>
> *(Quoted in Mackintosh and Wainwright, 1987, p. 214)*

Dissemination and sharing of knowledge and prototypes was encouraged through a 'product-bank'.

> Each centre contributes a product-bank of innovations patented by the networks for use by working people and for socially useful purposes. Machine-banks, consisting of second-hand machinery refurbished as part of a training programme, will be available for use by client enterprises.
>
> *(Greater London Enterprise Board, 1984c, p. 12)*

The plan was for profit-making enterprises to pay royalties on non-exclusively licensed products, which would contribute to network running costs and cross-subsidize the socially useful mission. Other sources of revenue were identified through the provision of useful products and services to the public sector and returns from the spin-off development of cooperative enterprises under the wider activities of GLEB. A user-friendly electronic heating controller, designed to improve efficiency, was fitted at County Hall to improve energy performance. However, proposals to manufacturers for its wider commercialization were resisted: the design reduced the need for lucrative maintenance and servicing contracts. In practice, marketing challenges like these sometimes proved intractable. Other activities, including IT manufacture and toys for schools, did go into successful local manufacture. Others, such as an electric bicycle, found developers and investors in other countries, including Germany and Italy, but without benefit for jobs in London. Even where a commercial market looked promising for prototypes, the investment required to move into manufacturing was simply beyond the means of GLEB, and financial institutions either were not interested in providing the industrial capital or refused to locate production in London.

The difficulty of developing products so directly was recognized, and the product-bank idea was adapted by an offshoot from the networks. A Technology Exchange was created that matched technology designs to firms seeking new products. This technology-transfer service was opened up successfully to commercial technology offers internationally. This commercial offshoot was deemed a success for the more business-oriented overseers of the Technology Networks at GLEB (Rustin, 1986). In contrast to the more radical aspirations of activists, the business emphasis rested in using workshop facilities to develop businesses. Brass Tacks, for example, repaired and reconditioned broken furniture and consumer goods for distribution to disadvantaged households. The Technology Networks worked with it to manufacture replacement components on a bespoke basis.

Here was an aspect to the movement that brought in business leaders and linked to their interest in small-scale enterprise (Davis and Bollard, 1986; McRobie, 1981). Business leaders took ideas and activities beyond the ideological confines of 'socially useful' and inserted them more widely into the spirit of enterprise that Thatcherism was trying to cultivate. Similar links were forged through training programmes and where practices generated by ideals for democratizing technology could be realigned with providing people with skills to enter new technology job markets (Palmer, 1986).

Not everyone in Technology Networks was agreed upon this direction. One of the first networks, starting in 1983, was LEEN. As various community, tenant and energy organizations became involved in the network, so the focus of the workshop opened up. As Dave Elliott explained:

> It was found that the rationale for the establishment of the networks, the promotion of alternative products and the provision of access to workshop and technical facilities leading to socially-useful employment was not the main problem regarding energy related issues discovered by LEEN. In the field of energy, at least at the local level, the main factor is not the lack of socially-useful technologies; rather the technology exists, but what is required is the political, institutional and financial commitment to the redistribution of resources that would allow the implementation of these technologies.
>
> *(Mole and Elliott, 1987, p. 87)*

Susie Parsons from LEEN explained how,

> Partly in light of these problems, many people involved in the technology networks quickly came to the conclusion that they had other useful roles besides product development. One of these was the use of existing technology to provide services to people, and helping people to understand and use existing technology more effectively.
>
> *(Mackintosh and Wainwright, 1987, pp. 208–209)*

Working with others under a 'Right to Warmth' campaign, LEEN provided energy audit and advice services for people, which involved developing convenient energy monitoring and modelling devices and assembling packages of energy-conserving technologies for installation in homes. The campaign drew attention to particular needs in apartment blocks and organized community energy initiatives aimed at job creation through the implementation of energy improvements (Greater London Enterprise Board, 1984c).

Activists involved in other technology networks recognized the political nature of forging links between technological development, community activism and local economic regeneration. Attempts were made to identify and then mobilize behind socially useful initiatives by linking to parallel developments in popular planning. The GLC Popular Planning Unit was attempting through community engagement to prioritize bottom-up socio-economic development priorities. Community workshops elsewhere were on a similar journey (Lowe, 1985).

