

Social Defence Strategy: The Role of Technology*

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Social defence – namely, nonviolent community resistance to aggression as an alternative to military defence – requires the development of strategy, as does military defence. The role of technology in social defence strategy has never received much attention. Of the various perspectives on technology, perhaps the most useful for the purposes of social defence is that artefacts, by embodying social relationships, influence but do not determine their uses. In practical terms, it is fruitful to survey different types of technology to see which ones are most supportive of strategic goals. Studies of social defence have dealt with operational and social dimensions of strategy and, to a lesser extent, the logistical dimension. In contrast, the technological dimension of social defence strategy has been almost entirely neglected. Technology can play a crucial role in social defence in direct defence against attack and, more importantly, in supporting operational, logistical and social dimensions of strategy. For example, decentralized media are valuable for social defence operations, and systems for self-reliance in food and energy are valuable for social defence logistics. To illustrate technology assessment for social defence, a hypothetical example of Czechoslovakian social defence planning, drawing on experience from the 1968 invasion, is outlined.

Social Defence

Social defence is an alternative to military defence based on popular nonviolent resistance to aggression, using means such as rallies, non-cooperation, strikes, boycotts, sit-ins and alternative social institutions. It is based on the idea that the commitment of an aggressor can be undermined by such nonviolent means, which can directly thwart the aims of the aggressor, cause troops to become unreliable and trigger citizen opposition from within the home country of the aggressor. Social defence also provides a

means of combating military coups, for which military systems are obviously the cause rather than the solution. Social defence is also called nonviolent defence, civilian-based defence, civilian defence and defence by civil resistance.

Social defence can be considered an application of nonviolent action to the task of defence. However, while there are untold examples of nonviolent action (Sharp, 1973), no society has ever set up a system of social defence. Certain historical examples are commonly used to suggest the potential of social defence, such as nonviolent opposition within Nazi-occupied Europe (Semelin, 1993), the resistance to the 1961 Algerian Generals' revolt (Roberts, 1975) and the col-

* I thank Nils Petter Gleditsch and several anonymous referees from *JPR* for their helpful comments on an earlier draft of this paper.

lapse of Eastern European regimes in 1989. Nevertheless, such examples at most are indications of strengths and weaknesses of spontaneous nonviolent action. They involved no advance preparations, planning or training, limiting the insight they can provide into the dynamics of a well-organized system of social defence.

The nonviolent campaigns in India led by Gandhi in the 1920s and 1930s provided the inspiration for many individuals to begin conceptualizing nonviolent action as a form of social struggle (Gregg, 1966; Shridharani, 1939). Beginning in the 1950s, various writers and researchers have elaborated the idea of social defence as a full-scale alternative to military defence.¹ As well as interest from researchers, activist groups and networks have promoted social defence in countries such as Australia, France, Germany, Italy, the Netherlands and the United States (see the newsletter *Civilian-Based Defense*; Drago, 1992).

Given that social defence is proposed as an alternative to military defence, it is to be expected that the issue of strategy – fundamental to military theorizing – is relevant to social defence. Strategy has been addressed by a number of social defence theorists, but one aspect has seldom been mentioned: technology. Weapons and weapons support are crucial to military success. Social defence does not use weapons, which may explain the neglect of technology in social defence research, but technology nevertheless can play an important role.

The aim here is to give an overview of the ways that technology fits into social defence strategy. The next section gives a brief overview of theories of technology in order to judge which ones are likely to be most

useful for nonviolent activists in conceptualizing the roles of technology in social defence. In the following section, the role of technology in social defence strategy is outlined, looking at the role of technology in each of four dimensions, following Howard (1979): as a direct tool in nonviolent struggle (the technological dimension of strategy) and as a supporting element in the operational, logistical and social dimensions. To illustrate how these ideas might be applied, a hypothetical example of technology policy for a post-1968 Czechoslovakian social defence plan is presented.

Theories of Technology

In this section, a number of perspectives on technology (taken here to include science) are outlined briefly in order to assess which ones are most useful from the point of view of peace activists (see also Cronberg, 1994). It is appropriate to look at theories of technology from the point of view of peace activists – and nonviolent activists specifically – because, in a social defence system, the entire population needs to be involved in the defence and, therefore, in designing and using technological systems. Sophisticated theories that cannot be understood or applied by citizens are not likely to be useful for practical social defence purposes. Hence, this survey concentrates on simple and commonplace ideas about technology; conclusions here do not necessarily apply in other contexts.

One view that used to be common is that technological innovation is inherently progressive. The development of nuclear weapons is one of the best arguments against this view, and it is not surprising that peace activists have little time for this perspective. A variant of the technology-is-good view is that certain types of technology are inherently good, such as computers, a perspective found for example in the magazine *Wired*.

¹ Boserup & Mack (1974), Burrowes (1996), de Valk (1993), Ebert (1968), Galtung (1976), Geeraerts (1977), Keyes (1981), King-Hall (1958), Lyttle (1958), Martin (1993), Niezing (1987), Randle (1994), Roberts (1967), Schmid (1985), Sharp (1985, 1990).

