Futures Traversed

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Abstract

The temporal realm of futurity is not to be confused with the domains of space and matter. It has different 'properties' and our interactions in that realm produce results that differ significantly from actions that mainly affect space and transform matter. Where the future is approached as if it was space or matter surprises ensue and paradoxes arise that are difficult to handle with the conventional knowledge practices that dominate in the institutional spheres of contemporary industrial societies. This paper opens up for scrutiny some of the associated interdependencies and explores a number of attendant significant paradoxical effects.

Biographical Details

Barbara Adam is Professor of Sociology at Cardiff University. She is founding editor of the journal *Time & Society* and has published extensively on the social relations of time. Her most recent book *Time* (2004) is published under the Polity Press 'Key Concepts' Series. She currently holds an ESRC Professorial Fellowship in which she explores the social relationship to the future. Web sites: http://www.cf.ac.uk/socsi/whoswho/adam/ http://www.cf.ac.uk/socsi/futures/

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We treat the future as if it was space and/or matter. As a result a range of paradoxical effects arise. In this paper I want to trace some of the complex and contradictory processes that are set in motion when the future is understood and approached as if it was a territory that can be colonised and traversed, or as a material resource to be used and consumed. Since, however, the temporal world of processes is not like space and matter the skills and approaches required to operate within and across it differ from those necessary for spatial exploration and conquest. As we traverse the temporal realm, for example, we do not just move within it but also tend to negate it, another meaning of traversal. That is to say, when we move across space, the territory that is being traversed remains; it continues to exist. When we traverse time and colonise the not yet, in contrast, the future is eliminated and transformed into an ever expanding present. It ceases to exist when the present becomes the exclusive operational focus. Moreover, as realm of responsible concern, the future is moved outside our frame of reference when transactions are conducted in and for this growing present, and thus gain meaning and significance solely with reference to it. In this paper I focus on these interdependencies and show how important it is to take the future seriously, which means not just approaching it spatially and materially but also temporally. Focusing on the temporal and processual aspects of the future and integrating these with conventional spatial and material features we increase complexity but at the same time enhance the potential to avoid some of the unintended consequences that arise from the current capricious treatment of the future.

To better understand some of these interdependencies I first want to consider the paradoxical impacts of the compulsive pursuit of speed on contemporary efforts to transform and traverse the future. Here I show how the valorisation of speed restricts the temporal perspective to the operational realm of the present. I follow this with an exploration of the modern quest for control. In previous papers Chris Groves and I have demonstrated how the future loses its reality status when it is abstracted from context and emptied of content: the pre-existing futures in which our predecessors believed evaporate and elude our grasp. Here I elaborate on cases where treasured plans and strategies for control disintegrate as actions conceived in the realms of space and matter get absorbed into the global process web of interactive give-and-take. In the last section of this paper I consider the politics of posterity, and scrutinise the temporal relations that currently characterise it. I demonstrate how a politics of space and matter founders in the temporal realm of future making and future taking.

Speeding into the Present

Speed provides evolutionary advantage. Applied to both animal and human life, for example, it is often vital to survival, be this for catching prey or escaping one's pursuer. Historically, for human societies it has enhanced military prowess and economic competition, and has thus been perceived as a generally good thing for individuals, groups and organisations. The contemporary valorisation of speed therefore connects our efforts with those of earliest ancestors, most recent predecessors and contemporaries the world over. Yet, when we explore the quest for speed from a futures perspective, we note some modern variations that significantly differentiate today's approaches from pre-modern and ancient ones. The foundations

of my analysis of some of these differences have been laid in previous project papers. Here I want to build on these and develop them in a particular direction.

Progress, we showed in previous papers, is a product of human will, not natural necessity. It could be advanced, Hans Blumenberg (1986: 240) proposes, 'by method, organization and institution, and condensed by speeding it up.'[1] The speeding up referred to here is intimately tied to an economic perspective on the future. In Futures Traded Chris Groves explained how extraction from context and emptying of content made the future amenable to translation into money. Once time and the future are equated with money and traded as abstract exchange values, speed provides not only evolutionary and cultural but also commercial advantage. That is to say, when saving time also saves money, acceleration becomes an economic imperative. Thus, once the time-speed-profit combination had been established and had begun to permeate every aspect of the industrial way of life, no social relation and no approach to that life could escape its influence: the social worlds of education, work and commerce being prime examples. Jeremy Rifkin (1987: 3-4) goes so far as to suggest that 'the idea of saving and compressing time has been stamped into the psyche of Western civilization and now much of the world'. To understand the depth of its socio-cultural penetration, we need to focus once more on the underlying rationale of the assumption that time equals money and speed equals profit.

