

## Chapter 2: Knowledge Society as the Republic of Science Enlarged: The Case of Sweden

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### Introduction

The emergence of knowledge societies has coincided with the upgrading and centre-staging of the politics of science and technology. Suddenly, the opportunities and threats opened up by science and technology are of the closest concern to us all. As a result of this, what were once seen as separate worlds, now reappear before us as interactive cultures – 'science', 'industry', 'government' and 'society' – all must now, it seems, evolve in close concert with each other, or risk not evolving at all.

If the centrality of science and technology to knowledge societies is universally agreed, how best to configure the new patterns of interactivity underlying them is not. As Sheila Jasanoff (2002) has recently observed, although mid-twentieth century cultural assumptions about the most appropriate relations between citizens, experts and policy-makers may now be seen as in need of serious revision, no ready-made answers are forthcoming as to what should replace them. This, she goes on to argue, provides comparative analysis with a new and valuable role to play:

Comparison in short offers novel vantage points from which we can question the foundations of our own presumptions of rationality. For 21<sup>st</sup> century governments grappling with the limitations of the 20<sup>th</sup> century's modernist institutions, comparison is a tonic to liberate the imagination (Jasanoff 2002: 370).

In this paper the ambition is to offer up one particular emerging knowledge society for comparative analysis by charting the twists and turns in its knowledge politics from the beginning of the 1990s to the present day. The case of Swedish knowledge society presents a fascinating paradox. It is funding from Swedish research councils that has supported the production of the two books by Gibbons, Nowotny, Scott and company – *The New Production of Knowledge* (1994) and *Re-Thinking Science* (2001). While both books have drawn serious criticism for indulging in, for example, 'prepackaged thinking' (Shinn 2002) and 'performative history' (Godin 1998), nowhere else has the 'new social contract' (Gibbons 1999) between science and society they set out been so firmly rejected as in Sweden. While no country invested more than Sweden in the production of *The New Production of Knowledge*, no other has been at greater pains after 1997 not to become its 'context of application'.

### Social Responsibility versus Scientific Autonomy

To make sense of Sweden's rejection of *The New Production of Knowledge* it is necessary to view the new interactivity underlying knowledge societies as the source of two competing anxieties. On the one hand, there is the concern that scientific expertise will constantly risk over-reaching itself through its ever deeper involvement in the practical application of new knowledge. That in the context of radical innovation, where uncertainties abound and ignorance is pervasive, accredited experts will often fail to appreciate, and feel pressured to ignore, their own 'lay expert' status in the face of the highly original problems and difficulties they confront. This anxiety provides the basis for what can be called a new politics of socially responsible science ruling over the relations of citizens, experts and policy-makers in knowledge society.

On the other hand, there is the more traditional concern, reappearing in intensified form, that just because of its further involvement in innovation, scientific expertise is now in greater danger than ever before of being corrupted by particular political, economic or even religious forces seeking to impose their own special interests on innovative outcomes. This anxiety provides the basis for what can be called a renewed politics of scientific autonomy ruling over knowledge society. A new politics of social responsibility is not easily combined with a renewed politics of autonomy as each tends to see the other as part and parcel of the problem

it is designed to address.<sup>1</sup> Gibbons, Nowotny et al in their two books portray the good knowledge society opting for a new politics of socially responsible science. Sweden on the other hand, for reasons which shall be laid out below, has after 1997 fallen firmly into the grip of a resurgent politics of scientific autonomy.

A new politics of socially responsible science seeks to bring scientific and technological decision-making further into the public sphere, or into the Agora as Nowotny et al (2001) express it. The attempt to construct new communities of 'extended peer review' in knowledge society has been compared to earlier extensions of the franchise which gave, for example, women the vote, and workers the right to form trade unions (Ravetz 1999). Such a contemporary democratization of expertise, it is argued, can actually lead to the enrichment of scientific and engineering knowledge subjected to 'more intensive testing and retesting in many more contexts' (Gibbons 1999:84, see also Barry 2001: 8). Instead of remaining merely 'reliable' and truthful under fragile and limited laboratory conditions alone, science laid bare in the Agora can strive after a new kind of universality by attempting to show itself 'robust' enough to survive in contact with a far greater range of people and environments (Nowotny et al 2001: 258, Gibbons 2000: 162). A new politics of social responsibility can be seen as strongly shaping the European Commission's Science and Society Action Plan. According to this the creation of a sustainable European Research Area is dependent upon, among other things, 'new procedures for the participation of civil society in science policy', and more generally, a commitment to putting 'responsible science at the heart of policy-making' (European Commission 2002). In Britain, in the aftermath of the BSE (bovine spongiform encephalopathy) crisis, a new politics of socially responsible science is expressed in the shift from 'scientific literacy' to deliberative democracy in the public communication of science and technology (Durant 1999, Elam and Bertilsson 2003, Irwin 2001, Turney 2002); a shift which received official recognition in 2000 with the publication of the House of Lords Report on Science and Society<sup>2</sup>.