Tensions emerged between those looking to the development of revenue through commercialization of products, a view associated with GLEB boards overseeing the networks, and the popular planners seeking to mobilize the networks for socialist transformation. Reflecting from their position in popular planning at the GLC, Maureen Mackintosh and Hilary Wainwright wrote:

> GLEB, for its part, put an increasing emphasis on commercial skills and product development, worried that money might be wasted, and the networks not survive, if products were not produced and marketed fast enough. They saw the products themselves as providing a sort of 'technological agitprop' capable of stimulating a further input by example. They argued that such practical demonstrations of the potential for socially useful job creation had to take priority over open-ended outreach work . . . Network staff, members, and users, however, take a more complex view than this. They acknowledge the importance of commercial skills, and having a plan of development of the networks. But they see on the whole a too early concentration on new products as counterproductive. What GLEB calls 'outreach', they see as the essence of networking, and the factor which can in the end generate real innovations. While recognising the tensions, they [network staff] see them as creative: the only way to democratise inputs to technological development.
>
> *(Mackintosh and Wainwright, 1987, pp. 212–213)*

It became increasingly apparent that the more radical aims required a transformation in the culture and institutions of innovation. 'Constructing an open door to planning and decision-making procedures is not enough' (Linn, 1987, p. 116). The networks and resources for design, prototyping and product development needed to also be culturally and socially accessible to Londoners. Socially speaking, that meant working around or transcending the daily demands on people's energy and time by providing them with the opportunities to participate (to patterns set by participants, in the evenings, weekends, etc.). Culturally, it meant the gradual process of building egalitarian relationships that crossed lines of expertise, class, race and gender. Workshop practices, language, attitudes and expectations needed careful and open reflection in order to overcome unintended exclusions. GLEB-appointed boards overseeing the networks were accused of having 'employed high numbers of technically experienced trade union men whose language, bureaucratic ways of working and emphasis on the product rather then the community process act to exclude even technically qualified women' (Linn, 1987, p. 121). The practicalities of bringing diverse communities together with engineers, machinists and designers proved considerable. As Mary Moore put it, 'You will not find this group coming together naturally after a CND demonstration or a football match, for a quick drink or an exchange of ideas' (quoted in Mackintosh and Wainwright, 1987, p. 214). Democratizing decisions required the resolution of conflicts between different groups, whether workers, neighbours, consumers, investors, professions, communities, and across divisions of class, gender and race (Blackburn et al., 1982).

Such challenges extended beyond the workshops. Pam Linn, at ThamesNet, described vividly the intimidating power relations in play when an unemployed grassroots innovator met the executives of a large manufacturer suspected of pirating his design for safety lighting (Linn, 1987). The networks alone could not resolve these deep-seated societal issues. Some networks did attend to the cultures of innovation within their workshops by developing more inclusive practices (Clark, 1983).

But the opportunity to do so proved short lived. Hostile to radical local authorities, the Conservative central government abolished the GLC and similar authorities (e.g. West Midlands) in 1986. It also curtailed local government powers and budgets over economic planning more generally. In the universities and polytechnics too, reductions in funding and a harsher environment eroded already fragile academic alliances. Community workshops struggled on with reduced funds, but those that did had increasingly to adapt to a commercial, self-financing logic, such as providing training and consultancy that aligned their services to the needs of private enterprise (Eastall, 1989).

Methodologies: human-centred technology

Mention was made earlier of movement links with projects in Scandinavia that were seeking methodologies for human-centred technologies (Asaro, 2000; Howard, 1985). Through these initiatives, researchers and workers began to consider more participatory ways of designing and negotiating the introduction of new technologies. Together they developed the use of mock-ups, scenarios and prototyping, and joint study of workplaces and the labour process and its socio-economic basis (Ehn, 1988; Kraft and Bansler, 1994). The aim was to empower workers through participatory methodologies in technological change.

In the UK, similar discussions finally came to fruition in 1986 with a European Commission European Strategic Programme on Research in Information Technology (ESPRIT) project to develop human-centred computer-integrated manufacturing (Rosenbrock, 1989). The idea was to develop programmable machine tools and devices that followed and enhanced operator skill and control. Reflecting emerging industrial interest in flexible specialization (Piore and Sabel, 1984), project collaborators at the University of Manchester Institute of Science and Technology (UMIST), the Innovation and Technology Centre at Bremen and the Danish Technical University involved industrial partners who would host the pilot systems. However, while usability, work teams and skills enhancement were part of the project, any framing for the purposes of industrial democracy and socially useful production receded and was displaced by a more commercially minded logic.