As a resource money can be quantified, accumulated and saved. This is clearly not the case with the future. On the contrary, futures diminish, evaporate and get absorbed into the present as time is traversed and futures are colonised and used. When we get to a destination more speedily, therefore, that destination is no longer the future but becomes the present. For the metabolic systems of individual organisms, increased speed means approaching death faster. As I already indicated above, moreover, before the future could become an economic medium for exchange it had to be abstracted from context and emptied of content. That is to say, unique individual, collective and environmental futures had to be cleansed of their uniqueness before they could be traded as abstract exchange values. When we engage in speed practices, however, it is specific not generalised futures that are implicated and these cannot be saved or accumulated. In all its *social* (contextual, embedded and embodied) dimensions, therefore, the future – lived, generated and known – stands in a highly paradoxical relation to the issue of speed.

In Futures Traded Chris Groves further identified the link between time, credit, investment and profit. From within that perspective efficiency means producing something or performing a task in the shortest possible time, since to spend as little money as possible on labour and other resources assures the fastest returns on investment. Here I want to relate the valorisation of speed to the speed-efficiency-profit equation and explore some implications for our relation to the future. To map these interdependencies I draw on work by the French political theorist and technology critic Paul Virilio[2] who set out a number of historical distinctions between modern pursuits of speed on the basis of three forms of technology: nineteenth

[1] Quoted in Nowotny (1994/1989: 46)

[2] Virilio, P 1991: *La Vitesse,* Paris: Éditions Flammarion. Virilio, P 2000/1995: *Open Sky.* Transl. J. Rose, London: Verso. (Orig. *La vitesse de liberation,* Paris: Galilée). Virilio, P. 1995/1993: *The Art of the Motor.* Transl. J. Rose, Minneapolis: University of Minnesota Press. (Orig. *L'art du moteur.* Paris: Galilée)

century *transport*, twentieth century *transmission* and twenty-first century *transplantation*. While all three are means of speeding up the traversal of space and time, they also differ in the ways they create and negate futures. It is these similarities and differences that are of particular interest to us here. In particular we want to keep in mind the space-matter-time distinctions as these help to shed new light on the contemporary production of futures and its multiple socio-environmental implications. I will structure the discussion around Virilio's headings of 'transport', 'transmission' and 'transplantation', but my focus on the future will take the analysis in a rather different direction.

The underpinning assumption of the valorisation of speed is that saving time means saving money and thus increases efficiency. But does this relation hold? Do we save time? Do we save money? What does it mean to get to the future quicker?

Transport: Virilio argues that speed-based wealth is dependent on the speed at which people, objects and information can be moved across space. It is relevant to all sectors of society but has the greatest significance for the military and commerce. With each advance in the speed of these diverse forms of mobility, the relation between time, space and matter is altered: increased speed either shortens the time involved or allows for greater territories to be traversed until, with today's air transport, people are potentially able to reach any place on earth within a period of two days.

Research on transport and speed has demonstrated a number of interesting interdependencies, all of which have long-term socio-environmental consequences. Two of these will serve to illustrate the point. First, it has shown that the increase in speed of modern modes of transport has not resulted in massive time savings but that we travel *more* and *cover greater distances* instead (Brög 1996; Whitelegg 1993 and 1997). When approached from a futures perspective, this finding relates to some interesting and surprising interconnections: since we do not tend to save time we also are unable to utilise the promised and/or expected saved time for future activities and translation into money. Similarly, we do not wrest from that traversal of space a future that could be invested or traded for other futures. Moreover, a future that is reached faster is no longer the future but the present. It is therefore a future lost. Secondly, speed requires energy (Adam 2001; Hillman and Plowden 1996). Higher transport speeds therefore necessitate increased energy consumption. This depletes natural, mostly non-renewable resources, increases levels of pollution and advances global warming. All these are unplanned effects of the pursuit of speed that extend into the long term future: the more a competitive advantage in exploiting the future is sought by speeding up, the less it seems to be attained. Here, long-term future losses are offset against the hope of present gains. The future, however, is closing in. What used to be distant beyond concern has become a potential peril for immediate successors: the loss of major cities across the world through flooding has become a threat for our children and our children's children. As such it can no longer be ignored.

Unrelated but from a temporal perspective equally important is the effect of high speed on the capacity for extended vision and by implication the long-term perspective. When we walk, for example, we are able to look around, take in the landscape or the urban vista. Our vision is unbounded, our perspective open. With increasing speed our vision and perspective are progressively reigned in, forced into an ever narrower space, until it is concentrated on the moment, the immediate space

and the task at hand: the motorway, the cars in front, behind and to the side of us. In other words, the higher the speed the more the immediate space and time become all-absorbing. This is a troubling relation: *while high-speed travel produces ever greater time-space distanciated environmental effects our perspective is progressively narrowed to the here and now.* Stephen Bertman (1998: 2-3) calls it the 'power of the now' which 'replaces the long-term with the short-term, duration with immediacy, permanence with transience, memory with sensation, insight with impulse'.