In stark contrast to the new politics of socially responsible science visible elsewhere across Europe today, the redesigned politics of scientific autonomy currently ruling over knowledge society in Sweden is characterized by a renewed defence of 'free basic research' (den fria grundforskningen) and the so-called 'Erlander Tradition' in science and society relations. What we witness is a staunch defence of the modernist institutions of scientific knowledge production in Sweden, dating firstly from the mid-twentieth century. These institutions are identified as still unsurpassed in their ability to co-ordinate the production of scientific knowledge, and as still constituting the foundations for the future development of both individual and collective powers of self-determination. In direct opposition to Nowotny et al's (2001) entreaty for science to move into the Agora, those championing the continued autonomy of Swedish science today, demand that science remain formally outside the Agora, even while it deepens, or rather, just because of its deepening involvement in global patterns of science-based innovation. For the defenders of autonomy, Swedish science is faced today, with forces of the same potential darkness as those Robert Merton faced in 1942 when he laid down the elements of a scientific 'ethos', classically affirming the identity of an ethical enterprise apart from and above other forms of enterprise in modern society. Now as then, the separation of science from society, and from what are constructed as strongly impinging external forces, remains understood as the first requirement for sound decision-making in

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<sup>1</sup> A new politics of social responsibility can be said to follow in the wake of a perceived scientific endangerment of society, while a renewed politics of scientific autonomy arises out of a perceived social endangerment of science. A more reasonable politics of knowledge society would follow from a contingent rather than necessary view of their opposition. Public deliberation versus expert adjudication can be seen as contingent choices rather than as the necessary negation of each other in knowledge society. Both should be considered legitimate depending upon the (always contestible) circumstances. Thus, the privileging of one over the other should be possible to see as varying from case to case and as never finally decided. In order to be able to open up those issues to broad and inclusive public deliberation considered deserving of such treatment, other issues will always have to be left black-boxed and in the hands of experts alone. For arguments consistent with this view of the governmental challenge posed by contemporary knowledge society see Barry (2001). In this paper, it may appear that socially responsible science is being portrayed as naturally superior to, and more 'politically-correct', than the exercise of autonomous expertise. This is not the position of the authors. We merely wish to draw attention to, and highlight, the fact that a renewed politics of scientific autonomy reigns as good as supreme over a politics of socially responsible science in Sweden today.

<sup>2</sup> The first summary recommendation of this report is that: 'Direct dialogue with the public should move from being an optional add-on to science-based policy-making and to the activities of research organizations and learned institutions, and should become a normal and integral part of the process' (House of Lords 2000).

science and politics alike. Questioning this requirement, or seeking to seriously redefine it, is seen as endangering not only the quality of Swedish science, but also the very survival of Swedish culture as such. Scientific experts are to be seen as the indispensable guardians of Sweden's liberal democratic culture, whose expertise cannot itself be safely democratized. In the true and good knowledge society, Swedish experts will still be allowed to lead, and Swedish non-experts will, for their own safety and welfare, still be expected to follow.<sup>3</sup>

