STEPS centre

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Socially Useful Production

Adrian Smith

Socially Useful Production

STEPS centre

Socially Useful Production

A history and analysis is provided of the movement for socially useful production, which flourished for a brief period in the UK in the 1970s and 1980s. Swimming against the rising tide of neo-liberalism, activists provided both a critique of the existing institutions for innovation in society, and developed a set of practical initiatives that explored and anticipated more directly democratic processes for socially shaping technologies. Recalling this history prompts questions about connecting tacit knowledge and participatory prototyping to the political economy of technology development, and which are relevant to current debates about grassroots digital fabrication, open hardware, and industrial policy

About the Author

Adrian Smith is a Senior Research Fellow at SPRU – Science and Technology Policy Research. He is also a STEPS Centre Research Fellow. Adrian specialises in critical analysis of the politics of technology, society and sustainable development.

About the STEPS Centre

Today's world is experiencing rapid social, technological and environmental change, yet poverty and inequality are growing. Linking environmental sustainability with poverty reduction and social justice, and making science and technology work for the poor, have become central challenges of our times. The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) is an interdisciplinary global research and policy engagement hub that unites development studies with science and technology studies. We are developing a new approach to understanding and action on sustainability and development in an era of unprecedented dynamic change. Our pathways approach aims to link new theory with practical solutions that create better livelihoods, health and social justice for poor and marginalised people. The STEPS Centre is based at the Institute of Development Studies and SPRU Science and Technology Policy Research at the University of Sussex, with partners in Africa, Asia and Latin America. We are funded by the ESRC, the UK's largest funding agency for research and training relating to social and economic issues.

www.steps-centre.org

Follow us on Twitter @stepscentre

Other titles in this series include:

Approach	Pathways to sustainability: an overview of the STEPS Centre approach
1. Dynamics	Dynamic Systems and the Challenge of Sustainability
2. Governance	Understanding Governance: pathways to sustainability
3. Designs	Empowering Designs: towards more progressive appraisal of sustainability
4. Agriculture	Agri-Food System Dynamics: pathways to sustainability in an era of uncertainty
5. Health	Health in a Dynamic World
6. Water	Liquid Dynamics: challenges for sustainability in water and sanitation

For more STEPS Centre publications visit:

www.steps-centre.org/publications

This is one of a series of Working Papers from the STEPS Centre www.steps-centre.org.

ISBN 978 1 78118 146 1

IDS Institute of Development Studies

US University of Sussex SPRU – Science & Technology Policy Research

E·S·R·C Economic & Social Research Council

Socially Useful Production

Adrian Smith

STEPS Working Paper 58

Correct citation: Smith, A. (2014) *Socially Useful Production,* STEPS Working Paper 58, Brighton: STEPS Centre

First published in 2014

ISBN: 978-1-78118-146-1

Acknowledgements: The author would like to thanks the following people for providing helpful reviews of the paper: Ian Scoones, Professorial Research Fellow, Institute of Development Studies; and Johan Schot, Director SPRU (Science and Technology Policy Research), University of Sussex.

For further information please contact: STEPS Centre, University of Sussex, Brighton BN1 9RE

Tel: +44 (0) 1273915673; Email: steps-centre@ids.ac.uk; web: www.steps-centre.org

Table of Contents

Acronyms

CAITS	Centre for Alternative Industrial and Technological Systems
CIM	Computer Integrated Manufacturing
CND	Campaign for Nuclear Disarmament
CTA	Constructive Technology Assessment
ESPRIT	European Strategic Program for Research in Information Technology
GLC	Greater London Council
GLEB	Greater London Enterprise Board
IT	Information Technology
ICT	Information and Communications Technology
IDS	Institute of Development Studies
ITGD	Intermediate Technology Development Group
JNU	Jawaharlal Nehru University
LEEN	London Energy and Employment Network
LIN	London Innovation Network
LNTN	London New Technology Network
NELP	North East London Polytechnic
R&D	Research and Development
CCEPTRE	Centre for Product Development and Technological Resources
STEPS	Social, Technological and Environmental Pathways to Sustainability
SPRU	Science and Technology Policy Research
STS	Science, Technology and Society
UDAP	Unit for the Development of Alternative Products
UMIST	University of Manchester Institute of Science and Technology
UNIDO	United Nations Industrial Development Organization

Abstract

A history and analysis is provided of the movement for socially useful production, which flourished for a brief period in the UK in the 1970s and 1980s. Swimming against the rising tide of neo-liberalism, activists provided both a critique of the existing institutions for innovation in society, and developed a set of practical initiatives that explored and anticipated more directly democratic processes for socially shaping technologies.

Consisting of an unusual and uneasy combination of grassroots trades union organisation and new social movement activism, the movement generated alternative corporate plans, arguments for alternative innovation institutions, socially useful prototypes and product banks, co-operative enterprises, and networks of community-based workshops. Activity was informed by a range of movement ideas: peaceful, environmentally and community-friendly alternative technologies; skill-enhancing, human-centred machines and worker control in the labour process; participatory design and industrial democracy; productive, practical activity for building socialised markets and economies; and a faith in the grassroots ingenuity and skill of people liberated through creative opportunities to engage in technology design and development.

Whilst eventually overwhelmed by the more powerful political and economic forces behind neo-liberalism, the movement nevertheless provided a creative impulse to ideas and practices whose legacy has been to point insistently to political choices in technology development and insist upon an opening of innovation in society.

Largely forgotten now, the radical roots of the movement are worth recalling for at least three reasons. First, the rich details of the movement provides a repertoire of activities to reconsider, some of which, including community workshops, are not too dissimilar to emerging initiatives today. Second, because the movement encounters with political economy reminds us that the route towards wresting technology choices from the hands of elites requires challenging political strategies. And third, because the movement argued these strategies had to include material, extra-discursive opportunities for people to express their (often tacit) knowledge and views through direct, productive engagement in material activity.

1. Introduction

As a mirror, held to face another,
Deepens it with recessions
This used idea, abandoned
And pinched up into caricature,
Monitors and shakes the new.
(Roy Fisher, *Suppose-*, 1967)

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 manufacture. Instead of redundancy, the workers argued their right to socially useful production.

Industrial restructuring and relocation by capital threatened many manufacturing livelihoods and communities in industrialised 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 organisation, 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 state support 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 1982: 140). Or, as Minister for Industry, Tony Benn put it in an Open University film at the time, 'one of the 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 Shop Stewards' Combine 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: 139).

Links were forged with workers' adopting similar initiatives elsewhere in the UK, but also in Germany, Scandinavia, Australia, and the US. The Plan also found willing support, and led to related initiatives, amongst

[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.

newer social movements in radical science, community activism, and environment. Arguments in the Lucas Plan, 'went far beyond the confines of the company, industry, trade unions and even the country concerned' (Pelly 1985: 107). The Plan assumed a symbolic role within 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 activity for 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 came to little essentially because the coalitions that were formed and the spaces for activity were swept aside by the rise of Thatcherism and the installation of neo-liberal ideology. Notions of social purpose were overwhelmed by the ideology of free markets.

It nevertheless remains instructive to reconsider this movement. Some of the finer-grained details shed important light into attempts at constructing pathways for alternative innovation. A few developments arising from activism at the time have outlasted the movement, albeit in a transformed rather than a transformational form. But the real legacy of the movement has been its contribution to calls for more democratic institutions for the social shaping of technologies and innovation. It is a discourse that has been sustained by research and advocacy for opening up technology appraisal, such as arguments for Constructive Technology Assessment in the field of Science and Technology Studies. Returning to some of the more radical undercurrents reminds us how importantly activists considered practical, material engagements in technology, and how their challenge was seen as deeply and overtly political. Recalling these ideas and activities now is instructive for discussions as diverse as, for example, the green economy (Bowman and Wainwright 2009), just transitions to sustainability (Newell and Mulvaney 2013), and community workshops for grassroots digital fabrication (Smith *et al.* 2013).

The study presented here addresses the following questions:

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

Socially useful production is one case study in a research project analysing a variety of grassroots innovation movements.[2] Other cases are the appropriate technology movement in Latin America, the People's Science Movement in India, the movement for technologies for social inclusion in Brazil and Argentina, the Honey Bee Network in India, and grassroots digital fabrication in European 'makerspaces'. Learning from histories across diverse contexts (Tosh 2008), the research team hopes to generate insightful contrasts and identify fundamental issues that might be helpful to grassroots initiatives today towards more socially just and environmentally sustainable pathways for science, technology and development.[3] The development of methodologies for analysing such pathways, such as thinking with history, is the aim of the STEPS Centre in which this project is situated.[4]

[2] www.steps-centre.org; www.grassrootsinnovations.org The team consists of Dinesh Abrol (JNU, India), Elisa Around (Clark, USA), Mariano Fressoli (UNQ, Argentina), and Adrian Smith (SPRU, UK).

[3] Our methodology is explained at: http://steps-centre.org/methods/pathways-methods/cases/historical-contexts/

[4] The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) has its hub in SPRU (Science and Technology Policy Research) and the Institute of Development Studies, both at the University of Sussex. The grassroots innovation project is a collaboration between Adrian Smith

Our analytical framework draws upon a combination of ideas from the literature on social movements and science and technology studies. As such, we analyse grassroots innovation movements by looking at their generative contexts; the way the movement frames its ideas and approaches to innovation; the spaces where the movement is able to develop strategies and practical innovation activity; and the actual pathways constructed.

The movement for socially useful production generated its own literature, supportive and critical, which this study has drawn upon. Archived material is also available in relation to the meetings and conferences, programmes and organisations, artefacts, lobbying, and other repertoires of action generated by the movement (e.g. film, reports, media articles). In addition to analysing documentary material, interviews were undertaken with protagonists and observers at the time. An earlier draft of this paper was also circulated for comment amongst a wider group of people familiar with the movement.

Analysis begins in Section Two by explaining the economic, political and social background from which the Lucas Plan emerged. Section Three then analyses the framings of technology and development emerging from the Lucas initiative. Analysis then moves in Section Four to the spaces where the movement was able to develop strategies for the material realisation of socially useful production. Some specific illustrations are discussed in Section Five, and which lead into a discussion in Section Six about the consequences and challenges in constructing pathways towards socially useful production. The paper concludes in Section Seven by reflecting on some lessons for grassroots pathways.

and Adrian Ely at SPRU, Dinesh Abrol at Jawaharlal Nehru University (Delhi), Mariano Fressoli at Universidad Nacional de Quilmes (Buenos Aires), and Elisa Arond at Clark University (USA).