Coming back to the questions I asked earlier, we can see that the relation between speed, money and efficiency is a complex one when viewed from a futures perspective: first, while the valorisation of speed casts ever longer socio-environmental shadows, our temporal perspective progressively shrinks to only encompass the present. Environmental theorists work with the image of our 'ecological footprint' to explain spatio-material relations. Our socio-environmental *timeprint* would be the temporal equivalent to give a graphic illustration of the mismatch between the timescale of impact on the one hand and socio-political concern on the other: *the socio-environmental timeprint seems to grow in inverse proportion to our capacity to encompass and take care of the domain we thus occupy*. Secondly, the higher the speed of travel, the greater is the negation of time and futures. This means not increasing but *de*creasing opportunities for trade of futures and translation into money. Thirdly, since futures cannot be saved or accumulated the speed-profit-efficiency relation does not hold either. Such effects and relations are even further accentuated in the case of modern transmission through information and communication technologies (ICTs) where space has been rendered irrelevant and communications are conducted in the ever-shifting now of 'real time'.

Transmission: For Marshall McLuhan this electronic world is a domain that fundamentally reorders the relation between matter, space and time.

> During the mechanical age we had extended our bodies in space. Today after more than a century of electronic technology, we have extended our central nervous system itself in a global embrace. (McLuhan 1973/1964: 12)

When instantaneity and simultaneity are achieved in information transfer across distance, space and the movement of bodies are rendered irrelevant to the communication of information. They become obsolete. This in turn has consequences for the senses and for the forms of communication that predominate in electronic information transfer. Thus, for Jeremy Rifkin,

> Electronic technology represents the final disembodiment of the senses. The more intimate senses, smell and touch, are eliminated altogether. Sight and sound are disembodied by machines, turned into invisible waves and pulses, transported over great distances with lightening speed, and then reembodied by other machines in the form of facsimiles, artificially reconstructed versions of the originals. (Rifkin 1991: 238)

With this technology an unbridgeable gap is opened up between the speeds at which information and physical bodies respectively can move across space: a discrepancy that can be as great as that between the speed of light and the pace of walking. Today, such gaps are routinely incorporated into the anticipations, plans and actions of members of industrial and industrializing societies, whether these involve travel, satellite television, e-mail and searching the world-wide web or relate to the movement of troops and equipment to scenes of modern warfare that are subject to electronic scrutiny and surveillance.

From a futures' perspective we note that ICTs have extended the present spatially to encircle the globe. This global present in turn has negated the informational future that previously existed between the sending and receiving of a message. To write and send a letter creates a future in the present. In doing this, we anticipate the recipient reading it and writing a response. This simple activity therefore involves us in a constant movement back and forth between present futures and future presents. It is this movement, which forms the basis of many everyday activities, which is made impossible when technology invests all focus, effort, power and prestige is in the now.

> The power of the now is the intense energy of an unconditional present, a present uncompromised by any other dimension of time. Under its all-consuming power, the priorities we live by undergo transformation in a final act of adaptation to electronic speed. (Bertman 1998: 2)

Much of the temporal structure of human interaction at a distance, and hence the meaning of this interaction, is fundamentally altered when duration is eliminated and instantaneity operates across space.

Instantaneity is traditionally the operational realm of face-to-face interaction. For communications across distance, in contrast, waiting times had to be calculated into the communicative process. With ICTs this is no longer the case: instantaneous communication can be achieved irrespective of the distances involved. With electronic communication the duration required to traverse space is compressed to zero. When established modes of communication are so fundamentally altered then human culture operates, as Zygmunt Baumann (2000: 128) points out, 'in unmapped and unexplored territory, where most of the learned habits of coping with the business of life have lost their utility and sense.' With the elimination of waiting periods, for example, the time to think, reflect, reconsider, plan and strategize has been substantially curtailed.