Peace activists are right to be wary of such views, noting for example that computers are used to design more deadly explosives, guide missiles to their targets and run military surveillance systems. Even normally benign technologies, such as sticks, knives and electricity, can be used for mass killing and torture. Militaries have shown a remarkable capacity to adapt all sorts of technologies for their purposes, suggesting that inherent goodness is rare if it exists at all.

A contrary view is that technology is inherently evil. Though this extreme position is taken only by a few opponents of civilization (e.g. Bradford, 1990), it has more support if applied to certain types of technology, such as nuclear weapons or nuclear power. Helen Caldicott (1978: 25), who has said she seeks to practise 'the ultimate form of preventive medicine by ridding the earth of these [nuclear] technologies which propagate suffering, disease, and death', is one of a number of peace activists who have expressed this view. However, there are few types of technology where complete rejection can be convincingly argued; for example, is nuclear medicine to be rejected along with nuclear weapons and nuclear power? For most activist purposes, the technology-is-evil view is too inflexible for analysis or campaigning.

A prevalent view is that technology is neutral. A strong version is that technology can be used equally easily for good or evil; a weak version is that technology can be used for good or evil. If technology is neutral, then how it is used must depend on the user or the social circumstances. Harmful uses are commonly attributed to evil or misguided users. This view is also commonly called the use-abuse model: technology can either be used for beneficial purposes or abused for harmful ones.

The technology-is-neutral view is typically justified with examples, such as that guns can be used to defend or oppress the

people. But just because a technology can be used for good or bad purposes does not establish that it is neutral, any more than torture or heart surgery are neutral because they each can be used to save lives or cause deaths. That a technology has varied consequences says only that it has varied consequences and logically should not imply that responsibility for the impacts lies entirely with the user or circumstances.

The weakness of the use-abuse model is apparent by noting that technologies are easier to use for some purposes than others. Guns are designed to kill or destroy, whereas blankets are designed to hold warmth; guns do not work well to hold warmth and blankets are not so effective for killing. It is absurd to suggest that any given technology is equally easy to use for any purpose, since the whole point of technology is to accomplish specific tasks. How easy a technology is to use for good or bad purposes depends on how one judges the tasks for which the technology is most easy to use.

Peace activists in practice have rejected the technology-is-neutral view, at least when it comes to weapons. For example, a cartoon in an 'anti-nuclear handbook' (Croall, 1978: 20) shows two nuclear explosions, one labelled 'peaceful nuclear test' and the other 'aggressive nuclear test', thus lampooning the idea that nuclear weapons are neutral. Campaigns against biological, chemical and nuclear weapons, plus campaigns against land mines and other anti-personnel weapons, would make no sense if technologies were thought to be neutral.

The views canvassed so far all treat technology as having some essential characteristic – goodness, evil or neutrality. An alternative approach is to attribute to technology only a tendency to serve certain purposes. In this view, a technology is easier to use for some purposes than others, but can, with greater or lesser difficulty, be used for

any manner of purposes. This view can be called 'selective usefulness'. A brick can be readily used to help construct a brick wall, but it can also be used as a doorstop, paperweight, hammer or weapon. A brick is thus selectively useful for constructing brick walls.

The actual uses of technology are affected by both its form – which creates a range of potential uses – and its social context, including individual psychology, interpersonal relations, technological infrastructure, economics and social expectations, among other factors. A rifle can be a weapon of war (as in many shooting wars), a tool for shooting animals (as by many hunters), a citizens' deterrent to aggression (as in Switzerland) or a means of homicide or suicide. All these are potential uses of a rifle, but in any particular situation some uses are far more likely than others.

Nuclear weapons are most easily used for mass destruction and for threatening retaliation for nuclear attack. It is possible to use nuclear explosives for other purposes, for example blowing up an asteroid that threatens to collide with the earth. Proponents of nuclear weapons highlight beneficial applications, but these should not distract attention from the ease with which nuclear weapons can be used for destruction and domination. If it is easy to use them for harmful purposes, it is reasonable for peace activists to oppose them altogether.

Another way of thinking about technologies is to say that they embody values or social interests. An assembly line can be said to embody the values of capitalists or managers, including control over the behaviour of workers (Noble, 1977). A precision-guided missile can be said to embody the values of the military, including a priority on destruction.

The appropriate technology movement is based on promotion of technologies that are selectively useful for local autonomy and

control (Boyle & Harper, 1976; Darrow & Saxenian, 1986). Biogas digesters, simple ovens, microhydro installations and many other technologies are promoted because they can be controlled by local people and benefit them without nasty side-effects. Related to this is the idea of convivial technology, which is anything that fosters autonomous and creative intercourse (Illich, 1973). The telephone is a convivial communication technology since virtually anyone can use it and it is not easily controlled by anyone. By contrast, broadcast television is expensive to produce and is controlled by a few, making it nonconvivial. These categories are subject to change. For example, the introduction of surveillance with voice recognition makes telephones less convivial and the development of cheap video cameras makes television technology more convivial.