## From Industrial Democracy to Science Unbound – The Arrival of Swedish Knowledge Society

### *The Reinvestment of Wage-Earner Funds in a New World of Research in Sweden*

The centre-staging of the politics of science and technology in Sweden at the beginning of the 1990s did not coincide with anything like a BSE crisis as experienced in Britain<sup>4</sup>. Rather, it arose in 1991 as a newly-installed Bourgeois government set itself the task of articulating a fresh 'New Start' for the nation. With the end of the Cold War, there appeared no better moment to try and enact a significant transformation of the nation's vision of itself. A key election promise for Carl Bildt's government was to abolish so-called wage-earner funds which had shown themselves to be an economic reform too controversial for Swedish consensus politics to swallow.<sup>5</sup> With these funds was also set to perish the larger long-term vision of Sweden as a progressive industrial democracy where the 'partners' in the labour market would continue to consolidate their joint commitment to the 'co-determination' of the industrial future. What could be relied upon to form the acceptable basis of a new vision of the future of Swedish economy and society? The answer was found in a concerted 'national mobilization for knowledge and competence' calling for large-scale investment in new forms of research and education relevant to the long-term competitiveness of the Swedish economy (Utbildningsdepartementet 1994, Unckel 1993, Benner 2001: 32). Wage-earner funds were to be translated into the kick-off capital for a new knowledge society and a new generation of knowledge-intensive companies at the forefront of the emerging fields of information and communication technologies, new materials science and technology and biotechnology. Government, however, was to hold itself to 'enabling', rather than directly intervening in the growth of the new *Kunskapsnation*. In contrast to the 'radical rationalism' associated with established 'sector research' policy in Sweden<sup>6</sup>, the new commitment was to supporting individual initiative, risk-taking behaviour and entrepreneurship. Both, individual universities and researchers were to be encouraged and aided to more freely associate in society and to enter into new interdisciplinary and trans-institutional arrangements (Benner 2000: 99).

<sup>3</sup> According to the classic Enlightenment position, science serves democracy as an external force and resource capable of informing and advising governments and citizens about the real nature of the political choices they confront. In line with a new politics of socially responsible science, the tables are turned and democracy serves science as processes of 'extended peer review' inform and strengthen scientific and technological decision-making relocated inside society (cf. Elzinga 2002: 15).

<sup>4</sup> The absence of any registered cases of BSE in Sweden has been taken as evidence of the relative superiority of Swedish expertise compared to in other European countries. As the former Minister of Agriculture in Sweden, Margareta Winberg, was able to argue in December 2000, against the imposition on Sweden of new European measures for controlling the spread of BSE: 'We have worked conscientiously over the long-term preventing the spread of the disease. We have not been negligent. Therefore, it is completely unreasonable that Sweden be judged like other countries who have been negligent for decades and let in BSE' (Winberg quoted in Ljungberg 2000).

<sup>5</sup> Conceived in the 1970s in relation to a radical programme of industrial democracy and collective profit-sharing, wage-earner funds were brought into being in the 1980s, firstly as a means of securing wage restraint and of guaranteeing the availability of new investment capital for domestic industry in hard times. In 1991, a year before their abolition, the collective holdings of the five regional wage-earner funds amounted to over 22,000 million crowns.

<sup>6</sup> As Elzinga (1990, 1993, 1994) and Premfors (1986) have charted, the 'radical rationalist' approach in Swedish research policy and the growth of the 'sectoral principle' after 1967 coincided with the takeover of government by a new generation of Social Democrats, who rejected the existing pattern of informal contacts between academia and politicians. Already in his capacity as Minister of Education, Olof Palme led the way in his attacks on academic elitism and in his determination to advance greater state management of higher education and research (Elzinga 1993: 215). As the centrepiece of Swedish Bernalism, the sectoral principle meant the growing domination of university research by the problems and demands of different 'sectors' of government starting with defence and extending to housing, energy, transport, health and so on. Thus, the 1970s witnessed the establishment of a large collection of sector research councils with their own separate budgets for commissioning appropriate university-based research. The largest of these came to the Swedish Board of Technological Development (STU) which was increasingly tasked with stimulating improvements in national industrial performance.

The new Swedish knowledge society was, therefore, to arise out of the fusion of two components. The first of these was a renewed commitment to the classic liberal vision of academic autonomy in society. Swedish science, it was believed, should still be imagined as a self-governing republic in the spirit of Polanyi (1962), free to set its own research priorities and define its own standards of excellence. Public spending on science was also to be kept at a level that would guarantee flourishing 'world class' research on Swedish soil (Utbildningsdepartementet 1994: 61, Benner 2001: 44). The second component was a new promise to enlarge and expand academic autonomy in society, by freeing individual universities and scientists to explore and demonstrate the relevance of their high quality research in their more immediate surroundings. Thus, the inhabitants of the Swedish republic of science were to be offered serious incentives to push back the walls of their republic *on their own initiative* and to start co-ordinating their free and spontaneous research practices in relation to both pure academic goals and broader socio-economic goals simultaneously. An ambition for Bildt's Bourgeois government was to generate a new pluralism in Swedish higher education and research by inciting different universities to cultivate their own unique profiles in constructive competition with one another, and in dynamic interaction with new external partners (Benner 2001: 48-51, Unckel 1998: 74). This desire to liberate Swedish universities and help them to set themselves apart from one another found direct expression in the transformation of Chalmers University of Technology in Gothenburg and Jönköping School of Commerce in Småland into private foundations in 1994.