2. The Lucas Plan's industrial background

The 1970s were a turbulent and transformative period in the UK, socially, economically and politically (Beckett 2010; Sandbrook 2012). Industrially, heightened international competition and restructuring were placing UK manufacturing under increased pressure. The industrial policy model of the state directing development through company nationalisation, and loans and subsidies to industrial champions, was in difficulty. At the same time, changes in investment practices and ownership brought manufacturing under additional pressures. Plant closures were growing.

In the workplace, militancy on the shop floor manifested in shop stewards organising occupations and work-ins as part of a repertoire of resistance to restrictions on pay, work, and plant closures (Coates 1981; Darlington and Lyddon 2001; Ferris 1972). In the short run, there were some notable successes, such as the Upper Clyde shipbuilders in 1972, where state intervention was won and firms encouraged (through public funds) to maintain production in the UK.

Workers were also concerned about the consequences of new technology for employment, work rates, and skills, particularly with computer controlled and automation technologies, and increasing recognition that new forms of worker awareness and initiative were required to negotiate the new technology (Thompson and Bannon 1985). Investment decisions by capital were central to restructuring and relocation, but so too was state power through tax breaks, grants and subsidies to enterprises 'rationalising' their operations and investing in new technology. Indeed, Lucas Aerospace emerged from a series of aggressive mergers and acquisitions in the industry in the 1960s supported by grants from the Government's Industrial Reorganisation Corporation.

It is beyond the scope of this paper to dwell on this further. Whatever combination of factors, a consequence was increasingly large numbers of skilled manufacturing workers confronting redundancy in the UK. Unemployment passed one million in 1972, and kept rising. The re-location and consolidation of factories onto larger sites, the introduction of new working practices through technological change, and outright closure of facilities, were re-shaping the industrial landscape.

Politically, the post-war consensus over the welfare state and Keynesian economic policy was fragmenting between a rising new right and a disoriented Left. Whilst a neo-liberal agenda became hegemonic eventually, this was still challenged at the time. Issues of new technology in industrial restructuring was recognised on all sides. The right in politics was increasingly laissez-faire towards economic restructuring: management should be liberated to make competitive choices, and 'lame duck' firms be allowed to fail. Unburdened enterprise, especially in services, would generate new jobs. Meanwhile, on the Left, alternative solutions were sought in renewed interest in popular economic plans, industrial co-operatives and workers' control (Tuckman 2011).

In an attempt to coordinate and strengthen responses, some shop stewards began breaking with historic divisions of role, craft and profession, and were 'combining' across trade unions and industrial sites. Industrial action through Combine Committees brought some success. Initially locked-out by management over a pay dispute in 1972, for instance, workers at the Burnley factory of Lucas Aerospace (its largest site) successfully occupied the facility and won claims through solidarity action at sites across the 17 constituent factories of the company. The Lucas Aerospace Shop Stewards' Combine Committee was able to demonstrate to workers the advantages of co-ordinated organisation.

It was out of this industrial background that the Lucas Plan emerged. Tony Benn M.P. was Minister for Industry in the Labour Government after their return to office in 1974. Influenced by the Institute for Workers' Control and other Left organisations, Benn was increasingly disposed towards workers'

participation and industrial democracy.[5] When a delegation from the Lucas Combine Committee visited Benn to discuss the potential nationalisation of the aerospace industry (an idea promptly dismissed by the Government), ideas emerged for the shop stewards to develop an alternative corporate strategy for the firm. The Combine Committee had already been discussing alternative production activities amongst the workforce, and it was hoped government intervention might bring management to negotiations along these lines.

Ideas and input were solicited initially through a letter from Combine leader Ernie Scarbrow to 180 leading authorities, institutions, universities, trades unions and other organisations, and who the Combine thought would be interested or sympathetic to developing new products. Only three responses were received. Dave Elliott from the Open University proposed a variety of renewable energy and energy efficiency product alternatives that the workers might develop. Meredith Thring from Queen Mary College proposed redeployment of Lucas capabilities to the development of telechiric products (devices for working remotely). And Richard Fletcher from North East London Polytechnic proposed a hybrid road-rail vehicle. All these suggestions were developed into the Plan, but the Combine was disappointed in the low response rate (Wainwright and Elliott 1982). Turning to their own workers, and distributing a wide-ranging questionnaire via shop stewards, the response was much stronger. The questionnaire prompted discussion about the equipment, skills and organisation available at the different plants. It led to reflection and ideas way beyond the development of alternative products, and into considerations about the planning and organisation of production, issues related to labour processes and training, and economic management.

The result was an alternative plan whose detailed descriptions and considerations, including designs for over 150 alternative products, took a year to put together. The plan ran to six volumes of approximately two hundred pages each. It contained market analyses and economic considerations; proposals for employee training that enhanced and broadened skills; and suggested a restructuring of work organisation into less hierarchical teams, breaking divisions between practical shop floor knowledge and theoretical design engineering knowledge. The Plan challenged fundamental assumptions about how innovation and business should be run.

Senior management at Lucas Aerospace rejected the Plan outright. Meetings with the Combine were delayed, cancelled, and evaded. However, the Plan attracted a great deal of attention and discussion beyond the Company. The New Statesman claimed (1st July 1977) that, 'The philosophical and technical implications of the plan are now being discussed on average of twenty five times a week in international media' (cited in Forrester 2012: 12). Management eventually agreed to discuss the Plan with Combine representatives in a TV studio, three years after its launch, and only after the public profile of the Plan had been raised through wider social movement activity.

Similarly, it took several years of campaigning to secure a debate about the Plan in the House of Commons. Even though Government was providing public money to Lucas, in the forms of deferred taxation, grants, and public financing of 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).

National trade union leaders were similarly unhelpful when it came to practical, material assistance. There was opposition to the idea of grassroots initiative upsetting the conventions of union demarcations, hierarchy, procedure and repertoires of activity. Whilst a few union leaders were sympathetic towards the Plan, others were actively hostile, and used their influence within the Labour Party to isolate the initiative.

[5] Indeed, he was to (infamously) provide public funds for motorcycle industry workers to establish co-operatives. As with other forms of government bailout at the time, these interventions came far too late, and stood little chance of rescuing firms suffering under many years' underinvestment, poor management and a failure to address international competition.

Under Secretary of State for Industry, Les Hickfield MP, explained, "The Department has received pressures from one level urging us in one direction and from a second level urging us in another. That is a difficult position for us, because we must try to retain, as I hope we do, good relationships with all levels of the trade union movement." (Hansard 1979)

The Under Secretary of State conceded that the proposals presented a 'tour d'horizon through much of modern technology and research' (Hansard 1979). The big difference, compared to research under the authority of senior industrial managers and government civil servants, however, was the participation of workers in these processes, and the grassroots agendas, criteria and directions to which this technical know how was being put. As Bob Cryer MP[6] put it in opening the Commons debate:

> That is the basic, practical, down-to-earth background of the corporate plan … 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. (Hansard 1979)

So whilst some saw the Plan as a presenting a series of practical, socially desirable products, others saw in them a vision for a radical re-ordering of innovation 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 frameworks of activism. This was particularly the case with some of the new social movements. Over the course of the 1970s in the UK, new social movements for peace, environment, community activism and women were becoming much more prominent features in social and political life. Each was placing new demands upon institutions. Peace movement interest in disarmament generated debate about conversion of the arms industry to civilian products; environmentalists sought alternative technologies for an ecological society, especially in response to the energy crisis; radical scientists wanted socially responsible technological development; feminists were campaigning for technological change for women; and community activists were linking neighbourhood deprivation to economic decline through industrial restructuring. Thus the Lucas Plan came to the attention of these different social movements in various ways. A broad coalition of groups began discussing and promoting ideas for socially useful production. They found institutional support amongst the leadership of a handful of radical local authorities, such as the Greater London Council (GLC), and who were able to provide resources and facilities for putting ideas into practice.

On the Left, there was hope that socially useful production combined with popular alternative economic strategies in metropolitan councils, like the GLC and West Midlands, could present a platform for rebuilding Labour Party support amongst the electorate. Whilst some may have still held hope for a general socialist transformation (Albury 1979), others saw a post-Thatcher government of the Left emerging through grassroots activity and on-the-ground demonstration that economic and social conditions could be improved through socially useful industrial policy (Rustin 1986). Limits were recognised, for example in terms of the scale of capital controls required to shape powerful long-wave forces under restructuring capital, around information and communications technologies (ICTs), biotechnology and new materials, and that were operating across industries internationally and economy-wide (Blackburn *et al.* 1982). State power had to be won and capacity built up, in order to organise the democratic direction of large investments, training, and

[6] His Keighley constituency neighboured the threatened Lucas plant in Bradford.

popular plans; and to reform markets and other institutions for socially useful production (Levidow 1983; Palmer 1986; Rustin 1986).

> We cannot, however, rely on the thousands of action groups and the strength of the unions throughout the country to create the switch of resources from private to public services that we need. Political action on a massive scale is required. There is only one major Party that is based on the unions and on local action groups and that is the Labour Party. (Barratt Brown 1978a: 2)

But as mentioned already, the Labour Party in government was ambivalent and the leadership discouraging towards grassroots socialism. Even if the Labour government had become more committed, the election of the Thatcher government in 1979 and the emergence of an eventually hegemonic neo-liberalism 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 grassroots movements.

The Conservative Government was openly hostile both to trades unions and radical local authorities. A series of legislative measures restricted trades union practices and emboldened management. The closure of traditional (and unionised) manufacturing industries in the recession of the early 1980s saw membership decline sharply. Local authority autonomy over economic development was restricted severely through new legislation, and metropolitan authorities like the GLC shut down completely. Spaces for Left alternatives were undermined and shrank. The resounding rejection of the Labour Party in the 1983 general election, combined with defeat of the miners in 1984–5, were bellwether events that effectively silenced ideas for socialist alternatives in UK public discourse (Turner 2010). In response, the Labour Party moved right, not left.[7]

Those movement initiatives able to redirect and connect to the new agendas of promoting small enterprises and training were able to outlast the collapse of trade union and socialist spaces for alternatives. What remained was a more pragmatic and business-oriented approach to prototyping products that had commercial as well as socially useful potential. There was a re-framing of design and innovation towards business development rather than social transformation.