Rather than take technology as it exists and look at its impacts on society, another approach is to look at the factors that make technology what it is: a study of origins rather than consequences. In practice, there is an ongoing process of interaction between technology and society. Nevertheless, it is convenient to separate the two sorts of influences in discussing theories. Much of the recent work in the sociology of technology has focused on the social factors in technological choice.

A powerful and popular understanding is that the process of introducing new technologies is out of human control: once a technology is developed, it cannot be stopped. A less extreme version is that considerations of efficiency and economics largely determine the shape of technologies: since in any era there is one best way to do something, that is the way it will be done. In this view, called technological determinism, the evolution of cars, telephones, computers and weapons is inevitable (Ellul, 1964; Smith & Marx, 1994; Winner, 1977).

Technological determinism is easy to refute. A close examination of any technology reveals social factors that influenced its development and use. There are plenty of technologies that were developed but never caught on, such as the supersonic transport aircraft and plutonium watches. It would be easy to develop deadly miniature biological or chemical weapons so that each individual could have their own personal lethal deterrent, but this has not happened.

Technological determinism is often presented as an implicit recommendation for passivity in the face of technological change. It is seldom of value for peace activists who, to have any incentive for action, must believe that it is possible to control or eliminate certain technologies. Edward Thompson's famous formulation of 'exterminism', containing the idea that 'Weapons innovation is self-generating' (Thompson, 1982: 5), appears to be that of a technological determinist, but of a 'soft' variety that leaves open some opportunity for peace activists to intervene.

At the opposite end of the spectrum is the view that social arrangements entirely determine the choice and form of technology. This can be called 'social determinism' or 'determined technology'. It can be linked to a Marxian analysis, for example, in which the domination of the ruling class leads to factories designed to maximize profit within the constraint of maintaining domination of workers (Dickson, 1974). It is difficult to carry this argument all the way, since many technologies such as cloth, paper and bottles, though perhaps influenced to some extent by class structure, appear to be designed primarily for reasons of functionality. The implication of this view is that in order to change technology, it is necessary to change social relations. It is not, however, a sensitive tool for achieving this. Thompson's 'exterminism' was developed in opposition to the conventional Marxist view that focusing on

nuclear weapons or nonviolent alternatives was a diversion from class analysis and class struggle.

A more moderate view, somewhere between technological and social determinism, is that technology is 'socially shaped'. In this model, social factors such as class, bureaucracy and gender influence but do not determine what technologies are taken up and what forms they assume. One analysis along these lines is that the electric refrigerator triumphed over the gas refrigerator because of the power of the electricity industry rather than any inherent technical superiority (MacKenzie & Wajcman, 1985).

The social shaping of technology approach is helpful in showing that technologies could have been different if social forces had been different. Most studies have explored specific cases, which is useful for historical and social understanding but, even when the topic seems relevant to peace and war (MacKenzie, 1990), may give little guidance for activists who want to know how and when to intervene to be most effective in shaping technology for peace and away from war. Nevertheless, there are insights to be gained that activists may find useful for purposes of argument, such as MacKenzie & Spinardi's (1995) case that nuclear weapons could eventually be 'uninvented' partly by failure to replenish the tacit knowledge that goes along with hands-on experience.

A closely related approach, called 'social construction of technology' or SCOT, proceeds by tracking the evolution of technologies, looking at the role of various 'relevant social groups' such as engineers, entrepreneurs and users (Pinch & Bijker, 1984). SCOT uses concepts such as 'interpretive flexibility' and 'closure' (the dominance of a particular technological form). SCOT has been criticized on various grounds; for example, it does not incorporate the influence of social structures such as class on technological development.

Whether the sort of close analysis advocated by SCOT can provide helpful insights to peace activists remains to be shown.

All the approaches mentioned so far assume that it is valid or helpful to distinguish between technology and society. It is also possible to proceed without making this distinction. 'Actor-network theory' proposes to investigate the whole complex of technology-society by 'following the actors' (Latour, 1987). This means looking, without preconceptions, at what actors do – and 'actors' can be either humans or artefacts. To avoid the human connotations, they can all be called 'actants'. Different actants attempt to build connections with others by 'enrolling' them, in the process building a 'network' of relationships. Actor-network theory has its own language and framework and has been the subject of considerable debate. So far there seem to have been no studies using this model that would be of any practical use to peace activists. Certainly there is no special commitment to particular values or outcomes.

How should theories of technology be applied? Common approaches are to assess specific technologies (such as the M-16 rifle), assess categories of technologies (such as guns) and to assess technologies in relation to their users (guns in Switzerland versus the USA). While useful in their own way, these approaches do not provide insights oriented to the development of social defence strategy.