Rasmussen recalls how research and practice generally over time became dominated by investigating 'how humans interact with computers, rather than looking the other way around, how the technology can be shaped to support enrichment of human skills and socially useful products' (Rasmussen, 2007, p. 475). He noted how initiatives in the 1980s and 1990s 'focused on the micro-level only. The societal perspective of the Lucas Workers' Plan or the attempts made by Greater London Council in the 1970s and 1980s get lost' (Rasmussen, 2007, p. 491). As such, the full significance of human-centred technological methodologies was reduced (Rosenbrock, 1989). Practical elements that were easier to absorb into industry informed subsequent developments in a more pragmatic user-centred design.

Aspects of the methodologies pioneered through movement initiatives have become standard features in user-centred design approaches and, hence, the marketability of technologies (Asaro, 2000). While the democratic intent developed much less fully, the spur provided by such intentions nevertheless generated ideas and practices taken up in industries that were restructuring for flexible specialization, working groups and seeking more effective human–computer interaction (Asaro, 2000; Piore and Sabel, 1984). Flexible machine-tool technologies afforded some operational autonomy to workers within shop-floor work teams, even if team conditions and targets were set by central management and, ultimately, capital rather than social need (Brödner, 2007). To some, this was a diminished, technical application of democratically motivated aspirations for human-centred methodologies (Buchanan, 2001).

Pathways for socially useful production

Four features were prominent in the development pathways pursued by the movement for socially useful production. These were, first, addressing the structural changes enabling and constraining pathways; second, how the characteristics of the spaces where initiatives materialized influenced the possibilities for moving beyond those spaces; third, the practical reasoning afforded by grassroots alternatives; and finally, the legacy of the movement, given its loss of momentum and dispersal.

Restructuring for socially useful production

Debates about socially useful production recognized repeatedly that its viability required deeper-seated political and economic changes; yet recognizing these changes was beyond the agency of the specific initiatives. The triple challenges of transforming the institutions of innovation for community participation, redirecting substantial investment into production for social use and articulating economic demand to social use value ultimately eluded the movement (Lowe, 1985; Mackintosh and Wainwright, 1987; Mole and Elliott, 1987).

The hegemonic rise of neoliberalism, and the specific antipathies of the Thatcher government, industrial management and capital towards the movement, proved insurmountable. The restructuring of industry, and changes in society and economy, continued in a different direction to that sought by the movement. These political and economic challenges were in debate in the 1970s. Indeed, resistance to emerging market orthodoxies nourished the spaces available for social alternatives and provided impetus to specific initiatives. Ultimately, however, the new orthodoxies undermined possibilities for consolidating and expanding movement initiatives. Activists tired, or moved on, or their pathways succumbed to these structural forces; spaces closed down, and activities dissipated into other spaces and forms (see below). Initiatives that outlasted the movement did so because they also

worked under the new structural orthodoxies, and their diffusion could be presented technically as socially innovative fixes, rendered palatable by stripping them of overt political intent.

Moving beyond alternative spaces

As the movement moved into the spaces of community workshops and alternative economic strategy, so activities became imbued with framings that included popular planning, community involvement, gender and environmental issues. The prototypes were envisaged by activists as moving into production under less-alienating industrial forms, organized through democratic planning, underpinned by state spending in socialized markets and using human-centred technologies in socially and ecologically progressive societies. Organizations and institutions sympathetic to these aims were able to orchestrate spaces for bringing grassroots needs and ingenuity into equitable contact with advanced design and manufacturing tools.

However, some spaces (transmitting structural changes noted above) introduced pressures for more business-oriented approaches. Social prototypes became objects for commercialization. Technological citizenship became skills provision. Forced to operate beyond its (shrinking) alternative spaces, socially useful production dissipated into a world of technological commercialization, user-centred design, training programmes and flexible specialization. In terms of the movement's radical framings, these moves were limited and limiting.

Activists had taken seriously the idea of pursuing a different kind of innovation and using concrete experience to explore, rethink and transform social relations and institutions. The movement was building among the grassroots the power to do innovative things. But becoming mainstream would require power over economic agendas. Debates concerning the purposes of prototypes in workshops were typical of the considerations in moving beyond alternative spaces. Was the goal to use grassroots innovation to stretch and transform the institutions of innovation, or to refine specific grassroots innovations to fit and conform to prevailing market institutions? In the end, it became increasingly difficult to sustain the more transformative strategy. The more tactical and pragmatic negotiation of specific initiatives for entrepreneurship, training and local economic development became the course of action available.