So at the broadest level, the movement might at first glance been seen as a failure, because it was unable to institute its philosophy of technology and social change within society (Forrester 2012). It struggled to redirect industrial capital towards the products it was proposing, it struggled to develop the social markets for those products, and it struggled to realign innovation, production and consumption towards the movement's radical social goals. A broad, self-reinforcing trajectory of socially useful innovation did not materialise.

However, such sweeping dismissal is to misconstrue the search for pathways in social development. It overlooks too hastily (and harshly) instructive features of even apparently 'unsuccessful' initiatives. If we are to do justice to alternative pathways then we need a different way of thinking, beyond all encompassing ideas about structural transition and with that, associated notions of all-or-nothing, winner-takes-all. Failure is rarely complete, nor success entirely total. Grassroots movements like those emanating around the Lucas Plan initiate various activities, and the plurality in their constituent framings and pragmatic responses to manifold possibilities result in more quietly influential pathways that thread through the different spaces available over time.

As the rest of this paper argues for the case of socially useful production, the finer-grained features in alternative pathways suggest grassroots innovation movements are much more complex, more interesting and more important. In this case, we find rich repertoires of activities worth reconsidering today for their instructive potential, some of which, including community workshops, are not too dissimilar to initiatives

[7] New Labour regained power in 1997, long after the socially useful production movement had dissipated.

already re-emerging. More broadly, this movement pioneered ideas and activities for a more constructive and democratic relationship with technology development in society. The argument the movement made against received views on technologies evolving apparently autonomously, and the practices cultivated by activists for involving people in deliberating upon the direction of technology development, were to prove influential to those in the emerging field of Science and Technology Studies. The Lucas Plan is part of a genealogy that includes Constructive Technology Assessment, participatory design methodologies, community workshops, and other arrangements for opening the direction of technology development to wider scrutiny and influence. It is for these reasons we reconsider the movement in greater depth in the remaining sections of the paper.

3. 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 & Technological Systems (CAITS) set out the principles underpinning 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 socialised market, e.g. design and production of medical equipment with direct contact with medical staff and patients. (George 1978: 176)

This was quite a typical framework (see also Cooley 1987: 154–5). Activists from other social movements fed a number of ideas into the framing of socially useful production, and whose elaboration through practice evolved over time. The initial impetus arising in workplaces, to protect jobs and enhance skills in the labour process, was later joined by interest from community groups, from socialists interested in alternative local economic strategies, and from Left environmentalists. Here we elaborate the currents of thought contributing to the framing of socially useful production. These were:

- 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

3.1 Arms conversion, alternative technologies and community activism

There were obvious attractions for the peace movement and their interest in disarmament. The Lucas Plan not only made salient within the arms industry the movement's moral critique, it also suggested a way to address the thornier issue of job security and unemployment arising from government cuts in defence spending. A swords-to-ploughshares conversion of facilities towards socially useful production, argued by defence workers themselves, was welcomed by the peace movement (Pelly 1985). Peace activists supported research, education and trade union organisation that disseminated the arguments, and helped develop alternative plans at other defence industry firms, including Vickers and British Aircraft Corporation.

Activists within radical science, centring on the British Society for Social Responsibility in Science, were also drawn to discussions about the Lucas Plan (Reilly 1976). Demands for more socially responsible technologies resonated with radical scientists' questioning of the institutional interests and priorities setting technological agendas in society (Asquith 1979; Levidow 1983). Some were drawn to Marxist analysis of the structures of science and technology, whereas others looked to the cultures and practices of science in society (Asdal *et al.* 2007); but what they shared was an interest in how the Lucas workers and emerging movement were trying to develop a very different framework for innovation and technology development. 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 things like 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 development (Cooley 1987).

Ideas for environment-friendly technologies were also adopted within the framing of socially useful production. However, whilst left leaning networks like the Socialist Environment and Resources Association promoted socially useful production initiatives, there was an uneasy relationship with other strands in environmentalism. The alternative technology movement's interest in smaller-scaled technologies appropriate for a decentralised, ecological society was ambivalent towards trade unionists interested in jobs arising from the industrial production of alternative technologies (Smith 2005). Even where the technological artefacts were essentially the same, such as wind turbines, heat pumps, and solar panels, it was their differentiated relations with production, use and ways of living that proved contentious, and which further complicated interaction across differences of class and ideology (Brachi 1974; Elliott 1975).

Nevertheless, as social issues, the environment and, especially, energy became included within the ambit of the socially useful. Similarly, women's perspectives and gender issues were raised as important absences in a framing of socially useful production arising initially in a male-dominated sector of manufacturing. Feminists, for example, pointed to gendered perspectives within industry, and urged socially useful production to look beyond manufacturing settings. They argued for the importance of consumption activities as well as production in other sectors. Furthermore, they contributed ideas that went beyond 'products' to consider the undervalued services provided in homes (Huws 1985; Liff 1985). These were important perspectives that broadened the movement's framing beyond male-dominated conventions in manufacturing workplaces, technology institutions and the labour movement, and that presented a different view on production, as well as drawing attention to consumption and demand side issues (Blackburn *et al.* 1982).

A further broadening arose through connections with radical currents emerging from community development activism. Radical community activism was increasingly seeing local problems in structural terms of class and economic relations (Community Development Project 1977). A strategy of integrating community and industrial struggles, and to form alliances between local trades councils and community groups, 'was a central part of the strategy of the new radical community work' (Loney 1983: 150). See also (O'Malley 1977). This brought community activism into contact with ideas for socially useful production, and directing industrial, technological and economic resources to innovating for needs identified and defined by local communities. An example of this was the Coventry Workshop where shop stewards' committees and grassroots community groups came 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: 6–7). The Workshop provided facilities and support to help people organise and take control of issues affecting them and address their needs (Field 1985).

3.2 Human-centred technology and the labour process

The movement found its first expression in the workplace, where technological change, particularly computer integrated manufacturing (CIM), was seen to be deskilling and displacing workers (Brödner 1990). Influential studies were confirming workplace experience, which was that automated technologies introduced by capital, like 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). Some feared dehumanised workplaces.

> The implications of this changed structure (automation and services) are severe, control over the production process would increasingly be concentrated in the hands of a relatively small number of highly-paid technicians and professionals, with the majority having less and less control. The progressive implementation of micro-processing, computer-aided and automated design and production techniques forms the backbone of this development. The traditional areas of discretion and job control gained by skilled workers (white and blue collar) over the years will be expropriated … a

> worker's skill becomes 'objectivised' in a corporately-owned system (e.g. computer tapes). (George 1978: 173)

Conventional trade unionists saw their task as first resisting, and then negotiating a share of the productivity gains arising from this trajectory of development (Wainwright and Elliott 1982). The Labour Party and others on the Left tended to see technology change as a relatively autonomous evolutionary process, such that policy efforts for working people ought to focus in promoting the best accommodation around inevitable developments towards automation (Freeman and Soet 1994; Kaplinsky 1984). In both instances, that meant securing generous redundancy payments and retraining packages for those laid off by machines (e.g. retraining for work in the 'new' services sector), and better pay and conditions for those remaining to tend the machines (Thompson and Bannon 1985).

However, some trade unionists and researchers saw nothing automatic in the development of automated systems. 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). Moreover, research into the labour process suggested 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 centralised offices could be inflexible, and lead to slow and costly re-tooling 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 exerting worker influence.

Workers and radical researchers argued computer-controlled machinery should allow programming on the shop floor, machines should enhance rather than substitute operator skill and initiative, and production should be organised by teams of workers who schedule the work required (Rosenbrock 1989). Significantly, workers themselves should be involved in the design methodology for these socio-technical systems (Ehn 1988). 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).

The Conference of Socialist Economists, with over 1500 members, debated labour process possibilities in 1976. Robin Murray was a participant in the Conference and worked at the Institute of Development Studies (IDS) at the time, but who would soon move to Chief Economic Advisor at the GLC (section 4.3). Recalling the conference he suggests:

> [The Conference] was enormously formative and brought together all sorts of strands – the autonomistas from Italy with their thesis on technology being the outcome of the struggle between capital and labour at the point of production, (Negri[8] came to the IDS at one point), the Radical Science movement, the British Society for Social Responsibility in Science, labour historians and those around the History Workshop Journal, the women's movement and so on. Many of those who came to work for the GLC came from these various traditions (and political groupings) and what was striking was how the discipline of having to create projects meant that all the feuds and distinctions which would have been so manifest in the radical political sphere at the time were remarkably subdued by practice. (Personal correspondence, 13 December 2013)

It was this drawing together in practical activity that marked the movement out, and which we discuss in sections Four and Five, and which enabled the interplay of the plural framings discussed in this section. It included in both the Lucas Plan and emerging movement a seeking of opportunities for workers and

[8] Antonio Negri.

communities to become involved in the practical design and introduction of a new *socio*-technical organisation of production (Mole and Elliott 1987; Thompson 1989).[9]

3.3 Industrial democracy and participatory design

In the mid-1970s, a union's right to participate in company deliberations on wages and working conditions was a standard feature in industrial relations (Coates 1981).[10] Industrial democracy down to the level of product design, however, including decisions on technology investment and the organisation of production, was part of neither mainstream union, corporate, nor government policy.

Yet this was a component consideration in socially useful production. Since the notion of 'usefulness' was a matter of negotiation, workers and communities had to be involved. 'It was envisaged that the establishment of an 'alternative' technological paradigm based on the concept of 'social use' and user involvement in product design and development would act as a framework for a trajectory of socially-useful product development' (Mole and Elliott, 1987: 219). Design, development, investment and marketing decisions were a matter for participation, debate and negotiation. Brian Lowe at the Unit for the Development of Alternative Products in the West Midlands put it:

> 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: 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: 54).

A further departure from conventional notions of industrial democracy was argument for the extension of participation outside the workplace into local communities and social movements. As Mike Cooley from the Combine Committee put it,

> We [the Lucas workers] were, therefore, deliberately transcending the absurd division which our society imposes upon us, which seems to suggest that there are two nations, one that works in factories and offices, and an entirely different nation that lives in houses and communities. We pointed out that what we do during the day at work should also be meaningful in relation to the communities in which we live. (Cooley 1987: 119)

But the aim was not simply to further legitimise worker involvement by pointing to their status as community members. Socially useful production meant bringing local community groups and activist networks into the production process. The joint Trades Councils argued that local branches should build alliances with community groups, organisations of the unemployed, pensioners, consumers, socialist groups and anti-racist bodies would allow wider participation in the development of alternative design criteria, organisation of production, and Research and Development (R&D) for social use than within individual firms (Blackburn *et al*. 1982). Mary Moore from the London Innovation Network described the aim as,

---

[9] The worker's framing of new technology was not anti-automation *per se*. The Lucas Plan included proposals to automate hazardous, dangerous jobs, whilst at the same time proposing 'telechiric' human-centred machine tools for skilled operation by workers.