Another way to apply theories is to start with the goals and strategies of particular groups and to find out which technologies can most help in achieving those goals and strategies. In the case of military research and development, military goals are examined, such as destruction of the enemy, secure communication, protecting soldiers and equipment and maintaining morale. Consequently, any area of technology that could potentially be useful for these goals is

scrutinized intensely, and technologies that look promising are developed, tested and deployed. From the point of view of military goals, it makes little sense to talk of good, evil or neutral technologies. It is simply the case that some technologies are found to be highly useful for military purposes and are intensively developed for those same purposes, whereas other technologies that have little relevance are left alone. All types of explosives are studied exhaustively, whereas development of easy-to-produce drugs that inhibit violence or undermine obedience to commanders is not a military priority.

The same sort of approach applies to social defence: all types of technology can be examined to see which ones are helpful (Martin, 1997). That is the approach used here in outlining the relevance of technology to different dimensions of social defence strategy.

While strategy affects technological choice and innovation, it is also true that available and potential technologies affect strategy, as in the case of nuclear weapons and the development of deterrence-based policies. Likewise, available and potential technologies affect social defence strategy.

Social Defence Strategy

There are various ways to approach the issue of strategy for social defence, which is a full-scale topic in itself. The point here is to look at the role of technology in social defence strategy. To pursue this, two approaches are introduced: strategic analysis based on the ideas of Clausewitz (1832) and the four dimensions of strategy discussed by Howard (1979). Although strategists such as Clausewitz (1832), Basil Liddell Hart (1967), Mao Tse-tung (1961–65) and others never thought of a defence based entirely on nonviolent means, military conceptualizations of strategy may still

be useful for analysis of social defence strategy.

Boserup & Mack (1974: 148–182), in a pioneering analysis, apply Clausewitzian strategic theory to social defence. One major element of Clausewitz's theory is the concept of the centre of gravity, namely the opponent's central source of strength, which should be the main target for destruction. The centre of gravity of the defence is determined by the mode of defence, which is the basis for Clausewitz's idea of the superiority of the defence over the offence. Boserup & Mack (1974: 163) conclude that for a social defence system, the centre of gravity is the unity of the resistance: 'It is against this point that the whole thrust of the attack must be directed and to its preservation that all efforts of the defence must tend'. If the defence is able to absorb the attack, then its next task is to mount a counter-attack against the centre of gravity of the opponent. Boserup & Mack (1974: 169) say that in the case of military attack against a social defence system, the centre of gravity of the offence depends on the mode of attack and that, generally speaking, it will be those things that allow the offence (for example, repression of the nonviolent defenders) to continue.

Other social defence theorists have built on Boserup & Mack's analysis but differed about the precise nature of the centre of gravity. Keyes (1981: 133) concludes that the centre of gravity for a social defence system is the morale of the resistance. Burrowes (1996: 209) argues that the strategic aim of the defence is to 'consolidate the power and will of the defending population to resist the aggression' and the strategic aim of the counter-offensive is to '*alter* the will of the opponent elite to conduct the aggression, and to *undermine* their power to do so'. In Burrowes' model, the centre of gravity is the sum total of social resources that support the strategy; more specifically,

it is the power of a party to a conflict to conduct the struggle and its will to do so. Both Keyes and Burrowes say that the centre of gravity for the offence is the same as for the defence, namely morale for Keyes and power/will for Burrowes.

Although Burrowes, Boserup & Mack and Keyes all differ concerning the location of the centre of gravity of a social defence system, they agree that it lies primarily in the social and psychological facets of the resistance, namely either unity, morale or will. It certainly is not technology (weapons). However, technology can be used to bolster unity, morale and will. Clausewitzian analysis gives no direct guidance about links between technology and psycho-social dimensions of nonviolent resistance. The issue of technology and the centre of gravity will be revisited in the example of post-1968 Czechoslovakian social defence planning.

Another way to approach technology and social defence strategy is through categories used by Howard (1979), who talks of four dimensions of strategy: logistical, operational, social and technological. Logistics is concerned with maintaining armed forces in the field, including raising troops, providing equipment, and ensuring transport. Operational strategy is concerned with use of armed forces, including decisions about deployment, attack and defence; this is the dimension highlighted by sagas of brilliant commanders. The social dimension of strategy deals with the willingness of the population to provide support for the struggle, including factors of patriotism, willingness to sacrifice and commitment to work. Finally, the technological dimension refers primarily to weapons used by armed forces. Howard (1979) notes that strategists in different periods have emphasized certain dimensions and neglected others. Clausewitz (1832) made operational strategy the centre-piece of his theory and castigated previous theorists for concentrating on logistics. He

neglected technological factors since, in the early 1800s, all sides had similar weapons. In contrast, US Cold War theorists of nuclear war emphasized technological strategy and neglected all other dimensions, especially the social dimension. It will be useful here to take a brief look at studies of social defence in the light of Howard's four dimensions and subsequently to examine the role of technology in each dimension.

In writings on social defence, perhaps the greatest attention has been devoted to the social dimension: the willingness of the population to resist, including willingness to participate in mass rallies or to put up with hardships imposed by an occupier. Although theorists differ as to the exact nature of the centre of gravity of a social defence system, in all cases it is located in the social dimension. The very expression 'social defence' indicates the importance of this dimension.