*Strategic Research: The Swedish Republic of Science Wooed into the Arms of the Schumpeterian Entrepreneur*

Therefore, in Sweden's new bourgeois knowledge society, autonomous science was to start actively leading from *within* society, as well as independently advising and guiding from without. As was befitting of a neo-liberal research policy, the traditional autonomy of science and scientists in society was to be both reasserted and reimagined. Seats of learning were to be re-envisioned as potential hubs of regional and national development. Against this background, the established distinction between basic and applied research, which had been so important to science and technology policy in Sweden in previous decades, was to be gradually superseded. Free, creative and original research could now be both basic and applied in future, as in both cases, it would be built upon the same foundation of free and independent scientific initiative. Beyond the opposition of basic and applied research lay the new world of strategic research where the highest academic standards could be pursued in programmes, whose long-term goal was also the achievement of improvements in national economic performance; medical care and environmental management (Lindgren n.d, Elzinga 1994, Edqvist 2002). In the new world of strategic research, the Swedish republic of science was to be enticed out of its academic closet; persuaded to forget its old quarrel with Bernalism, and drawn into a new and passionate embrace with the figure of the Schumpeterian entrepreneur<sup>7</sup>.

The advance of the Bildt government's new knowledge society, it can be argued, depended upon the introduction of cultural modifications to established identity of the scientist in Swedish society. In future, scientists were to view themselves as at larger liberty with their continuing authority in society shackled to their relative success at exploiting this new freedom. Traditional academic skills, although treasured, were to be seen as insufficient to meet the new challenge of research leadership directed at the fulfilment of smart combinations of strategic goals. Thus, from the outset a strong emphasis in government policy was on large-scale investment in new forms of research education and training. Young strategic researchers were to grow accustomed to working in-between academic science and knowledge-intensive industry; shuttling between the two in the course of their early career development (Benner 2000: 99, Unckel 1993).

Primary responsibility for implementing the new paradigm of strategic research and education was allocated to a new collection of quasi-private research foundations (forskningsstiftelser); the first established being the Swedish Foundation for Strategic Research

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<sup>7</sup> How does the Schumpeterian embrace impact on classic liberal visions (Merton, Popper, Polanyi) of scientific autonomy? In the first instance, autonomy is no longer solely connected to the collective authority of the scientific community, but also to individual powers of scientific leadership within and beyond the laboratory walls. Scientific autonomy becomes something less defensible as a national given in a democratic society, and something more that can be both won and lost in global scientific and technological competition.

(SSF) and the Swedish Foundation for Strategic Environmental Research (MISTRA), both created at the beginning of 1994, with a start of 6,000 million and 2,500 million Swedish crowns respectively<sup>8</sup>. These were deemed the best vehicles for redeploying wage-earner funds due to their perceived potential for overcoming both the overly academic orientation of the established disciplinary research councils, and the overly corporatist and bureaucratic identity of the existing sector research organizations<sup>9</sup>. Neither of these channels it was believed could be relied upon to translate substantial new funds into reliable new sources of economic growth and international competitiveness. Thus, after 1994 a third world, or 'layer', of research policy governance has emerged in Sweden engaging in complex relations of competition, co-operation and communion with the two pre-existing worlds of basic/disciplinary research and applied/sectorial research (cf. Edqvist 2002). The new research foundations were consciously designed to bring about a lasting reconfiguration of the national research policy landscape, being supplied as they were, with legal protection intricate enough to prevent their rapid dismantlement by any returning Social Democratic government (Benner 2001: 59, Unckel 1998: 74). Headed by an Executive Director and run by small secretariats, the new foundations were to allocate funds in broad areas of designated strategic importance according to the recommendations of externally-recruited advisory committees made up of expert scientists and industrialists. The general idea for all the foundations, and even those directed towards medical and environmental research, has been to supply concentrated injections of funding over extended periods of time (3 to 5 years or longer) into areas where Sweden has the potential for achieving a comparative strategic research advantage serving to enhance the long-term competitiveness of the national economy<sup>10</sup>.