[10] Over 12 million workers were union members in the late 1970s; a high water mark that dropped off rapidly in the 1980s.

> … 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 rather than just pop in with a product when you've produced it … So you wouldn't just market-research a new product, which puts users in a passive role. 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: 214)

The desire to produce in a socially useful way, and to place skills and production technologies at the service of communities rather than capital, found a willing audience amongst community activists and the Left.

3.4 Alternative economic strategy and social audit

A final idea framing socially useful production was how an interventionist economic policy and public funding for socially useful production could be justified through analysis of the direct and indirect social costs of unemployment. CAITS and other bodies argued that it was more cost effective to put people to socially useful work than to pay them benefits on the dole. After all, so the argument went, 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 similar 'social audit' arguments to justify public investment in socially useful production (Barratt Brown 1978b; Murray, 1985).[11]

Sympathetic left-wing local authorities adopted this alternative economic strategy and created enterprise boards that invested public funds in product prototyping and the development of co-operatives and social enterprises (Greater London Enterprise Board 1984a). Thus the framing of socially useful production became situated within alternative economic strategies, based in socialised markets, and which tried to challenge an increasingly hegemonic neo-liberalism[12] (Bodington *et al*. 1986; Palmer 1986; Rowthorn 1981).

However, whilst socialist ideas underpinned these alternatives, clear for example in the London Industrial and Labour Plans of the Greater London Council in the early 1980s, these broader frameworks also introduced questions of economic calculation into their development (Rustin 1986). Some Alternative Economic Strategies associated with the Left in the Labour Party in the early 1980s were not specifically about promoting social usefulness (Rowthorn 1981), although the London Industrial Plan of the GLC was specifically aimed at job creation and socially useful production. Whilst alternative economic plans were operating 'in and against the market', as participants put it at the time (Murray 1985), they were still public programmes under pressure to demonstrate value for money on more conventional lines.[13]

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? Moreover, how was one to prioritise 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 production?

---

[11] A 'Jobs Audit' commissioned by GLEB from consultants estimated the annual cost per job to be between £3,624 and £5,234, depending if 50 per cent to 100 per cent of the investment was written off. The direct annual cost to the Exchequer of an unemployed person at that time was between £5,000 and £7,000) (Eastall 1989: 19).

[12] Imposed initially in the terms of an IMF bailout of the UK in 1976, and developed more enthusiastically by the Thatcher government after 1979.

[13] Particularly from a very hostile popular media and central government (Turner, 2010).

Some attempts were made to formulate frameworks for socially useful production within a radical economics (Bodington *et al*. 1986; Rustin 1986). But others were reluctant to go down this line, because they feared it would distort their founding ideas into codified, technocratic forms little better than existing industrial production. Ideas in the original Lucas Plan had been more intuitive, implicit and tacit in their approach to social use through the projects suggested by the workforce. A saying attributed to a Lucas worker from the Burnley plant at the time put it as people knowing a socially useful product when they saw it. A similar, practical deliberation was associated with other, community based initiatives in socially useful production. As Mike Cooley put it, practical engagement in the material development of grassroots ideas into products and services,

> … demonstrate the capacity for quite ordinary people to question the direction in which technology is going, and demonstrate in a practical way some of the alternatives, and the processes by which we develop those alternatives. As we set out to do so, there is a danger that our sense of what is necessary will be silenced by technocratic, scientific jargon. We should not permit this, nor should we be intimidated by the determinism of science and technology into believing that the future is already fixed." (Cooley 1987: 155–6)

Under this view, what constituted social use was left to open and accessible considerations through local, specific, practical deliberation; and reflecting on social use as one tinkered with materials and experimented with products in ways that allowed more tacit understandings to come into much more socialised processes of innovation.

Nevertheless, over time a set of features defining 'socially useful' did emerge, of which the definition by Mike George above is typical. It provided a rudimentary framework for countering a weakness in the original, more intuitive approach of the Lucas workers, whereby management was able to counter that, '[the Company] cannot accept that aircraft, military and civil, do not have a social utility' (Lucas Aerospace 1976; cited in Forrester 2012: 13). 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).

Overall then, the framing of socially useful production was constituted by a dynamic interaction between component ideas: participation in design; community involvement; environmental and social justice themes; taking control of industrial strategy, and all supported by a socialised market and state support. The framing provided a repertoire of ideas and a language for diverse activists to collaborate in the construction of alternative paths. However, it was apparent that the framing of socially useful production had also to confront wider changes politically and economically.

4. Spaces for socially useful production

Some organisations and networks for socially useful production have been mentioned already. In this section we discuss their activity in what became a series of key spaces for a more practical exploration of socially useful production possibilities. These spaces were a mix of physical and institutional locations. They were centred in new trade unionism, research institutes, and radical local authorities, and where each provided distinct situations, opportunities, and resources for a practical figuring out of socially useful production. However, they were also spaces squeezed by the wider political and economic changes underway in the UK.

4.1 New trade unionism

Not all workplaces were like Lucas Aerospace. Production practices amongst the 18,000 workforce had specific characteristics favourable to the development of an alternative plan. These were a large proportion of skilled workers accustomed to working with (unionised) design and technology professionals, and where research and product development were important components in complex batch production processes that retained craft elements. Work on new products already involved mixed teams where the tacit knowledge of skilled 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 shop floor leaders were confident could be organised effectively, especially with the Combine Committee facilitating. Less organised workers in smaller firms, or working on mass production lines, and who were less familiar with product development, had further to travel.

Workers at Lucas were proactive in reaching out to workers in different sectors and across the trade union movement, sharing their ideas and experience. This began through visits and meetings, and alongside more routine trade union activity, such as conference motions and educational activity. Combine committees of shop stewards at other companies met to develop their own plans in response to redundancy threats. These included workers at firms like Vickers, British Aircraft Corporation, Dunlop, Parsons, and Chrysler (the latter proposing diversification into products for the Third World) (North East Trade Union Studies Information Unit 1980; Speke Joint Shops Stewards Committee 1979). Trade union representatives helped create space for these plans by organising teach-ins amongst the workers, distributing information and analysis, publicising activity through the labour movement press, and seeking help from other institutions, such as motions of support and funds, and policy proposals for the Labour Party. Workers were assisted, to a point, by trade union information units and public research bodies (North East Trade Union Studies Information Unit 1980). Indeed, the Lucas Combine Committee created CAITS for purposes that included helping others develop alternative plans (section 4.2).

The activity of Lucas shop stewards was also noted internationally (Rasmussen 2007). In West Germany, for instance, the metalworkers union drew upon the Lucas experience to inform Alternative Product Working Groups established in a number of firms, including Blohm and Voss, AEG, VFW, MBB, Krupp and MAK. Workers proposed combined heat and power systems, transport systems, and, at Voith in Bremen, designed tyre-recycling equipment. In an attempt to progress to prototypes, and help diffuse alternative initiatives, Innovation and Technology Centres were set up in Bremen and Osnabrück in collaboration between trade unions, universities and local authorities.

As already noted, attempts to win support from national unions were resisted, so it was left to the spaces within a more direct and less institutionalised ‘new’ trades unionism to advance ideas and activity (Wainwright and Elliott 1982). For a period of five or more years, workers used spaces beneath and outside trade union hierarchies, particularly through shop stewards networks, to make their case and organise for socially useful production.

4.2 Research and education institutes

With funding from the Joseph Rowntree Foundation, and support from North East London Polytechnic (NELP), the Lucas Combine Committee created CAITS at in October 1977. The initial idea was to use polytechnic resources and worker input to develop prototypes proposed in the Plan. It was believed working prototypes would strengthen the bargaining position of the union within the company. These facilities were extended to workers developing alternative plans at other companies and in other industries. CAITS and other research units could also provide union members with access to independent knowledge about the firms and sectors in which they worked.

At the time, union links with academia were unusual (Wainwright and Elliott, 1982). However, the links that were forged developed into co-ordinated research, educational and campaign activity in socially useful production (e.g. Open University, Coventry Polytechnic, NELP). Movement activists at a variety of polytechnics elsewhere linked their facilities to local communities, including linking through student projects in ways similar to Science Shops in the Netherlands. 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.[14]

The research space also opened possibilities for engaging with similar initiatives in other countries. UK union/research delegates attended European conferences, and in turn hosted overseas union/researchers at UK events (Centre for Alternative Industrial and Technological Systems 1978). Activities around the Lucas Plan chimed with European initiatives and attracted attention. 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). Mike Cooley spoke about activity for socially useful production in the UK.

Notable amongst these European connections were links with researchers and unions in Scandinavia. Collaborative projects in Denmark, Sweden and Norway began exploring how computer-based technologies could be designed and introduced into the workplace in ways that extended both democratic control over the labour process and enhanced the skills of the workers involved. The 'Utopia' project was perhaps the most developed expression of this activity. Pelle Ehn, the Utopia co-ordinator, 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: 25)

Attempts were made to feed lessons back into socially useful production initiatives (section 5.3). Ehn (1988) noted, 'The Greater London Council (GLC) translated the requirement specifications and meant to use it for a new graphic industry project along the lines sketched by Utopia.' (p.351). The GLC and Greater London Enterprise Board (GLEB) in particular proved to be a key space for the movement.

4.3 Left local authorities

A number of local authorities, under the control of the Left in the Labour Party, became supportive towards socially useful production, and provided space for a number of community workshop initiatives as well as programmes for developing the ideas into practice. Activity at the Greater London Council was perhaps the most intensive in this respect. With unemployment heading towards one in eight workers, and

[14] 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.

manufacturing in steep decline in the city, Londoners voted an avowedly socialist Labour council into power in 1982. Their manifesto had noted:[15]

> Groups of workers such as the Lucas Aerospace Shop Stewards' Committee have, with the support of the Labour Party, began 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: 81)

Once in office, council leaders created the GLEB to implement proactive interventionist economic policies aimed at fighting unemployment and revitalising industry (Eastall 1989).[16] An annual budget of £32 million was provided to support existing enterprises and create new ones. Given the Left political orientation of the council, enterprise agreements drawn up with recipients of GLEB loans sought worker involvement and favoured co-operatives (Greater London Enterprise Board 1984b; Murray 1985).