Works on nonviolent action devote considerable attention to the operational dimension. Is it wise to call a general strike? How should the media be used? What is the role of negotiations? For example, Zielonka (1986) analysed the Polish Solidarity movement and Sharp & Jenkins (1989) analysed the Chinese pro-democracy movement in 1989, in each case pointing to some mistakes in tactics. Writings by and for nonviolent activists – such as Gandhi (1927), Lahey (1973) and numerous articles in, for example, *Peace News* and *The Nonviolent Activist* – are filled with discussions of tactics. In as much as such discussions are relevant to social defence – and given that there are no actual operational experiences of social defence systems – they can be seen as falling within the operational dimension of social defence strategy.

Logistics is given less attention. Since social defence has no standing armed forces, the issue of raising and equipping troops seems almost irrelevant. If, though, logistics for social defence is considered to include

the training of community members for nonviolent action, on the assumption that all members of the community are potentially 'troops', then there turns out to be quite a lot of material. Activists devote great effort to preparations for nonviolent action. In practice, 'nonviolent action training' may include discussions of nonviolence theory, analysis of local power structures, practice in consensus decisionmaking, formation of affinity groups, role plays of direct action, sharing of skills in writing, speaking or production of media materials, contingency planning and comprehensive preparation for action.² Closely related to nonviolent action training is 'organizing', which includes analysing community needs and power structures, recruiting activists, building networks, running meetings and fostering community action.³ Especially for those who see social defence as something built from the grass roots rather than implemented by governments, nonviolent action training and community organizing are foundational elements. They might be said to fit within the strategic dimension of logistics; if not, this means that logistics has been neglected within the nonviolence tradition.

Finally, there is the technological dimension of strategy. While technology has become so important to military strategy as to consume an enormous part of military budgets and drive strategic thinking, it has been almost entirely neglected by social defence theorists. The principal exception is Johan Galtung (1976: 390–391, 400–402) who, in the space of a few paragraphs, has made some highly perceptive comments. He suggests designing facilities so that they can be disabled with the least possible damage, providing mobile personal communication devices (rather like mobile phones), and

² Clark et al. (1984), Coover et al. (1981), Desai (1980), Hengren (1993), Jelfs (1982), Taylor (1977).

³ Alinsky (1971), Fisher (1984), Hedemann (1981), Jay (1972), Kahn (1970), Shaw (1996), Wellstone (1978).

hiding supplies of concentrated food. Overall, though, social defence theorists have ignored technology.

Thus, each of Howard's four dimensions of strategy is relevant to social defence. Furthermore, technology is relevant to each of the dimensions of strategy, not just the technological dimension: as a direct tool in nonviolent struggle (the technological dimension) and as a supporting element in the operational, logistical and social dimensions. This is compatible with Howard's approach to the four dimensions; for example, he notes that 'technology is likely to make its greatest contribution to strategy by improving operational weapons systems and the logistical framework that makes their deployment possible' (Howard, 1979: 985). Each of the following subsections deals with the role of technology in one of the four dimensions of social defence strategy.

The Technological Dimension

Since social defence relies entirely on nonviolent methods, there are no 'weapons' in the sense of tools designed to inflict physical harm on opponents, as suggested by the title of Boserup & Mack's (1974) book *War Without Weapons*. Therefore, it might seem that social defence strategy has no technological dimension in the strict sense. Nevertheless, technologies can play a direct role in two areas.

Although nonviolent activists avoid harming others, they may themselves come under physical attack, from beatings and imprisonment to torture and mass killing. To deter or reduce the impact of violence from the opponent, technology can be used to avoid or mitigate harm. In the case of nuclear attack, fall-out shelters and geographical dispersal can reduce casualties; there is an enormous literature on 'civil defence' (a term often confused with 'civilian defence' or 'social defence') that is pertinent. Civil defence preparations also

can provide protection against conventional weapons. In the case of biological and chemical warfare, it is useful for nonviolent resisters to know about symptoms and, if possible, have antidotes ready. Again, a vast amount of research and preparation has been done by militaries to reduce the impacts of biological and chemical attacks, much of which can be used in a social defence system. The major difference is that knowledge and equipment need to be made available to the general public rather than oriented largely to the armed forces.

A second area where technology can play a direct role in a nonviolent struggle is in disabling the opponent's weapons and support technologies. Part of this is what is commonly called sabotage or violence against property. Some nonviolent activists support sabotage as long as there is no harm to humans, whereas others rule it out altogether on moral or pragmatic grounds. Setting aside this debate, it is useful to consider some ways that technology could aid in disabling the opponent's weapons. Screwdrivers and hammers, plus specialist knowledge, might be all that is required to disable a missile. Specially prepared chemicals could be used to neutralize chemical weapons. Special tools might help to quickly damage stockpiles of guns. Some sand in a fuel tank might disable a vehicle. An ingenious computer hacker could break into an opponent's computer system and delete files on missile launch sequences or dissidents targeted for arrest. Alternatively, an insider could achieve the same end by removing a computer chip or damaging it with a magnet. These examples suggest that, in many cases, fairly simple pieces of equipment may be sufficient to disable complex and powerful weapons. In many cases, specialized knowledge is a great advantage, and sometimes specialized tools to neutralize or disable weapons. Often, insiders are ideally placed to do this. One of the central goals of

social defence is to win over opponents so that they are unwilling to support the aggression; it is a simple extension of this to encourage the disabling of weapons.