The public effects of instantaneous communication across great distances are graphically demonstrated in Stephen Kern's (1983: 259 - 285) historical work on the politics of war and peace during the early part of the twentieth century. Kern shows the dramatic impact of instantaneity on the diplomacy associated with World War I. With the telegraph and telephone, established modes of conduct had been forcibly altered: distant events had to be dealt with rapidly, requiring immediate responses with little or no time left for reflection, extensive consultation, consideration of other options, or tempers to cool down. The new electronic context of instantaneous communication, where learnt behaviours and routines were no longer appropriate, required actions for which there was no precedent and responses for which there was no established code, leading to World War I and the hitherto unimaginable loss of life. Moreover, as Kern explains,

> There was not just one new faster speed for everyone to adjust to, but a series of new and variable paces that supercharged the masses, confused the diplomats, and unnerved the generals. (Kern 1983: 268)

Today, these multiple paces have become routine and the present has become the (almost) exclusive realm of communicative operations, with the future of formerly anticipated replies transformed into an outmoded relic of the past. Only when the technology breaks down are we reminded of this past and then the enforced confrontation with the future becomes a source of great irritation. Thus, when distance

is rendered irrelevant for communication and instantaneity becomes the norm the future as unfulfilled realm of expectations has increasingly negative connotations.

In contexts where communication is not only instantaneous but also networked across space the issues raised by the compression of duration are further amplified. The stock market is a case in point where information transfer is conducted not just *instantaneously* but also *simultaneously*. The significant consequences for planning and predicting the future were demonstrated by the dramatic collapses over the last decade of banks, financial services and, indeed, entire markets in the East. These collapses tend more and more to be caused by cascading patterns of *borrowing* against the future conducted in order to distribute risk. In other words, the speed of conducting deals whereby risk is distributed creates an ever more elaborate set of relationships. Speed of transmission here sucks in more and more individual economic futures, as risk is spread among ever-increasing numbers of investors. But this distribution of risk in fact places the whole network, and other non-economic structures that are implicated in it, at risk.

When everything is instantaneously interconnected and simultaneously interdependent then assumptions based on material objects in motion no longer apply. Processes become unbounded. The unique moment disappears. Communicated information loses its location: it is both nowhere and everywhere. Emphemerality and transience re-emerge with a vengeance, negating hard-won certainties and stabilities which had been wrested from the uncertain future during earlier historical periods with the rituals, social rules and institutions we described in Futures Tamed. With networked ICTs that operate in a temporal context of both instantaneity and simultaneity, traditional relations and approaches to the future are unsettled. That is, well established values of continuity, preservation and conservation become problematic at best, obsolete at worst. We see here an intensification of the relations and interdependencies we outlined with respect to the valorisation of speed in transport.

Once more, knowledge practices rooted in the realms of space and matter lose their relevance and grip. Laws and regulations based on the spatial order of territory and sovereignty become unworkable. Power becomes mobile, shifting and slippery. Zymunt Baumann (2000: 12) identifies a modern business elite that is in tune with these changed social structures where not durability but transience, not solidity but lightness, not space but temporality are valued. He analyses this new realm of networked instantaneity against the backcloth of the solid world of material production and gives extensive thought to its characteristics and underlying principles.

> Indifference to duration transforms immortality from an idea into an experience and makes of it an object of immediate consumption: it is the way you live-through-the-moment that makes that moment into an ‘immortal experience’. The boundlessness of possible sensation slips into the place vacated in dreams by infinite duration. Instantaneity (nullifying the resistance of space and liquefying the materiality of objects) makes every moment seem infinitely capricious; and infinite capacity means that there are no limits to what could be squeezed out of any moment – however brief and ‘fleeting’. (Baumann 2000: 124-5)

In such a context concern with the long-term is rendered hollow. Moreover, when dependence on things that endure becomes a liability and a sign of deprivation, the quest for solidity and permanence becomes an anachronism for the contemporary mode of information. Transformative thought and action, as we showed in other project papers, was based on a deep confidence in a future that was amenable to human will and design. With the global establishment of instantaneity and simultaneity this confidence in the planned future becomes misplaced and displaced by the ever-changing present as primary focus of gratification and concern.

Transplantation: when we consider a contemporary technology of transplantation, such as genetic engineering, we find once more the relations between time, space and matter altered and approaches to the future transformed in the process. As is the case with ICTs, genetic modification reduces waiting times and displaces the future by massively expanding the present. In distinction to transport and ICTs, however, genetic modification traverses not space but matter (bodies and organisms) and time. The movement of genetic material from one species to another, for example, is only possible because *all* living organisms share over 90% of their genetic material (Holdrege 1996). It is this shared genetic base, which extends back for hundreds of millions of years to the beginning of life, that allows, for example, genetic material from an arctic fish to be spliced into that of a tomato. By decoding, comparing, excising, splicing, recombining, transferring, and cloning individual genes and sections of DNA, scientists are able to inject characteristics that are not part of the hereditary genetic make-up and to combine morphological and functional characteristics that have evolved separately for millions of years (Kollek 1995). With the development of these radically new sets of techniques, therefore, scientists are traversing time back to the origin of life. The ensuing negation of the millennia of separate and singular evolution that are being traversed allows for scientific intervention within the very basis of organic life. However, this traversal of time extends not just to the beginning but also to the end of time, although the latter does not form part of the deliberate design. That is to say, once genetically modified organisms are reinserted in the environment, the interactive and reproductive processes that ensue facilitate an open-ended process with the potential to extend to the end of time. With twenty-first century transplantation, therefore, our *timeprint* encompasses all of time but neither our knowledge practices nor our institutional structures are adequate to the responsibility that accompanies such temporal extension.