As a very visible spokesman for the Lucas Plan, design engineer Mike Cooley was, effectively, sacked by the company in 1981. He subsequently took up a position as Technology Director with the GLEB where he was able to use the resources of the Greater London Council, including political commitment, to enable others in the movement to network and make the case for aspects of socially useful production.

It was through the creation of five Technology Networks with a GLEB budget of £4 million that facilities were provided for socially useful production (section 5.2). They were to seek new forms of innovation since, as a leaflet explaining the Networks put it:

> Previous waves of technological innovation resulted in an expansion of production which ultimately compensated for the old skills and jobs destroyed – whatever the human cost in the interim.
>
> But the current wave of technological change involves such an explosive increase in productivity that to maintain net employment would place an unimaginable strain on world resources, and on society's existing arrangements of distribution.
>
> At the same time an increasing number of real demands are not translating themselves into effective economic demand. (Greater London Enterprise Board 1984c)

Two networks served particular areas in London, and three specialised in particular issues. 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 aims of these networks 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

[15] The manifesto devoted 71 of its 157 pages to industry and employment.

[16] Enterprise boards were also created by Labour authorities in the West Midlands, Sheffield, West Yorkshire, Lancashire and Merseyside. Each attempted to leverage private sector funding in addition to public funds, including (local authority) pension schemes. The GLC went furthest in its socially useful conditions attached to investments.

London Enterprise Board 1984c: 9–10). Mike Cooley, explained how the networks developed ideas from the wider movement:

> The networks reflect international developments in the field of product innovation and design and, we believe, combine in one organisation the best aspects of the science shops in Holland, the Innovation Centres in West Germany, and other creative responses worldwide. (Greater London Enterprise Board 1984c: 3)

Similar initiatives were created around the country. In the West Midlands, the Council expanded the Unit for the Development of Alternative Products (UDAP); further north, Sheffield Council and 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.

5. Illustrative examples

Movement ideas and activism for socially useful production manifested in a variety of specific forms. Here we illustrate some of that variety with example pathways for developing innovation objects, facilities and methodologies that developed. Each captures different challenges in the construction of alternative pathways for innovation, and which are discussed in section six.

5.1 Object pathways: innovating the road-rail bus

Amongst researcher responses to Lucas worker invitations in 1975, was the proposal from Richard Fletcher at NELP to develop a bus that could run on both road and rail. The design idea was for these affordable vehicles to increase the flexibility with which public transport could use infrastructure more effectively, and 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 with North East London Polytechnic, then the road-rail bus was developed further at the polytechnic, alongside some of the other prototypes.

Whilst the social use of the road-rail bus was open to question, an added advantage soon became apparent once the prototype was ready for the road (and rail). The bus was put to use as a roadshow for the Lucas Plan and socially useful production. Press were invited to join the bus as it toured industrial sites, shopping centres, and local communities around the country. Other exemplary prototypes and design were carried on board. The bus and displays engaged people in discussions, and inviting visitors 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 absence of (social) markets for these objects.

Beyond engagement (or propaganda) however, and as with other areas of the economy, transport markets were being liberalised and direct links severed between production and public sector users. The road-rail bus was not developed further in the UK.[17] 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: 68). It proved difficult to align investor interest in returns on capital with the social goals activists were trying to realise 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 and flagged issues of concern to people. It was argued people engaged differently with these practical activities at places of work or community life, compared to discussions at public meetings in evenings (Cooley 2007). Early in the career of their Technology Networks, GLEB wrote, '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,

[17] Though the CAITS prototype was never commercialised, 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 Magazine reported trials of a bus by Hino Motors and Japan Rail Hokkaido in 2008 (http://www.wired.com/autopia/2008/05/half-bus-half-t/; accessed 16/08/13)

emphasis added). This quote is quite typical in blending practical, object-oriented activity with aspiration to challenge the emerging neo-liberal hegemony through that activity (Linn 1987). But it was a blend that also introduced friction into the movement. Practical experience in the Technology Networks revealed such tensions.

5.2 Facilities for pathways: Technology Networks

Like CAITS, the GLEB Technology Networks and other community-based workshops around the country envisaged the prototyping of alternative technologies as a significant activity. Early practical experience prompted some rethinking and debate about this emphasis in workshop facilities and, through that, the purposes in socially useful production.

Each workshop developed differently, but the broad aims were similar. All provided physical spaces, access to shared machine tools, and assistance from technical staff providing services to local communities, enterprises and co-operatives. Attempts were made to recruit staff who 'appreciate the tacit knowledge of local residents and workers' (Greater London Enterprise Board 1984c: 12). Workshops were governed by representatives of local communities, trade unions, tenants groups, and academia (Cooley 1985).

Learning from Dutch science shops, and in an attempt to break down barriers between workshop staff and local communities, the London Networks were sited away from 'alienating' campuses. The facilities provided walk-in venues intended for anyone wishing to get involved. Training was provided. LNTN undertook training initiatives, for example, exploring how communities could network ICTs to generate and share information, to engage with expert systems and enable groups to communicate and co-ordinate more effectively. A women's co-operative was established to address gender bias in microelectronics. Technology Networks hosted visits and machine tool training for visitors from developing countries as part of the GLC's Third World Information Network, and whose trading arm went on to pioneer Fair Trade systems.

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: 12)

Profit-making enterprises were required to pay royalties on non-exclusively licensed products, which would contribute to Network running costs and cross-subsidise the socially useful mission. Other sources of revenue were identified in the public sector, through provision of useful products and services, and returns from the spin-off development of co-operative enterprises under the wider activities of GLEB.

At least that was the plan. Some devices developed in the Networks proved quite successful, such as a user-friendly, electronic heating controller designed to improve efficiency. New electrical controllers were also designed and fitted to the large refrigerators at County Hall to improve their energy performance. However, proposals to the refrigerator manufacturers for their wider commercialisation were resisted: the design reduced the need for lucrative maintenance and servicing contracts. In practice, marketing challenges like these often proved intractable. Some ideas, 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. However, for many prototypes, even where a commercial market looked promising, the investment required to move into manufacturing was often beyond the means of GLEB, and financial institutions were either not interested in providing the industrial capital, or refused to locate production in London.

Recognising the difficulty of developing products so directly, the Product Bank idea was further adapted by an offshoot from the Networks. A Technology Exchange was created that matched technology designs to

firms seeking new products or solutions to production problems. This technology transfer service was opened up to commercial technology offers internationally. Learning from the limitations of Lucas and GLEB, and involving people from both initiatives, the Technology Exchange provided catalogues and exhibitions to subscribers. It was supported by the European Community and United Nations Industrial Development Organization (UNIDO). According to Brian Padgett from the Exchange, the problem with the Lucas Plan was that many viable prototypes and designs were frustrated by dependency upon unsympathetic company managers and investors. 'It was this that prevented the take-up of the Lucas Shop Stewards' useful but diverse ideas from adoption by a single client with clearly defined markets.' (interview, 07/10/2013). The Exchange opened things up. It operated until 2002.

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 participants, the emphasis amongst GLEB leadership, rested in using workshop facilities to develop small businesses and social enterprises. Brass Tacks, for example, repaired and reconditioned broken furniture and consumer goods for distribution to disadvantaged households. The Technology Networks worked with them to manufacture replacement components on a bespoke basis. Other small enterprises were promoted and supported through the Technology Networks. GLEB provided office space at one of the Networks to those working on the UK appropriate technology programme of Intermediate Technology Development Group (ITDG), and who were active in this approach.[18]

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). It was able to take ideas and activities beyond the ideological confines of 'socially useful' and insert them more widely into the spirit of enterprise that Thatcherism was trying to cultivate. Similar links were forged through training programmes, and where ideals for demystifying new technology (with a view to democratic participation) could be aligned with interest in providing people with skills (with a view to employing them as users) (Palmer 1986).

However, this was a direction that not all agreed upon. One of the first Networks, starting work in 1983, was LEEN. As various community, tenant, and energy organisations became involved in the network, bringing different experiences, 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: 87)

Strategy shifted towards building a campaign, with local authority support, that would put pressure on central government to invest in existing energy efficiency and conservation technologies that LEEN identified as addressing community needs (London Energy and Employment Network 1986). 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: 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

[18] Intermediate Technology Development Group – initiated by Fritz Schumacher and inspired by his ideas. John Davis of Shell was involved in the UK programme.

conserving technologies for installation in homes. The campaign drew attention to particular needs in apartment blocks, and organised community energy initiatives aimed at job creation through the implementation of energy improvements (Greater London Enterprise Board 1984c).

Activists involved in other technology networks recognised increasingly the political nature of forging links between technological development, community activism, and local economic regeneration. The challenges of investment and marketing socially useful prototypes were mentioned in Section 4.3. But simply deciding which socially useful initiatives to prioritise for development amidst the ferment of ideas and proposals was unclear.

Attempts were made to identify and then mobilise behind certain socially useful initiatives by linking to parallel developments in popular planning. The GLC Popular Planning Unit was attempting through community engagement to prioritise bottom-up socio-economic development priorities. Community workshops elsewhere were on a similar journey. Brian Lowe at UDAP in Coventry explained how,

> The original relatively simple aims of establishing technical feasibility of alternative products has widened to encompass a much broader activity. The Unit has now become absorbed into and became a distinct but constituent part of the popular planning movement.' (Lowe 1985: 68)

However, not everyone was supportive. Tensions emerged between those looking to the development of revenue through commercialisation of products, a view associated with GLEB boards overseeing the networks, and the popular planners seeking to mobilise 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: 212–213)

Such challenges to realising the participatory design framing ran deeper still. It became apparent through community workshop practices that realising popular planning implied a transformation in the culture and institutions of innovation. 'Constructing an open door to planning and decision making procedures is not enough' (Linn 1987: 116). The networks, and the resources for design, prototyping, and production development needed to be culturally and materially accessible to Londoners. Materially speaking, that meant working around or transcending the daily demands on peoples' energy and time by providing them with the resources to participate. Culturally, it meant the gradual process of building more egalitarian relationships that crossed lines of expertise, class, race and gender.

Workshop practices, language, attitudes and expectations needed careful and open reflection 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 than the community process act to exclude even technically qualified

women' (Linn 1987: 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[19] demonstration or a football match, for a quick drink or an exchange of ideas' (quoted in Mackintosh and Wainwright 1987: 214). Democratising decisions involves the negotiation and resolution of conflicts, between different groups of workers, between producers and consumers, between professionalised expertise and grassroots knowledge, and across divisions of class, gender and race (Blackburn *et al*. 1982).