Some of so-called 'non-lethal weapons' (Lewer & Schofield, 1997; Morehouse, 1996) are designed to disable the enemy's weapons, such as bugs to put in fuel to eat away linings, hydrogen embrittlement of lethal weapons, anti-traction chemicals, supercaustics, combustion modifiers and computer viruses – all of which can be used, in principle, as part of nonviolent sabotage. It should also be mentioned, though, that the emphasis in technological development of non-lethal weapons has been on methods to control crowds and individuals who are, in many cases, acting nonviolently. Batons, water cannons, rubber bullets, tear gases, sonic devices and many other non-lethal weapons are designed to immobilize or injure opponents and have no place in a nonviolent defence system.

The Operational Dimension

Nonviolent action can be conceived of as a way of engaging in and fostering communication: nonviolent actions themselves are forms of communication, and one of the key aims of nonviolent action is to promote genuine dialogue. In contrast, while violence itself certainly sends a message, ultimately it is a denial of dialogue, certainly when the other party is killed. In the operational dimension of strategy, communication is central and, as a consequence, so is the role of communication technology (Martin, 1996a).

In most cases, centralized media are far more useful to rulers than to resisters, which is why television and radio stations are commonly the first targets in military coups. Because they are technological means by which a small number of people can control communication to a large number of people, they are ideally suited for central control. Far

more useful to nonviolent resisters in conducting operations are network media such as telephone, fax, electronic mail and circulation of audio and video cassettes. Print equivalents include leaflets, posters and the postal system. An aggressor cannot control all the messages on such media and inevitably lacks sufficient reliable personnel to undertake full monitoring. One option is to shut down systems altogether – such as pulling the plug on the telephone system – but this would have such a drastic effect on personal and business life that it would alienate sympathetic or neutral sectors of the population, as well as hampering the aggressor's own communication.

Governments, corporations and social activists today are all well aware that influencing 'public opinion' is crucial to promoting their social agendas. Governments and corporations employ sophisticated public relations staff to present their views in the best possible light and to hide, distort or downplay damaging revelations. Social activists often design their actions and campaigns around obtaining media coverage (Dale, 1996; Gitlin, 1980; Raboy, 1984). More routinely, the telephone and electronic mail are used routinely to exchange ideas and to build and maintain networks. In a crisis, such as a major strike, a scandal or political coup, these processes go into overdrive. During wars, control over communication has always been important to militaries and governments; it is even more important for nonviolent activists. Therefore, use of communication technology is absolutely vital to a social defence system.

In a social defence system that paid adequate attention to operational strategy, it can be imagined that everyone would receive training in use of communication technologies (from photocopiers to short-wave radio), that there would be investigation and education into media manipulations and how to counter them, that procedures would

be set in place to make decisions quickly in a crisis, that channels for communicating to supporters in other countries would be set in place, and that there would be ample opportunities to develop skills and run simulations.

The Logistical Dimension

Logistics refers to raising, maintaining and supplying armed forces (Van Creveld, 1977) or, by extrapolation to the case of social defence, maintaining and supplying the entire population involved in the nonviolent struggle. Thus, in social defence, logistics becomes the much wider topic of maintaining the society, including supplying food, water, clothing, shelter, transport and energy. In all these areas, technological infrastructure is vital.

As in the case of communication technology, centralized systems are vulnerable to takeover or destruction. Power supplies based on a few large generating plants are vulnerable to military occupation or sabotage. A threat to destroy power supplies may be enough to deter many people from resistance. In contrast, an energy system based on energy efficiency, passive solar design, town planning to reduce transport requirements and local energy production using solar energy, wind power and biofuels is far more resilient in the face of attack. With such an energy system, the population can survive quite satisfactorily in the face of a blockade of fuel imports from other countries or in the face of disruptions to the central electricity grid.

Technological infrastructure is similarly important in the areas of agriculture, housing and transport. When the population is dependent on imports and centralized sources of supply – whether of pesticides and fertilizers for agriculture, or transport to get food to cities – then it is more vulnerable to aggressors and occupiers. In such a situation of vulnerability, military

defence appears necessary to stop any aggressor at the borders before destruction or control of vital facilities can occur (Martin, 1996b). On the other hand, when the population is self-reliant, it is in a better position to resist and to survive an occupation: social defence is then a more feasible proposition.

Special attention is warranted for industrial production. In many cases an aggressor seeks not to destroy factories but to occupy and use them. One idea is to design factories so that workers can, by removing or destroying a crucial part, disable operations (Galtung, 1976: 390–391). For many industrial processes today, the easiest way to achieve this would be to remove one or more computer chips. Spares could be kept in a safe place, such as in another country. In this situation, disabling the technological system would make production impossible. Production could not be resumed quickly by intimidating or even torturing workers, since the incapacity would be built into the equipment.