As such, pathways beyond pioneering spaces need to be understood in a porous and pluralistic way, so that the complex relationships with other processes can be appreciated. Part of the complexity apparent in this case is that pathways must not be considered solely in instrumental terms. The instrumental view sees spaces and pathways in terms of generating a reservoir of ideas, designs, methodologies, objects and so forth that offer up appropriable instruments for fixing social problems. However, movement activities also involved people in the practical reasoning of broader social issues through material activities, and thereby in developing critical thinking towards political and economic relations in their social worlds.

Practical reasoning and socially useful knowledge

Even where initiatives appeared not to leave substantial consequences, activists' practical confrontation with social and economic issues generated a rich plurality of knowledge. Whether highlighting and addressing the exclusions and inequities in existing grassroots innovation (e.g. hitherto unspoken privileges in workshops) or pointing to injustices in society, a figuring-out of issues through material projects proved both informative and expressive for participants. Movement initiatives and spaces permitted finer-grained and more richly textured forms of knowledge production as compared to, say, more rarefied analysis and argument in manifestos, reports and policy documents. Material projects involving hands as well as minds brought in more varied participants, allowed wider forms and channels of expression and addressed different audiences as compared to, say, speeches and texts evoking an abstract revolutionary agent, entrepreneurial state or overseeing governance framework.

Arguably, some prototypes proved to be diversions (e.g. the road–rail bus). But they nevertheless allowed the gathering and accommodation of new and unusual allies, including engineers and community activists, and so should not be dismissed without consideration for the social processes they helped to catalyse. The Right to Warmth campaign at LEEN illustrated this vividly. Monitoring methodologies developed at LEEN validated in technical form acceptable to public authorities something that householders already knew: their homes were damp, cold and inadequately heated at great cost. Conversely, it required the knowledge and skills of tenants' associations, community organizers and the households themselves to mobilize a campaign to win the public funds for refurbishing their homes with the technical remedies developed at LEEN. All were mobilized through the process, but it is worth pointing out that the grassroots innovators would not have implemented their techniques and devices without the power of the tenants' campaigns.

In that respect, pathways in this case involved a practical figuring-out of the complexities of motivating framings. Deliberations ranged far beyond the focal activities to which people were attending in the development of objects. Prototypes were devices for engaging wider socio-technical systems and broader alliances, and presented a broader perspective on technologies in societies. Participants learnt and demonstrated by doing how technologies were not neutral tools but, rather, devices shaped by social structures. While the movement eloquently articulated and popularized arguments for democratic design and human-centred technology, its prototype devices were both material input and manifestation of such arguments. Socially useful pathways drew out the tacit knowledge of people that was conventionally overlooked by innovation institutions. The movement wanted to uncover the ideas, skills and resourcefulness of workers and communities, and to try to empower them in ways that demanded constructive responses by more powerful institutions, without becoming engulfed by the logics and codes of those institutions.

The social shaping of technology

Given the discussion above, the overall legacy of the movement has to be seen in its pointing clearly and committedly to the fact that there is nothing natural or inevitable about technological trajectories; social choices shape our technological worlds. The movement pointed to this social shaping and, in a very practical and grounded way, explored how people might develop greater agency over alternative shaping processes for more socially useful purposes. In so doing, activists anticipated ideas and analysis that were to consolidate into science and technology studies over the coming years; indeed, for some contributors to those studies, the movement for socially useful production was a formative inspiration.

Although it is now largely forgotten, returning to the movement for socially useful production nevertheless proves instructive. Recalling the radical origins of ideas about participation in technology development begs questions about just how sufficient are polite policy recommendations today for, say, inclusive innovation, as compared to calls for shaping technology democratically. The experience of socially useful production is one of the practices being selectively appropriated by more powerful political and economic structures. The more challenging features of the pathways pursued were locked out by these structures, while other features were co-opted and reconfigured.

But the other instructive aspect to the history provided here is the very practical attempts to involve people materially in technology development. Whereas methodologies such as constructive technology assessment seek predominantly discursive approaches and arenas to shaping technology, the movement for socially useful production created (physical) spaces for practical and direct engagement in the development of technology. Despite their limitations, Technology Networks did enable people to engage in technology directly in extra-discursive ways, and thereby to reflect on the wider social, economic and political processes that made some workshops' aspirations more elusive than others.