For our focus on speed and the future, it is the dramatic time saving achieved by contemporary genetic engineering which is of significance here. What differentiates these new genetic techniques from established traditions of selective breeding is the capacity to effect change in the present, whereas conventional breeders had to await results over many generations of reproductive subjects. The new techniques of time traversal mean that millions of years of co-evolution can now be circumvented and reproduction cycles dramatically speeded up or cut out altogether. This unprecedented acceleration of processes appears to have obvious economic advantages in a social system where time is money and the future is traded for its economic exchange value. Since, however, the system processes of ongoing interaction are unbounded, open-ended, long-term, time-distantiated, and often marked by extended periods of immanence and latency, the scale of potential financial gains is matched only by the associated potential for unintended and unforeseen consequences. This means that the

creation of future uncertainty and indeterminacy is correlated with the power to traverse and compress, thus negate, time.

Looking back over the issues discussed so far we note that in all three forms of technology – transport, transmission and transplantation – the speed-efficiency-profit relation changes with our focus. That is to say, conventional understanding in terms of space and matter is altered significantly when time and the future are moved into the foreground of our attention. From a futures perspective we see that getting to the future faster does not provide us with more but *less* future. The future is lost and replaced by an ever expanding present. We appreciate further that by extending the present to the furthest reaches of the empty future, the future loses much of its open character: the passage to it becomes ever narrower when much of the future is already used, disposed of, borrowed or spoken for. Options are being dramatically reduced and the potential for actions significantly curtailed. We recognize that increased control in the present associated with the traversal of space and time has produced a matching loss of control over outcomes, an issue to which we shall return in the next section of this paper. Equally, we begin to realize that increase in speed seems to be accompanied by a proportional decrease in the scope of our visions. While our actions reach ever further into the future, our perspective and concern continue to contract to the operational realm of the present. This means in turn that when increasing speed of change displaces the open future with an extended present then the processes of innovation and waste production which used to be marked by linear succession all 'crowd into the extended present' (Nowotny 1994/1989:71). Speeding into the present, we can therefore conclude with Helga Nowotny (1994/1989: 49-50), 'is filled with conditional negatives' and marked by limits and finitude. In metabolic terms, for example, increased speed quickens ageing and shortens the period before death. In socio-environmental terms speed requires more resources and produces more obsolescence. Instead of offering unending potential, contemporary knowledge practices that speed us into the present confront us with the possibility of individual, collective and environmental dead ends. Finitude at all these levels has become palpable.

This raises questions about efficiency and sustainability. Efficiency, as I have shown, is achieved by speeding up processes, that is, by compressing duration. A point is eventually reached with ICTs and genetic engineering where operations are conducted in the real time of extended presents. The gaze becomes firmly fixed on the immediate horizon and short-term material gains. It entails accelerated production and consumption of nature's resources in a context where traditional bonds of obligation, commitment and responsibility between generations have been severed.

> 'Efficiency is a present-oriented temporal value. Its concerns are purely instrumental. What counts is increasing output now. The past and future are seen as impediments to the full use and exploitation of the present'. (Rifkin 1991: 267)

Since the valorisation of speed is a central feature of the industrial way of life and its operational logic, regard for the long-term future or concern for the wellbeing of future generations of humans and fellow beings becomes a contradiction in terms. Speed-based efficiency and sustainability, we can therefore conclude, are incompatible.

In the light of the above we need to appreciate, however, that efforts to achieve sustainability require not a 'return' to pre-modern social relations but depend instead on a willingness to remember social arrangements that were conducted in a temporal realm that extended from origin to destiny and operated on the principles of indebtedness, obligation and responsibility, as outlined in Futures Tamed. Clearly, there is and can be no going back, but by recalling 'memories of the future', that is, by remembering the visions and achievements of predecessors, we are able to recognize the importance of embodied embeddedness that connects us not just with ancestors and future generations of successors but locates our actions and inactions in a seamless web of environmental interdependence that reaches all the way to the birth of stars and an indefinite future. The implications of such an exercise in remembering past futures are significant for the issue of control, to which we now turn.