Technological infrastructure is thus fundamental to supporting the population so that it has the capacity to engage in nonviolent action. Social defence logistics is a much broader topic than military logistics, since it is really about supplying and maintaining the entire population.

The Social Dimension

Support from the population for nonviolent resistance is central to the success of social defence. As discussed before, the key variables are social and psychological, epitomized by concepts such as unity, morale and will. Technology is not directly involved but can play an important supporting role.

Communication technology, which is vital for operational strategy, also plays an important role in the social dimension of strategy. If the communication system helps people feel a part of the struggle, builds bonds between communities and serves to

counter the opponent's attempts to divide and rule through propaganda and disinformation, then it is important in building the social foundations of the defence. Face-to-face interaction is an excellent way to build solidarity; if communication technology is to be used then, as in the case of operational strategy, network technologies such as the telephone and electronic mail seem likely to be best. Practical tests of the effects of communication technologies on social cohesion would be part of development of communication infrastructure for social defence.

Infrastructure for food, water, shelter, transport and energy also has important social impacts. If the infrastructure fosters individualistic thinking and activity, then it probably weakens solidarity for nonviolent action; if it fosters collective bonds, then it strengthens solidarity. If each family in a neighbourhood separately purchases food from supermarkets, there is little collective interaction; if people work together in a food cooperative or grow food in a neighbourhood garden, this forges links between neighbours.

These social impacts of infrastructure might be considered adventitious consequences of technological choice: it just so happens that telephone systems and community-level renewable energy systems build community ties more effectively than television and centralized energy supplies. However, it is possible to go further by intentionally designing technological systems to foster the sort of psychological orientation and social bonds that would best support social defence.

For example, consider the built environment. The layout of streets and buildings, the availability of meeting places and the design of offices and homes affects the way people relate to the world and to each other. Some high-rise developments foster alienation, whereas it is possible to design housing developments to foster interaction

and mutual support, as in the case of co-housing. Careful design of offices can make workers more likely to get to know each other informally and reduce isolation. By planning public spaces appropriately, opportunities for public protests can be increased while reducing options for aggressors (Gillett et al., 1996).

Social inequality can undermine social cohesion. If some people are extremely rich while others are homeless, this can cause divisions that weaken the potential for resistance against aggression, since social defence only works if society is seen by its members as worth defending. Technological infrastructure for collective provision of goods and services can reduce inequality. For example, if simple building materials or prefabricated units are freely available for anyone to use, then there could be a surplus of basic housing stock and no one would need to be homeless. Surplus housing would provide a reserve in case an aggressor destroyed some people's homes as well as preventing serious inequality represented by homelessness. Needless to say, any society that guaranteed satisfactory housing for all would both require and foster the sort of community solidarity that would sustain a powerful social defence system.

Thus, in various ways, technology is a key element in the social dimension of strategy. Psychological and social dynamics are affected by the technologies that people use and live with. Therefore, designing the technological infrastructure appropriately can make a big difference to the capacity for social defence.

Social Defence Technology Assessment: A Hypothetical Example

The Czechoslovakian people's resistance to the 1968 Warsaw Pact invasion is one of the classic examples of nonviolent action against military aggression (Skilling, 1976; Windsor

& Roberts, 1969). It was estimated at the time that military resistance would be overcome in only a few days. The active phase of the spontaneous nonviolent resistance lasted just a week, but less dramatic resistance continued for much longer. It was not until eight months later that the Soviet government achieved its initial aim of setting up a puppet regime. Although the nonviolent resistance was a failure in a direct sense, it served powerfully to undermine Soviet credibility throughout the world and led to reassessments by communist parties in many countries.

For the sake of illustration, one may imagine a post-1968 assessment of social defence strategy, either in the old Czechoslovakia or in the new states, Slovakia and the Czech Republic. The example is hypothetical in that no government has systematically examined how it could implement a social defence system. The focus here is on the role of technology in social defence.

To proceed, it is convenient to look at the roles of technology in the 1968 resistance and see how it might be improved.

- The most important technology for the 1968 resistance was the radio network, which was used to report events, call meetings, advise on tactics and counsel the use of nonviolence (Hutchinson, 1969; Wechsberg, 1969). Only when a population is completely united, as was the case in Czechoslovakia in 1968, can such a centralized medium be an effective tool for popular resistance. The stations were occupied by the invaders after a week, which terminated the active phase of the resistance. To avoid this dependence on a single vulnerable communication system, an alternative is to promote development of multiple network communication systems, including electronic mail, fax, phone, citizen's band and short-wave radio. An
- important aspect of the communication technology is direct connections to global communication systems, so that individuals can link with others throughout the world. (Operational and social dimensions.)
- The invaders used existing transport routes. Railway workers slowed down the aggression by shunting a train carrying radio jamming equipment into a siding. This suggests that rail lines, roads and airports could be designed so that transport could be blocked easily, but with the least possible damage to facilities. (Technological dimension.)
- A highlight of the 1968 resistance was people removing house numbers and street signs so that troops could not find their way around to arrest particular individuals. It might be anticipated that future invaders would prepare for this contingency by obtaining or developing more effective means of tracking individuals, whether by computerized directories (with maps, names, addresses and phone numbers), telephone surveillance with voice recognition or, in the future, recognition through computerized examination of face or hands. To overcome these methods of tracking and surveillance, some possibilities are providing alternative housing for individuals at risk, public-key encryption of telecommunications and a range of disguises designed to foil automated systems. (Operational and social dimensions.)
- Security cameras could be installed that are controlled by nonviolent activists, to monitor human rights abuses and provide documentation to the wider public, including internationally. (Operational and social dimensions.)
- Energy, food, water and other support systems would be designed for local self-reliance, to help the population survive