But the challenges extended beyond the workshops. Pam Linn at ThamesNet described vividly, for example, 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. The Networks alone could not resolve these deep-seated issues. Some Networks did attend to the cultures of innovation and develop more inclusive practices within their workshops (Clark 1983). But the opportunity to do this proved to be short-lived. Hostile to radical local authorities, the Conservative central government abolished the GLC and similar authorities (e.g. West Midlands) in 1986. They 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. Some community workshops and other initiatives struggled on with reduced local authority funds, but those that did had increasingly to adapt to a commercial, self-financing logic, such as the Technology Exchange and training projects that aligned their service provision to the needs of private enterprise (Eastall 1989). GLEB's Networks proved to be the high water mark for facilities for grassroots experimentation.

5.3 Methodology pathways: Human-centred technology

Movement ideas about human-centred technology were realised through a variety of research projects involving direct and indirect inputs from workers. In some cases, trade unions were formally part of the projects. Section 4.2 mentioned how Lucas had inspired the Utopia project in Scandinavia, indicating the international connections with parallel movements.

> These 'action research' projects spread throughout Scandinavia … They quickly took on the form of a popular-education movement. Workers began to understand technology as something they might be able to influence – just like other aspects of working life. And technologists began to see some of the implications for people on the shop floor of the technologies they designed. They began to question some of the assumptions and methods of their profession. (Howard 1985: 43)

Through these initiatives designers 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, prototyping, and joint study of workplaces, the labour process and its socio-economic basis.

Similar attempts were made in the UK. Long-standing discussions had been held amongst a group of activist-researchers, including GLEB and Howard Rosenbrock at the University of Manchester Institute of Science and Technology (UMIST). They came to fruition in 1986 with a European Commission European Strategic Program for Research in Information Technology (ESPRIT) programme project (1217) to develop human-centred computer integrated manufacturing. The idea was to develop programmable machine tools and devices that followed and enhanced operator skill and control. Reflecting emerging industrial interest in flexible specialisation, the collaboration between UMIST, the Innovation and Technology Centre at Bremen and the Danish Technical University included industrial partners who would host the pilot systems. Whilst usability, work teams, and skills enhancement were part of the project, the framing of this as part of a strategy for

[19] Campaign for Nuclear Disarmament.

industrial democracy for socially useful production had receded and was displaced by a more commercially minded logic.

Rasmussen recalls how research and practice 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: 475). He noted how initiatives in the 1980s and 90s, '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: 491).

As with Utopia, ESPRIT project lessons for participatory and interdisciplinary design proved significant (Rosenbrock 1989). These represented the practical elements that were easier to absorb in industry, and informed subsequent developments in a more pragmatic user-centred design. Some of the methodologies pioneered through movement initiatives in this vein have become standard features in user-centred design approaches, and hence marketability, of technologies (Asaro 2000). However, to some of the pioneers this presents a diminished, technical application of what were politically motivated aspirations for human-centred design principles (Buchanan 2001). It was through initiatives like Utopia and ESPRIT (see below) that principles and practices for skill-based participatory design developed. And whilst the democratic intent developed much less fully, the spur provided by such intentions nevertheless generated ideas and practices taken up in industries restructuring for flexible specialisation, working groups, and seeking more effective human-computer interaction (Asaro 2000; Piore and Sabel 1984).

Even if diminished in consequence compared to intent, the design activities emerging from the movement nevertheless contributed to a less automated approach to computer integrated manufacturing (Asaro 2000). The centrality of usability and market demands for flexibility led to machine tool technologies that afforded some operational autonomy to workers within shop-floor teams, in terms of an ability to programme machines (compared to CIM rhetoric about centrally automated factories), even if team conditions and targets were set by central management and, ultimately, capital rather than social need (Brödner 2007). Those bigger debates continued in academic spaces.[20]

[20] Through a series of further conferences and speaking tours, supported in part by funds from GLEB, activist-researchers eventually formed the journal AI & Society in 1987 (Gill 2007). The journal became an important forum for developing ideas about human-centred technology. As such, this strand ceased to be a grassroots movement, even if providing a forum for professionals over methodologies, developments, and social values.

6. Discussion: constructing socially useful pathways

What can we learn about grassroots innovation framings, spaces and pathways in this case? Framings were influenced by prior experiences and wider social and political ideas, both in a constructive sense, as an inspiration and mobiliser, and, more critically, as forces to be resisted in terms of the rise of neo-liberalism. These framings served to orientate the design of initiatives, the search and cultivation of spaces for developing initiatives, and finally guided negotiations and re-framings between path construction and the wider social world.

But of course there were material requirements also. The characteristics and facilities afforded by the spaces cultivated, such as the resources available, the institutional situation, and other characteristics, fed into the possibilities and design of socially useful innovations. Similarly, developments in the wider social world, less inclined to alternatives, but rather seeking appropriable ideas and practices for other agendas and problems, provided both opportunities, distortions and constraints that introduced tensions and deflected path construction.

Here we draw out and discuss four features of the history significant in the path construction activities for socially useful production. These are: firstly, political and economic structures that enable and constrain path construction possibilities; secondly, the importance of spaces for alternative development, and possibilities for pathways moving beyond those spaces; thirdly, the practical reasoning afforded by grassroots alternatives; and finally, reflections on the overall legacy of the movement for the social shaping of technology.

6.1 Restructuring for socially useful production?

A recurring theme amidst debates about socially useful production was recognition that its viability required deeper-seated political and economic changes. Instigating favourable structural conditions was beyond the agency of the specific initiatives. The triple challenges of reforming and opening the institutions of innovation to community participation, re-directing substantial investment into the manufacture of socially useful products, and articulating economic demand to social use value, ultimately eluded the movement; even though activists recognised it as a critical issue (Lowe 1985; Mackintosh and Wainwright, 1987; Mole and Elliott 1987).

The hegemonic rise of neo-liberalism, and the specific antipathies of the Thatcher Government, industrial management and capital towards many features of the movement, proved insurmountable. The restructuring of industry, and changes in society and economy, went in a very different direction to the movement. These political and economic challenges were in debate in the 1970s. To an extent, opposition to emerging market orthodoxies nourished the spaces available for social alternatives, and provided impetus to specific initiatives; whilst at the same time those same orthodoxies ultimately undermined possibilities for consolidating and expanding upon the alternative initiatives that arose. Activists tired, or moved on, as the pathways pursued by the movement gradually succumbed to these structural forces; spaces closed down, and activities dissipated into other forms (section 6.4). Thus some initiatives, presented originally as part of broad alternative political and economic programmes, became innovative objects and techniques whose quiet diffusion was made palatable because they were presented as apolitical, socially innovative fixes, stripped of any overt political intent.

6.2 Moving beyond alternative spaces?

The prototypes in the original Lucas Plan were envisaged as being made in a less alienating form of industrial production, organised through careful planning, and underpinned by state spending in socialised markets. The Plan was informed by the ideologies and trade union experience of the Combine shop stewards. They

sought (high) technologies for a restructured industrial society in which grassroots needs and ingenuity was brought into equitable contact with advanced manufacturing processes. As the movement moved out of this setting, into the spaces of community workshops and alternative economic strategy, so activities for wider-scale diffusion came to be interpreted somewhat differently, to include popular planning, community involvement, gender and environmental issues.

The wider political and economic changes noted above meant a combination of expediency and more business-oriented alliances broadened interpretations further still, such as in the Technology Networks, and where prototypes for socially useful production became objects for commercialisation. These included the commercialisation of technological artefacts, the institutionalisation of design principles and methodologies, new service models for energy, and organisational forms like technology exchanges.

But in terms of the movement's radical framing, these moves were limited, offshoot achievements. Activists had taken seriously the idea of pursuing a different kind of innovation, and using concrete experience of trying to do innovation that way, to explore, reflect and rethink the wider institutional, political and economic restructurings required. The movement was trying to build among the grassroots the power to do innovative things, at the same time as recognising that becoming mainstream practice would require power over innovation and economic agendas. Even without power over conventional agendas, however, alternative innovation was possible for a period in sympathetic spaces; and some of the innovations were even able to move out of those spaces as they developed into forms attractive on more conventional and commercial terms.

Debates concerning the purposes of prototypes and workshops were typical of the considerations in moving beyond alternative spaces. Should prototypes and networks become focal points for the mobilisation of campaigns for institutional change in line with the underlying goals of the movement? Or should they devote their efforts to the development of objects emerging from this milieu that were promising on more conventional commercial grounds? Was the goal to use grassroots innovation networks 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, for structural reasons, it became increasingly difficult to sustain the more transformative strategy. The more tactical and pragmatic negotiation of specific initiatives of social entrepreneurship and local economic development services became the more reasonable course of action available over the course of the 1980s.[21]

More recently, as mainstream trajectories of development have had to bend to similar social demands today, such as the environment, so we see a return of some of the artefacts pioneered earlier. However, firms and policy-makers are not adopting these artefacts without adapting them to their own agendas and interests. Forrester argues activists in the 1970s, 'exhibited a deeply political understanding of current and potential technology, in marked contrast to the purely technical nature of the alternative technology we recognize today. The term has shifted from describing a technology that will enable an alternative society, to a technology which provides an alternative means to enable current social structures to be maintained.' (Forrester 2012: 14).

What becomes apparent is that in the settings of local economic development, or community activism, or even human-centred technological research, the world is not organised into neat narratives for or against socially useful production. There is a much more complex interplay and intersection of demands, possibilities, and limitations across a dynamic variety of spaces, and which activists need to negotiate. Indeed, the movement in this case study emerged through the intersections of workers, the Left, community activists, and others, already seeking pathways towards their goals. And as socially useful production as a relatively coherent movement fragmented, so some of the ideas, practices, and material symbols of its goals were

[21] Robin Murray, GLC economic director, for example, went on to pioneer ideas in social innovation.

carried away into other spaces, including those associated with the design profession, environmentalism, academia, and social entrepreneurship.

As such, path construction moving beyond pioneering spaces has to be understood in a differentiated and disaggregated way, such that the complex relationships with other processes can be appreciated. Part of the complexity made particularly apparent by this case study is that these pathways must not be considered solely in instrumental terms. So far, discussion in this section has tended to view the spaces and attempts at path construction in terms of generating a reservoir of ideas, designs, methodologies, objects, and so forth, and that offer up appropriable instruments for fixing problems. However, movement activities also involved people in practical reasoning with and through material objects concerned with political and economic issues, and thereby learning more about their social worlds.