Although the social democrats returned to power in the same year as the first strategic research foundations were established, the long-term impact of the foundations on Swedish science and technology policy has been profound. As the financially privileged embodiments of the new paradigm of strategic research, the foundations have continued to act as serious provocation to the established institutions of research and education in Sweden, and especially to those most closely tied to traditional disciplinary and collegial patterns of organization. The foundations have introduced a new element of uncertainty into the meaning and identity of autonomous science in Swedish society. By forging such close links between the conduct of research and the achievement of economic security and national competitiveness, they have unsettled basic perceptions of the true position of basic science in the production of powers of national self-determination. The traditional institutions of science in Sweden, therefore, were able to experience a serious devaluation of their relative importance and worth in the new research policy landscape that emerged after 1994. What resulted was the outbreak of Sweden's very own 'Science War', different to the Science Wars waged elsewhere in the world around the same time, but again, coinciding with the forceful reassertion of old and established forms of scientific authority feeling themselves under growing threat.

## Sweden's Internal Science War

### *Capital Gains and Government Cuts*

If the connection between the new strategic research foundations and a new pattern of knowledge production was something to be forged after 1994, their connection with a new pattern of research finance was something that was immediately realized. Fittingly, the largest foundation, SSF, acquired premises in the World Trade Center in Stockholm and was able to engage in a highly successful capital management programme between 1994 and 2000. Its

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<sup>8</sup> Apart from SSF and MISTRA, other foundations include the Swedish Foundation for Knowledge and Competence Development (KK-stiftelsen) established with a start capital of 3,300 million crowns, the Swedish Foundation for the Internationalisation of Higher Education and Research (STINT) start capital 1,000 million crowns and the Vårdal Foundation for Health and Allergy Research, start capital 520 million crowns.

<sup>9</sup> Despite the growing mistrust displayed towards sector research programmes throughout the 1990s, the first seeds of a real and active commitment to a new strategic orientation in research policy in Sweden were in fact sown by sector research organizations, and in particular STU, from the mid-1980s onwards.

<sup>10</sup> In the case of MISTRA, for example, the orientation is towards supporting research leading to the 'solving' of environmental problems through the intervention of new innovative environmental technologies: For MISTRA 'environmentally sound products, services and production processes must earn money in a market' ([www.mistra.org/eng/](http://www.mistra.org/eng/)).

initial capital of 6000 million Swedish crowns was invested with the help of both Swedish and international banks in a combination of bonds and equities. By 1997, SSF's capital had risen to 10,000 million crowns and in March 2000 it reached a peak of 13,000 million crowns, only to fall back to approximately 8,500 million crowns by the middle of 2002 (SSF 2001). The capital of the other strategic foundations has risen and fallen in a similar fashion, with for example, MISTRA's capital peaking at 4,800 million crowns in 2000 and falling back to 3,500 million crowns in 2002 (Eliasson 2002). The stunning growth of the capital available to the foundations during the 1990s allowed them to quickly imagine themselves living longer than initially envisaged<sup>11</sup>. Rather than needing to dispose of their funds in highly concentrated doses over a limited number of years to effect a lasting transformation of research and higher education in Sweden, they were, after only a short period of time, able to see themselves as coming to assuming a more permanent position in the national policy system.

The growing financial strength of the new foundations after 1994 gained extra significance as the new social democratic government was forced to embark on a general programme of cutbacks in public spending in a climate of growing economic crisis. Under pressure to make substantial expenditure cuts on research and higher education, the new Minister of Education, Carl Tham saw the strategic research foundations as presenting him with both problems and possibilities. They presented possibilities by constituting an alternative source of funding and compensation for any cutbacks in government spending he was forced to introduce. They presented problems, however, by remaining, for the time being, funding bodies deliberately designed beyond direct government control and influence. Therefore, the period 1994-1997 in Sweden was characterized by a protracted struggle on the part of the government to gain leverage over, what came to be known as, the 'wage-earner fund foundations' (löntagarfondstiftelser) so that their expanding capital could be used to help maintain levels of 'public' spending on both basic and applied research (Benner 2001: 98-112, Kasemo 1997: 62).

During the period 1995 to 1997, the established research councils in Sweden were forced to cut their total budget by 15% and the leading sector research organization, the National Board for Industrial and Technical Development (NUTEK)<sup>12</sup>, had to reduce expenditure by almost 30% (Benner 2001: 102). In this austere climate, the strategic research foundations were accused of having 'stolen away' funds from the public purse which they were then wasting on over-sized research projects in neglect of tried and trusted peer review procedures. As it was expected that the new foundations would soon be able to pay out as much money annually as the established research councils, the quality and integrity of Swedish science, it was argued, was in immediate danger of being lastingly damaged and undermined (Carlsson 1995, Tham 1995).