Blindfolded at the Controls

Control of the future had first been achieved through mechanistic science. Its success at shaping the future to human design, as Chris Groves showed in Futures Traded, was founded on a cluster of principles which included abstraction and de-contextualisation, quantification and spatialisation as well as the exclusion of both temporality and futurity from its methodology. Moreover, it entailed focusing on products rather than processes, that is, the *outcomes* of change and action rather than change and action itself[3]. Control was further enhanced by bounding objects in time and space which involved denying temporal depth. This meant placing process and connectivity outside the scientific frame of reference, thus treating materials *as if* they were bounded, static, a-temporal, and insisting on the irrelevance of context. The pretence, however, can only be carried so far given that our technologies are imbued with social values and knowledge practices, are caught up in a system of irreversible energy exchanges and leave legacies for an open future, as I have shown above and we have identified in previous papers.

In Futures Transformed I first suggested the need to understand technology in non-technical terms, that is, not as bounded objects in space, fabricated to a blueprint but as social things that stand in an interactive and transformative relation to their creators and users as well as to their environments. Hence I identified them as 'proto-living things'. When we want to understand how control has been achieved and lost in modernity the distinction between a purely technical and a social understanding of technology becomes crucial. This understanding in turn relates to the way the future is approached, that is, whether it is treated primarily in spatial and material or also in temporal terms. Let me take an example from nuclear technology to illustrate the point.

With the splitting of the atom the bounded energy of the stars has been released from the invisible depth of existence. The beginning of time and the end of time are bridged in this moment of concentrated power. The enormity of the power unleashed in the moment of control, however, evades control once the interactive process is set in train for an indefinite, open-ended period into the future. Furthermore, the future thus created is also the future negated: it is traversed in the full meaning of the word once the potential end in the present has become an inescapable condition of modernity, as

[3] For an extended discussion on this subject see Prigogine and Stengers' (1984) work on the difference between mechanical dynamics and thermodynamics.

I described in Futures Transformed. A number of interdependent socio-technical parameters contribute to this condition: first, knowledge of how to create a nuclear device is irreversible. It constitutes an integral and ineradicable part of our world. Secondly, the world-wide stock-piling of nuclear material continues despite global treatise and efforts to reduce the potential for overkill. Thirdly, the number of countries with nuclear capability is still growing regardless of whether or not they are welcomed by the established members of the nuclear club. This creates a context where continuity can no longer be taken for granted. The potential end in the present has therefore become a fundamental condition of modernity whilst, as indicated in the previous section, control of outcomes has become synonymous with wishful thinking. When the conventional knowledge system with its assumption of control clashes with the actual workings of its products, therefore, paradoxes arise and unintended consequences accumulate unchecked until society wakes up to the realization that neither its scientific predictions nor its methods of control are appropriate to the contemporary condition. Theo Colborn and her collaborators (1996) use the imagery that we are flying blind, hurtling towards a future with no-one in control while Zygmunt Bauman (2000: 56) simply states that we are passengers in a jet plane that has no pilot.

Our blindness derives from our reliance on knowledge practices that are out of sync with contemporary technologies and thus make controlling them and managing their consequences difficult. We use the conceptual tools of abstraction, decontextualisation, spatialisation, quantification and bounding for the control of interactive, future-creating and/or networked technologies, such as hormone disrupting chemicals, radio-active materials, ICTs or emerging nano-technologies. Thus we draw on mechanistic and deterministic materialism for projects and processes marked by interiority, latency, invisibility and time-space distantiated effects. This approach is criticised by Michel Serres (1999/1982: 108) as an unwarranted ‘metaphysics of the solid’. We are attempting to predict, control and regulate innovation, which is produced at an ever-increasing pace, on the basis of past-based knowledge. Here Aurelio Peccei (1982: 10) points out that reliance on knowledge of the past becomes inappropriate when ‘the future will no longer be a mere *continuation* of the present but a direct *consequence* of it’. We are relying on knowledge of the past to control situations where the extremely long-term processes and time scales involved create fundamental indeterminacy. A prime example here would be radio-active waste management that draws on past-based geological data and risk assessment to establish for thousands of years into the future the safety of geological sites for the burial of radio-active materials (Schrader-Frechette 1993). We apply methods of control established under carefully-managed laboratory condition to open-ended interactive processes – genetic engineering would be a prime example here. We seek to control technological processes marked by instantaneity and simultaneity with tools designed for the behaviour of matter in space and its causal and sequential processes, resulting in cases of what Alfred North Whitehead (1929) called the fallacies of misplaced concreteness and of location. Finally, networked operations in ‘real time’ escape our grasp because control requires a gap between action and outcome on the one hand and linear succession on the other. With ICTs neither the gap nor the sequence are available for the insertion of controlling action. These are contexts where solidity evaporates, where ‘all that is solid melts into air’, to use Karl Marx and Friedrich Engel’s (1967/1848: 224) evocative phrase.