6.3 Practical reasoning and socially useful knowledge

Even where initiatives do not appear to leave long-lasting consequences, looking back and understanding how grassroots innovators and activists confronted challenges at the time identifies how their practical activity 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 the more agit prop pointing to injustices in society; a figuring out of issues through material projects could prove both informative and expressive for participants. Movement initiatives and spaces permitted a finer-grained and more richly textured knowledge production, 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 of expression, and addressed different audiences compared to, say, speeches and texts evoking an abstract revolutionary agent, entrepreneurial state, or overseeing governance framework. Practical reasoning presented a very different way of participating materially in debates, and could be quite empowering to those involved.

In that respect, path construction included spaces for a practical figuring out of the complex possibilities of grassroots innovation in socially useful production. The examples in section five illustrate some of these complexities. Socially useful prototypes focused attention and activity in the development of objects, but were done in ways in which deliberation ranged far beyond those objects. The prototypes were devices that engaged wider socio-technical systems, and presented a broader social perspective on technologies. Participants at Lucas, at UDAP, in the ESPRIT programme, and so forth, demonstrated by doing how technologies were not neutral tools, but rather material devices shaped by social values and structures. Some in the movement eloquently articulated and popularised arguments for democratic design and human-centred technology, but the prototype devices themselves were a material manifestation of the centrality of tacit skills and grassroots ingenuity in design.

Arguably, in cases like the road-rail bus, the social usefulness was not always immediately apparent, and some prototypes proved perhaps to be diversions. But nevertheless they 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 processes they helped catalyse. These objects were devices for engaging people in debates about the promise of technology in social realities, and urged reflection on how those relations might be changed.

Nevertheless, practical reasoning had to connect with political mobilisation. The experience at LEEN illustrated vividly, for example, how householders had tacit knowledge about the thermal performance of their homes. Monitoring expertise and energy auditing methodologies developed at LEEN validated in technical forms 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 organisers, and the householders themselves to mobilise a campaign to win the public funds for the requisite technical remediation. All were mobilised through the process, but it is worth pointing out that the technical experts would not have been able to implement their techniques and

devices without the power of the tenants' campaigns. There was a combination here of practical reasoning, propositional expertise, and political linkages involving a variety of actors and audiences.

To the extent that socially useful production was committed to involving the tacit knowledge of people conventionally overlooked by innovation institutions, it was always going to be difficult to enshrine and institutionalise it in clear codes. The movement wanted to uncover the ideas, skills and resourcefulness of workers and communities, and to try and empower them in ways that demanded constructive responses by more powerful investment agencies and political authority, without becoming engulfed by the logics and codes of the latter.

6.4 The social shaping of technology

Given the discussion above, the overall legacy of the movement is the way it pointed clearly and with commitment to the fact that there is nothing natural or inevitable about technological trajectories; social forces and actor interests shape them. The movement pointed to this social shaping and, in a very practical and grounded way, explored how people might exercise greater conscious agency over alternative shaping processes for more socially useful purposes. In so doing, activists anticipated ideas and analysis that was to consolidate into science and technology studies over the coming years; indeed, for some contributors to those studies, the Lucas Plan and associated movement for socially useful production was a formative inspiration. The traces of the movement's arguments and activities have been carried by activists in their subsequent careers, have been taken up and developed by others, and consequently contributed to opinion and activity to consciously shape technology for social benefit.

Though largely forgotten now, returning to the roots of the movement for socially useful production nevertheless remains instructive. Not only do we better appreciate one of the routes towards recent suggestions for the social shaping of technology, such as Constructive Technology Assessment, but we are also reminded why this recent work needs to recall some of its radical roots. Recalling the political origins of some of these ideas suggest polite recommendations for opening up policy frameworks are unlikely to be sufficient for a more democratic shaping of technology and innovation. The experience of the Lucas Plan is one of ideas and practices being overwhelmed and appropriated by more powerful political and economic forces. The more challenging attempts at social shaping were closed down, such as direct democratic control of the technology development process, while other elements were co-opted and reconfigured by capital, such as ideas, methodology, and artefacts for flexible specialisation in manufacturing.

But the other instructive aspect to the history provided here are the very practical attempts to involve people materially in technology development. Whereas methodologies like Constructive Technology Assessment (CTA) and others 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. Technology Networks might have been quite limited, but they did enable people to engage in some material processes shaping technology in extra-discursive ways, and thereby 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 grassroots digital fabrication suggests an insistent urge to shape technology directly from below and beyond formal institutions of technology development (Smith *et al*. 2013). The earlier movement's arguments for technological agit prop and participation through doing could be informative for current movements for makers and commons-based peer-production. Equally, the possibilities opened up by the more rapid, extensive, and versatile networking possibilities of the new technologies of social media, recast these earlier ideas into interesting new forms.

That said, the emphasis on tacit knowledge, skill, and learning by doing through close face-to-face collaboration involving material objects that 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 social media. It suggests the new movements cannot and

must not underestimate the off-line, local community-based activism component in any democratisation of a technology commons.

It is these early contributions towards the social shaping of technology that is the legacy of the movement for socially useful production. Neo-liberal deference to the market does not invalidate the argument made by the movement, even if neo-liberalism proved to be the more powerful and hegemonic social shaping agent at the time. Neo-liberalism provides an unreflective and narrow approach to the social shaping of technology: market choices became the social shaping processes of choice. Current concern for rising social inequalities, uneven and insecure economic development, and environmental sustainability, suggest this is an inadequate way to shape the innovation of technology. The workers involved in the Lucas Plan and activists in the movement for socially useful production bequeathed us practical experience for thinking differently about the social shaping of technology, and perhaps doing innovation better.

7. Conclusions

This case study has been oriented by the following questions:

1. Why has the grassroots innovation movement emerged?
2. How have activists mobilised support and activity in grassroots innovation?
3. What dilemmas confront the movements when constructing alternative pathways, and how have they negotiated those dilemmas?

The movement for socially useful production consisted of an unusual (and sometimes uneasy) mix of people and organisations acting in a remarkable set of circumstances. The framing of innovation by the movement arose through a combination of unorthodox trade unionists revitalising and redirecting an undercurrent of industrial democracy and worker's control, and in so doing meeting with ideas arising from newer social movements, the Left, and radical scientists. What they shared was opposition to the contemporary direction of new technology, and a search for alternative pathways for innovation.

> [A]n alternative paradigm that prefigured a different role for technology in society … To do this it is necessary to produce both a critique of the current shape and aims of existing technologies together with examples of alternatives that could lead to social and technological change. (Mole and Elliott 1987: 82)

In this respect, activists were pursuing pathways ahead of necessary structural changes identified in their own critique of capitalist innovation. This prefiguring of social goals through alternative technologies presented activists' path constructing strategies with two related challenges. The first challenge was in trying to hold together practical, project-based initiatives which lacked the full means to achieving their emancipatory goals, because those goals required structural changes beyond any means internal to the initiative itself. Nevertheless, a widening network of pragmatic activism sought out and developed sympathetic spaces that allowed ideas to be put into practice. Some of those initiatives proved viable under prevailing structures and spawned small businesses, product banks, design methodologies, and other artefacts of wider interest.

Herein lay the second challenge. The particularities of the spaces available for practical projects had an influence on the kind of socially useful innovation that was materially possible. Reliance upon a mixture of material resources in the spaces to hand, the skills available, and roughly aligned institutional goals, or whatever it was that opened up a degree of socially useful possibility, introduced specific relationships that could be built upon, and which became a feature of the initiative. Examples included dependence upon local government grants for workshops, trade union resources for educational propaganda, or the prototyping infrastructure of sympathetic polytechnics.

Some of these relationships had to be shed if the initiative was to diffuse beyond the pioneering setting. Should activists modify the output of the initiative so that it could flourish in the wider social world, such as its commercialisation into a commodity; or should they try to expand the set of spaces where the same initiative could be undertaken, such as through networking and mobilising for a socially useful restructuring of industry or, more modestly, the popularisation and spread of community-based workshops for grassroots innovation? Which brought activists back to the first challenge concerning the doing of projects ahead of structural change, and which proved insurmountable at the time.

These twin challenges constituted the central dilemma facing the movement for socially useful production. It was, nevertheless, a highly productive dilemma. Even if swimming against the broader political and economic currents of the time, the burst of ideas and practices coming out of the movement were to prove

more enduring and formative for subsequent arguments and approaches in the social shaping of technology. We see that legacy today both in the more rarefied attempts to instil more open and deliberative approaches to innovation policy, but also in renewed grassroots innovation interest in community workshops and working materially on shared technology projects.

Timing and contingency are always significant in the social shaping of technology, but the ready provision of plural possibilities is a never-ending requirement. Even if alternative pathways are by definition more open and less powerfully articulated than conventional institutions for innovation, they nevertheless cultivate ideas and practices that sometimes resonate through time, and can have real material consequences when the moment is right. Insisting upon a democratic opening in the social shaping of technology, and attempting it materially through practical initiatives, was probably the most socially useful and enduring product of the movement inspired by the Lucas workers.

Acknowledgements

Earlier versions of this paper received helpful comment and correction from people giving generously and patiently. Others were interviewed as part of the research. Whilst any failings remain my responsibility, I wish to acknowledge help given in making the paper much better than would otherwise have been the case. Thanks go to: Dario Azzellini, Alice Bell, Mike Cooley, Dave Elliott, Tobie Kerridge, Les Levidow, Sonia Liff, Nils Markusson, Robin Murray, Brian Padgett, Johan Schot, Ian Scoones, Johan Söderberg, and Andy Stirling. The case study was funded under Economic and Social Research Council support for the STEPS Centre at Sussex University.