The current flourishing of hackerspaces, fablabs and makerspaces (Chapter 6) suggests that this urge is insistent, and that pathways for shaping technology directly from below and beyond formal institutions can re-emerge. The possibilities opened up by the more rapid, extensive and versatile networking possibilities of the new digital fabrication technologies operating across social media platforms recast these earlier ideas into interesting new forms. That said, the emphasis on tacit knowledge, skill and learning by doing through face-to-face collaboration involving material objects, which caught the attention and imagination of the earlier generation of activists as a way of resisting automation, raises questions about the possibilities of codification and transmission of experience and know-how through digital social media today. It suggests that the new movements cannot and must not under-estimate the offline, local community-based activism component in any democratization of a technology commons (Smith, 2014b).

Conclusions

The movement for socially useful production consisted of an unusual mix of people acting in a remarkable set of circumstances. Movement framings picked up ideas from grassroots trade unionists revitalizing industrial democracy for the purposes of human-centred high-technology, and in so doing met ideas arising from newer social movements, the Left and radical scientists. What the movement shared was opposition to the contemporary direction of technology and a search for alternatives. In this respect, activists were pursuing pathways ahead of necessary structural changes identified in their own critique of capitalist innovation. This prefiguring of restructured social relations through technological prototyping presented activist pathways with two related challenges.

The first challenge involved holding together practical, project-based initiatives while lacking the full means to achieve their emancipatory goals, because those goals required structural changes. Nevertheless, the movement sought out and developed spaces committed to similar political and economic changes, which enabled initiatives in socially useful production that illustrated what these changes could underpin practically.

The particularities of the spaces available for practical projects had an influence on the kind of grassroots innovation that was materially possible. Reliance upon a mixture of material resources in the spaces to hand, the skills available and allied social goals, or whatever features opened up a degree of socially useful possibility, introduced specific relationships that could be built upon and which became internal to the initiative. Examples included dependence on local government grants for workshops, on trade union resources for educational campaigns or on the prototyping infrastructure of sympathetic polytechnics. Each also entailed conditions for commitment.

Some initiatives proved viable beyond these spaces and commitments, under prevailing structures, and spawned small businesses, product banks, methodologies and products. Herein lay the second challenge. Some of the relationships and commitments with the alternative spaces had to be shed in order for the initiative to diffuse beyond the pioneering setting. It is a challenge that we see across subsequent case studies. Should activists modify the output of the initiative so that it could flourish in the wider social world, such as its commercialization into a commodity? Or should they try to expand the supportive conditions found in protective spaces into the wider social world, such as through networking and mobilizing for a socially useful restructuring of industry or, more modestly, the popularization and spread of community-based workshops for grassroots innovation? Which brought activists back to the first challenge concerning pursuing pathways ahead of structural change.

These twin challenges constituted the central dilemma facing the movement. It was a highly productive dilemma. Even if swimming against the broader political and economic currents of the time, the ideas and practices bursting from the movement were formative for subsequent, more enduring arguments and approaches

in the social shaping of technology. We see that legacy today in attempts to instil more open and deliberative approaches to innovation policy, but also in renewed grassroots interest in community workshops and shared technology projects (Chapter 6).

Timing and contingency always feature in the social shaping of technologies, but the ready provision of plural possibilities is a never-ending requirement. Even if alternative pathways are vague and less powerfully articulated than conventional institutions for innovation, they nevertheless cultivate ideas and practices that can resonate through time and can have real material consequences when the moment is right. In the case of socially useful production, we find rich repertoires of activities worth reconsidering today for their instructive potential. This movement pioneered ideas and activities for a more constructive and democratic relationship with technology development in society. It pushed against received views about technologies evolving apparently autonomously from society. The practices cultivated by activists anticipated those in constructive technology assessment, participatory design, community workshops, critical making and other arrangements for opening the direction of technology development to wider scrutiny and influence. Insisting upon democratic technology developments, and attempting to advance this practically, was probably the most socially useful product of the movement.

Notes

1 Mike Cooley, prominent in the Lucas Plan and wider movement, was awarded the Right Livelihood Award (also known as the alternative Nobel Prize) in 1981, 'for designing and promoting the theory and practice of human-centred, socially useful production'. The prize money was donated back to the Lucas Combine.
2 His Keighley constituency neighboured the threatened Lucas plant in Bradford.
3 More popularly oriented materials included TV programmes, such as *Look No Hands*, in which Mike Cooley argued for human-centred technology. All this served to raise the profile of the movement.
4 Although the CAITS prototype was never commercialized, there was some interest in developing it in Germany. Attempts to develop this type of public transport recur periodically. A version of the technology is used in rail-maintenance vehicles. *Wired* reported trials of a bus by Hino Motors and Japan Rail Hokkaido in 2008 (Lew, 2008).