Time, space and matter are fundamental dimensions of social life. When we take one dimension out of the equation, as I have shown in this paper and in Futures Transformed, we run into difficulties. Contradictions and unintended consequences blossom. Management and control become an unrealisable dream. Here I identified some of the pertinent mismatches between knowledge practices and technologically constituted process-interdependencies. Once these are brought to the forefront of our attention, it is no longer surprising that the successes of mechanistic science are intimately bound to its excesses and the problems that confront contemporary societies the world over. We begin to understand why everywhere we care to look increase in mastery is accompanied by loss of control and why paradoxes abound.

Accompanying these multiple temporally constituted tensions seems to be an additional generalised sense of disquiet about responsibility for our actions: how to dispose of nuclear waste safely and responsibly thousands of years into an unknown and unknowable future; how to change the direction of energy policies to avert a worsening of climate change over geological time scales; how to secure food supplies for rising populations without worsening conditions for unlimited generations of people and fellow beings into an open-ended future? When decisions taken in the domain of politics and policy have implications that stretch over such vast time scales it becomes appropriate to talk of a 'politics of posterity'. The tensions and contradictions associated with this domain of knowledge practice occupy us in the last section of this paper.

Politics of Posterity

In the political sphere, the issues we encountered above re-appear. Here we find that the system of liberal democratic politics has developed historically as, primarily, a politics of space and matter. Its sphere of responsibility extends to a nation's territory, its resources and its wealth distribution. It is in charge of things that can be measured and counted: territories, people, institutions, traffic, crime, budgets and Gross National Products. With political debates on climate change, the management of nuclear power and its waste products, the regulation of chemicals, strategies about genetic engineering and approaches to nano-technology, however, politics has entered the future worlds of tens, hundreds and even thousands of generations hence. This means that decisions made and policies established by today's liberal democracies operate outside the spatial and material framework for which they had largely been established.

For the production of the long-term future, liberal democracies draw on three dominant institutions: science, economics and law. As Chris Groves and I argue in earlier project papers, all three knowledge practices have time-space characteristics that make their suitability for the task of guiding future-creating policies questionable. As we have seen, mechanistic science takes its evidence from accumulated knowledge of past and present matter and space. It consequently treats the future as both immaterial and unreal. Economics operates largely from the present for the present. Its forays into the future, therefore, tend to be parasitical on successor generations of humans and fellow beings. It treats the future as a resource like any other, consequently making a category mistake whose effects ripple through the entire system of instrumental economic action. Law, finally, is guided by precedent and arbitrates future operations on the basis of past and present matter, space and social relations. None of these dominant knowledge systems of contemporary liberal

democracies, therefore, are fully equipped to deal with the futures of their making, and are thus limited in their contributions to the understanding, administration and regulation of the temporal realm.

In addition to this first set of difficulties associated with the lack of competencies with respect to the future, the reach of actions undertaken by liberal democracies far exceed the period for which representative governments are elected. Liberal Democracies' bounded terms of office and the fact that some voters are not yet born make the politics of posterity hugely problematic. Potentially the impact of *all* political action extends beyond a government's period of office. That is unavoidable. However, for actions that affect us and our children in the near future, there is an implicit understanding that the public have given a mandate to the government of the day to act not just on their behalf but also on the behalf of their children. With today's political decisions that affect the very long-term future this is no longer the case since effects of policies are not just experienced by voters and their children but by an open-ended chain of generations without vote, voice or advocates to speak for them, nuclear power being a case in point[4]. Without institutional structures that encompass the operational realm of the future and without knowledge practices that can accord reality status to futures in the making, today's future-creating politics tend to be conducted in both a *political* and a *knowledge vacuum.* This has serious consequences.

When risks and hazards, created within the jurisdictional time-space of a particular liberal democracy, transcend the boundaries of its legitimate authority, their impacts and costs are in effect externalised onto other nations and/or to successor generations. The problems are shunted along, moved outside the sphere of responsibility. From a spatial and materialist perspective, hazards externalised across time are no longer recognised in principle as the concern of the offending nation's representative government in office. The long-term policies routinely pursued by contemporary liberal democracies, therefore, transgress the temporal boundaries of their political mandates and realms of jurisdiction. Moreover, since elected representatives are responsible to their electorate only, and since it is this electorate that bestows legitimacy on a government, the rights of people distant in time who cannot enact that power relation are 'discounted' in a way that is analogous to the discounting of the future in economic processes. To put it differently, the politics of space and matter operate with impunity in the temporal domain of the future in which all of us are trespassers.