References

Asaro, P. M. (2000) 'Transforming society by transforming technology: the science and politics of participatory design', *Accounting Management and Information Technologies*, 10: 257–290

Asdal, K., Brenna, B., and Moser, I. (2007) 'The politics of interventions: a history of STS. In K. Asdal, B. Brenna, and I. Moser (eds), *Technoscience: the politics of interventions,* Oslo: Unipub, p. 7–53

Asquith, P. (1979) 'Workers' control or control of the workers', *Science for People*, 42: 8–12

Barratt Brown, M. (1978a) 'The political economy of CAITS', in *Alternatives to unemployment: new approaches to work in industry and the community,* London: Lucas Aerospace Combine Shop Steward Committee and North East London Polytechnic, p. 7–9

Barratt Brown, M. (1978b) 'Profits and losses and the social audit', in K. Coates (ed.), *The right to useful work*, Sheffield: Spokesman

Beckett, A. (2010) *When the lights went out: Britain in the seventies*, London: Faber and Faber

Blackburn, P., Green, K., and Liff, S. (1982) 'Science and technology in restructuring', *Capital & Class*, 6.3: 15–38, doi:10.1177/030981688201800102

Bodington, S., George, M., and Michaelson, J. (1986) *Devloping the socially useful economy* Basingstoke: Macmillan

Bowman, A., and Wainwright, H. (2009).'A real green deal', *Red Pepper*, October 2009

Brachi, P. (1974) 'Sun on the roof', *New Scientist*. 19 September 1974: 712–714

Braverman, H. (1974) *Labor and monopoly capital: the degredation of work in the twentieth century*, London: Monthly Review Press

Brödner, P. (1990) *The shape of future technology: the anthropocentric alternative* London: Springer-Verlag

Brödner, P. (2007) 'From Taylorism to competence-based production', *Ai & Society*, 21.4: 497–514. doi:10.1007/s00146-007-0087-41

Buchanan, R. (2001) 'Human Dignity and Human Rights : Thoughts on the Principles of Human-Centered Design', *Design Issues*, 17.3: 35–40

Centre for Alternative Industrial and Technological Systems (1978) 'Alternatives to unemployment: new approaches to work in industry and community', London

Cherns, A. (1976) 'The Principles of Sociotechnical Design', *Human Relations*, 29.8: 783–792. doi:10.1177/001872677602900806

Clark, P. (1983) 'Working with people', *Radcial Science Journal*, 13: 100–104

Coates, K. (1981) *Work-ins, sit-ins and industrial democracy*, Sheffield: Spokesman

Collective Design/Project (1985) *Very nice work if you can get it: the socially useful production debate*, Sheffield: Spokesman

Community Development Project (1977) *Gilding the ghetto: the state and the poverty experiments*, CDP Inter-Project Editorial Team: London

Cooley, M. (1981) 'The Taylorisation of intellectual work', in L. Levidow and B. Young (eds), *Science, technology and the labour process*, London: Blackrose

Cooley, M. (1985) 'After the Lucas Plan', in Collective Design/Projects (ed.), *Very nice work if you can get it: the socially useful production debate*, Sheffield: Spokesman: p. 19–26

Cooley, M. (1987) *Architect or bee? The human price of technology* (Second edition), London: Hogarth Press

Cooley, M. (2007) 'From judgment to calculation', *AI & Society*, 21.4: 395–409, doi:10.1007/s00146-007-0106-5

Coventry Workshop (1978) *Progress Report 1976-77*, Coventry: Coventry Workshop

Darlington, R., and Lyddon, D. (2001) *Glorious summer: class struggle in Britain 1972,* London: Bookmarks

Davis, J., and Bollard, A. (1986) *As though people mattered*, London: Intermediate Technology Publications

Eastall, R. (1989) 'Restructuring for Labour? Job creation by the Greater London Enterprise Board', Manchester: Department for Government, Victoria University of Manchester

Ehn, P. (1988) *Work-oriented design of computer artifacts*, Stockholm: Arbetslivscentrum

Elliott, D. (1975) 'What is to be made?' *Undercurrents*, 13: 17–19

Ferris, P. (1972) *The new militants: crisis in the trade unions*, Harmondsworth: Penguin

Field, P. (1985) 'Making people powerful: Coventry Workshop', in Collective Design/Project (ed.), *Very nice work if you can get it: the socially useful production debate,* Sheffield: Spokesman, p. 53–60

Forrester, C. (2012) 'Alternative technology in 1970s Britain', conference paper for 'AT at 40', London: Centre for Alternative Technology

Freeman, C., and Soet, L. (1994) *Work for all or mass unemployment? Computerised technical change in the twenty-first century*, London: Pinter

George, M. (1978) 'Which future and whose future in manufacturing industry in the UK?' in *Alternatives to unemployment: new approaches to work in industry and the community*, London: Lucas Aerospace Combine Shop Steward Committee and North East London Polytechnic, p.171–185

Gill, K. S. (2007) 'Birthday issue volume 21.4: from judgement to calculation, *Ai & Society*, 21.4: 387–392, doi:10.1007/s00146-007-0101-x

Greater London Enterprise Board (1984a) *Saving jobs - shaping the future: an introduction to enterprise planning*, London: Greater London Enterprise Board

Greater London Enterprise Board (1984b) 'Corporate Plan 1984-1985', London: Greater London Enterprise Board, p. 40

Greater London Enterprise Board (1984c) *Technology networks: science and technology serving London's needs,* London: Greater London Enterprise Board, p. 34

Hansard (1979) Hansard House of Commons Debates, 12 February 1979: vol 962, cc 899-932

Howard, R. (1985) 'UTOPIA: where workers craft new technology', *Technology Review*, 88.3: 43–49

Huws, U. (1985) 'Challenging commoditisation - producing usefulness outside the factory', in Collective Design/Project (ed.), *Very nice work if you can get it: the socially useful production debate,* Sheffield: Spokesman, p.149–167

Kaplinsky, R. (1984) *Automation*, Harlow: Longman

Levidow, L. (1983) 'We won't be fooled again? Economic planning and left strategies', *Radical Science Journal*, 13: 28–38

Liff, S. (1985) 'Women factory workers - what could socially useful production mean for them?', in Collective Design/Project (ed.), *Very nice work if you can get it: the socially useful production debate*, Sheffield: Spokesman, p. 178–186

Linn, P. (1987) 'Socially useful production', *Science as Culture*, 1.1: 105–138 doi:10.1080/09505438709526191

London Energy and Employment Network (1986) *London energy action plan,* London: London Energy and Employment Network, p. 45

Loney, M. (1983) *Community against government: the British Community Development Project 1968-78*, London: Heinemann

Lowe, B. (1985) 'A report from the Unit for the Development of Alternative Producsts', in Collective Design/Projects (Ed.) *Very nice work if you can get it: the socially useful production debate,* Nottingham: Spokesman, p. 61–69

Lucas Aerospace Combine Shop Stewards' Committee (1976) 'Corporate Plan: A contingency strategy as a positive alternative to recession and redundances', Bradford: LACSSC

Lucas Aerospace Combine Shop Stewards' Committee (1978) 'The Lucas Plan', in K. Coates (ed), *The right to useful work*, Sheffield: Spokesman, p. 212–232

Lucas Aerospace Combine Shop Stewards' Committee (1979) *Democracy versus the Circumlocution Office*, London: Institute for Workers' Control

Mackintosh, M., and Wainwright, H. (1987) *A taste of power: the politics of local economics*, London: Verso

McRobie, G. (1981). *Small is possible*, London: Abacus

Mole, V. and Elliott, D. (1987) *Enterprising innovation: an alternative approach*, London: Pinter

Murray, R. (1985) 'London and the Greater London Council: restructuring the Capital of Capital', *IDS Bulletin*, 16.1

Newell, P., and Mulvaney, D. (2013) 'The political economy of the "just transition."', *The Geographical Journal*, 179.2: 132–140

Noble, D. (1979) *America be design: science, technology and the rise of corporate captialism*, New York: Knopf

North East Trade Union Studies Information Unit (1980) *A farewell to arms? The future facing Vickers Elswick on Tyneside*, Newcastle: North East Trade Union Studies Information Unit

O'Malley, J. (1977) *The politics of community action*, Sheffield: Spokesman

Palmer, J. (1986) 'Municipal Enterprise and Popular Planning', *New Left Review*, *159.*February: 117–124

Pelly, D. (1985) 'Arms conversion and the labour movement', in Collective Design/Project (Ed.), *Very nice work if you can get it: the socially useful production debate* , Sheffield: Spokesman, p. 104–115

Piore, M. J., and Sabel, C. F. (1984) *The second industrial divide*, New York: Basic Books

Rasmussen, L. B. (2007) 'From human-centred to human-context centred approach: looking back over "the hills", what has been gained and lost?', *Ai & Society*, 21.4: 471–495 doi:10.1007/s00146-007-0088-3

Rauner, F., Rasmussen, L., and Corbett, J. M. (1988) 'The social shaping of technology and work: human centred computer integrated manufacturing systems', *AI & Society*, 2.1: 47–61

Reilly, T. (1976) 'Trade unions and technology', *Science for People*, 32: 13–15

Rosenbrock, H. H. (Ed.) (1989) *Designing human-centred technology*, London: Springer-Verlag

Rowthorn, B. (1981) 'The politics of the alternative economic strategy', *Marxism Today*. January: 4–10

Rustin, M. (1986) 'Lessons of the London Industrial Strategy', *New Left Review*, 155: 75–84

Sandbrook, D. (2012) *Seasons in the sun: the battle for Britain, 1974-1979*, London: Penguin

Senker, P. (1986) *Toward the automatic factory? The need for training*, Berlin: Springer-Verlag

Smith, A. (2005) 'The alternative technology movement: an analysis of its framing and negotiation of technology development', *Human Ecology Review*, 12.2: 106–119

Smith, A., Hielscher, S., Dickel, S., Söderberg, J., and van Oost, E. (2013) *Grassroots digital fabrication and makerspaces: reconfiguring, relocating and recalobrating innovation?* SPRU Working Paper 2013-02, Brighton: SPRU, University of Sussex

Speke Joint Shops Stewards Committee (1979) *Dunlop: jobs for merseyside*, Merseyside: Speke Joint Shops Stewards Committee

Thompson, P. (1989) *The nature of work* (2nd edition), Basingstoke: Macmillan

Thompson, P., and Bannon, E. (1985) *Working the system: the shop floor and new technology*, London: Pluto Press

Tosh, J. (2008) *Why history matters*, Basingstoke: Palgrave Macmillan

Tuckman, A. (2011) 'Workers' control and the politics of factory occupation, in I. Ness and D. Azzellini (Eds), *Ours to master and to own: workers' councils from the commune to the present,* Chicago: Haymarket, p. 284–301

Turner, A. W. (2010) *Rejoice! Rejoice! Britain in the 1980s*, London: Aurum

Wainwright, H., and Elliott, D. (1982) *The Lucas Plan. A new trade unionism in the making?* London: Allison and Busby