an extended occupation or a blockade. (Logistical dimension.)

- One of the weaknesses of the 1968 resistance was the dependence on Dubcek and other leaders. Held in isolation in Moscow and not realizing the effectiveness of the resistance, these leaders made compromises that demoralized the population (Sabata, 1988). There is no obvious way that this sort of problem can be fixed using technology. The key is to emphasize unity around the people as a whole, not around leaders. The move to network communication technologies, with a downgrading of mass media focus on individuals at the top level, might help.

So far, these elements of technology assessment are unsystematic responses to experiences of the 1968 resistance. To provide greater coherence, it is useful to go beyond a survey of technologies. This is where the concept of the centre of gravity is especially useful. For the purposes here, the centre of gravity of the nonviolent resistance can be taken to be, in general terms, the collective psychological commitment to continue to resist. (This is similar to the concepts of unity, morale, and will, but is fuzzier.) Many of the measures outlined above will support this centre of gravity: local self-reliance in systems to provide vital necessities will give a greater feeling of security; network communication systems will help build supportive networks within the country and outside; participation in preparations for avoiding arrest will give confidence in working together for mutual support. But beyond this, social defence planners might want to seek a more active procedure for building commitment. One possibility is participatory planning, in which citizens are brought together and supported in developing ideas and implementing measures for social defence. If people help design their

own defence system, they are much more likely to understand, participate in, and support it. The idea of participatory planning is a reminder that social defence need not be a government-led initiative, but can develop from grass-roots action – though government support can be an advantage.

For the nonviolent counteroffensive, an analysis of the centre of gravity of the aggressor is necessary. This is a wide topic, and depends considerably on who the aggressor is and the method of attack.

If participatory planning is a good way to strengthen the centre of gravity of a social defence system, it becomes obvious that all the dimensions of the social defence strategy cannot be spelled out in advance by a few experts or officials. The social defence system, including its technological aspects, will reflect the understandings and priorities of the people who must act to make it work. Experts and others can, of course, make analyses and recommendations, but not determine the process. Participatory social defence strategic planning is a dramatic contrast to military strategic planning, which is far from participatory, and highlights a fundamental difference between social defence and military methods.

Conclusion

It is a truism that we live in a technological society, in which technologies sustain life as we know it on a day-by-day basis, in which people's interactions with each other and the world are mediated by technologies and in which perceptions of society and the natural world are shaped by technology. Social and technological realms have become intertwined, so that social factors shape technology and technology impacts on society. Hence it should be no surprise that technology plays a major role in supporting social defence strategy, even though social and psychological factors are of central

importance. The only surprise is that technological factors have been so neglected by writers on social defence. This may be due to thinking of defence technology only as weapons, or perhaps to social defence theorists being from the social sciences rather than the natural sciences or engineering. In any case, technology deserves a much higher priority in social defence strategy (Martin, 1992).

Among the many perspectives on technology, perhaps the most useful for peace activists and, specifically, social defence strategy, is the idea that technologies embody values and social interests and that they are 'selectively useful', namely easier to use for some purposes rather than others. Just as militaries carry out research, development and testing of technologies to see which ones can be created or adapted for their purposes, so social defence systems will need means for selecting, researching, developing and testing technologies appropriate for their purposes. The concept of appropriate technology thus can be applied to social defence: the question is, which technologies are most appropriate for supporting a system of social defence?

Although it is conceivable that social defence might be implemented by governments as a rational choice, another possibility is that social defence will never be 'implemented' but will gradually become a reality as a result of nonviolent struggles – including campaigns by feminists, environmentalists and community activists – that build the capacity for nonviolent defence against aggression. If this is the case, then the move towards technology most suited for social defence also will be a gradual one. Campaigns against technologies that create the capacity for centralized control, such as mass communication systems and centralized energy systems, can be seen as part of the struggle for social defence, as can efforts to promote tech-

nologies fostering self-reliance. Since technological infrastructure is expensive and difficult to replace, it tends to freeze in associated relationships. Building an infrastructure to sustain social defence is thus a long-term project, in which decisions now, such as Internet protocols, may be important for many decades to come. Judging technological issues in light of social defence strategy is a valuable way for analysts and activists to decide about interventions now.

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