Without mandate for their temporal extension into the future, policies of liberal democracies are enacted in the frontier spirit that we described in Futures Transformed. On the one hand, they are cut off from socio-political chains of obligation, chains that stretch back into the historical fog without cut-off date and definable beginning as we explained in Futures Transformed. On the other hand, they are disconnected from a sense of obligation and responsibility extending into the future as far as the effects of decisions, actions and inactions. It means that political representatives that act on our behalf face the same problems that befell settlers in a new land. In Futures Transformed I connected these difficulties to newcomers acting as free agents in a land of apparent unlimited potential. Carried by the *frontier spirit*

[4] See Schrader-Fechette 1993; Adam 1998 chapter 6.

they moved from one amnesia-afflicted action to the next without the benefit of historically embedded memory. Further, their desires were un-tempered by the collective wisdom that bounds actions in the every-day realm of responsible community-based social relations that extend into an open future.

The inappropriate assumptions and associated socio-political practices amount to *institutionally constituted irresponsibility*[5]. To begin to envisage and institute a politics appropriate to our situation therefore requires changes within the institutional, collective and individual dimensions of action, knowledge and ethics. These are addressed in other project papers. Here I merely want to stress that the politics of space and matter needs to be expanded to encompass the temporal reach of today's decisions, actions and inactions. This entails the creation of political structures suited to the *timeprint* produced by their policies. It means finding ways to encompass futurity and processes that extend beyond the present, to embrace the lived and living futures that constitute an inescapable feature of our lives and are implicated in everything we do. Finally, as citizens we need to acknowledge that our collusion with the policies produced by political representatives makes us responsible for the techno-futures set in motion: yesterday, today and tomorrow. We are charged therefore as citizens and as private individuals not just to understand the contemporary bracketing of futurity but also to seek openings for change that help reconnect the spheres of social action that have come adrift during the scientific age: knowledge, action and ethics. Where knowledge about potential future effects is unobtainable, plans and actions needs to be judged and adjudicated on the basis of ethics. Ethics too, however, is in need of re-orientation, as Chris Groves showed in Futures Tended, if it is to become appropriate to the contemporary condition.

Reflections

The temporal realm of futurity is not to be confused or conflated with the domains of space and matter. It has different 'properties' and our interactions in that realm produce results that differ significantly from actions that mainly affect space and transform matter. Where the future is approached as if it was space or matter surprises ensue and paradoxes arise that are difficult to handle with the conventional knowledge practices that dominate in the institutional spheres of contemporary industrial societies. Like space the future can be traversed and like matter it can be used and consumed. The effects of such actions, however, are fundamentally different where the future is concerned. As time is traversed the future is transformed into the present, thus ceases to exist. By contrast, when the future is used and consumed in the present, it nevertheless continues to extend temporally, producing effects for future generations. By producing futures we appropriate the present of successors. In this case our *timeprint* exceeds our allocated operational domain and established sphere of responsibility. This means we operate as uninvited migrants and trespassers in the temporal territory of successors.

Efforts to transform, traverse and control futures tend to result in unintended consequences, and paradoxes seem to bloom proportional to the reach of the actions involved. Thus, for example, speed progressively forces attention on the present, making it ever more difficult to extend our vision to encompass the temporal depth

[5] See also Beck's *The Risk Society* and *The World Risk Society* where he too comes to the conclusion of structural irresponsibility, if by a different analytical route.

and breadth of our making. With nuclear technology our impact extends to millennia whilst confronting us with the potential end in the present. Economic instrumentality, finally, treats the future as a free resource, ignoring that it therefore exploits the future presents of others not yet born who cannot hold us to account or charge us for its use and/or depletion.

Using inappropriate conceptual and ethical tools is one way to ensure that paradoxes and surprises continue to accompany plans, strategies and actions. The task, therefore, is to make those tools more appropriate to the contemporary situation. Accordingly, the last part of this book will attend to those tools and scrutinise existing institutional structures as bases for such renewal. This is not to say that such revision will solve all uncertainty. It will not. But it will help us to distinguish genuine indeterminacy from that arising out of the use of inappropriate tools. Where non-knowledge does predominate, we are in the realm of morals and ethics. Here decisions have to be reached and quandaries have to be adjudicated by collective deliberation on the basis not of evidence and prediction established on past facts but on what is right and just. Knowledge, action and ethics, finally, will need to be aligned flexibly. They need to be combined according to the requirements of specific contexts of the future-producing practices in question.

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