The foundations stood firm, however, in the face of such criticism as Ingvar Lindgren, the first executive director of SSF, emerged as a key spokesperson on their behalf. Lindgren was the ideal frontman for the new foundations due to his impeccable scientific credentials<sup>13</sup>. He has been a professor of physics at Chalmers University of Technology in Gothenburg since 1966; a member of the Natural Science Research Council (NFR) during the 1970s and has sat on the Nobel Prize Committee in Physics for 14 years, including three years as its chairman. According to Lindgren (1995), many of those recruited to SSF's governing board as well as to its advisory committees had been, like himself, long-standing members of one of the national research councils and they prized this experience very highly in establishing routines for evaluating funding applications to SSF. Also it was a priority for SSF that their governing board be as firmly anchored as possible within the Swedish scientific community. The research councils together with both the Royal Academy of Science (KVA) and the Royal Academy of Engineering Sciences (IVA) would be asked to pick the new scientific members of SSF's

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<sup>11</sup> The first strategic foundations were established on the premise that they would dispose of their funds over a 15 year period (1994-2008). This timetable no longer applies.

<sup>12</sup> NUTEK was formerly STU (see note 6).

<sup>13</sup> Some discussion, however, did take place in the Swedish press regarding the size of Lindgren's wages. Including money paid to an assistant taking over his research at Chalmers, SSF paid Lindgren 99,200 Swedish crowns a month. In addition to this, he was also receiving a 30,000 crown a month pension from Chalmers. The Swedish Prime Minister's monthly earnings at the time were 80,000 crowns a month. In general, those employed at the strategic foundations were in the mid-90s paid almost twice as much as national research council staff. This added to the friction between these two worlds of Swedish research (Andersson and Sohlström 1997).

governing board every four years, and the existing board would merely ratify their choices (Lind 1995: 1974).

In his defense of the foundations, Lindgren also emphasized that although they were partly willing and prepared to co-ordinate their funding to compensate for cutbacks in government-controlled spending on research and education, this compensation would inevitably lead to an overall shift in Swedish research and education in a more strategic and 'goal-oriented' direction (Benner 2001: 104, Lind 1995: 1974). Obeying the statutes upon which they were established, the foundations were not designed to guarantee and strengthen the position of the institutions of basic research *outside* of society but the position of new environments of strategic research *within* society – that is new scientific environments working more directly 'with a view to enhancing Sweden's long-term competitiveness'. The foundations were based on the conviction that Swedish knowledge society could not be science-led from the outside, but only from the inside by a new breed of strategic scientists interacting more closely with others, and industrialists in particular, to build new world-class post-academic research environments. Therefore, Sweden's very own internal Science War, which broke out in the mid-1990s, was, to a considerable degree, a war waged between two conflicting visions of how to continue defending the autonomy and the exclusivity of Swedish science in a time of heightened global competition. Both sides could identify each other as leading to the fall of Swedish science if they were allowed to prevail. On the one side stood a vision of the growing commercial contamination of science, on the other, a view of its declining relevance and international competitiveness.

*Reasserting the Link Between Basic Science and the Sovereign Nation: The Power of the Erlander Tradition*

The sense of growing outrage felt by the traditional institutions of science in Sweden towards the course that government research policy was taking reached a peak during the period 1996-97. Outrage was fuelled by an accumulation of changes. At the same time as the fate of much basic research appeared to be being delivered into the hands of the new research foundations, the government was also embarking on a programme to broaden access to higher education through the rapid expansion of a new collection of regional universities and colleges. This was an initiative to fight off unemployment and open a door to knowledge society for as many Swedes as possible. However, this expansion programme was experienced as being pursued to the immediate disadvantage of established academic environments and as threatening again to sacrifice quality in Swedish higher education and research; this time on the altar of regional employment policy. Furthermore, the government was also committed to strengthening the position of women in research and higher education through new measures of positive discrimination. Suddenly, 'political' agendas could be felt as weighing intolerably heavy on sacred academic freedoms. Enough was enough<sup>14</sup>.

After 1996, science and society relations in Sweden have become associated with the defense of tradition and the reassertion of orthodox patterns of scientific authority. Since then, it has been regularly argued that the governance of science in Swedish society assumed an optimal form after 1945, crystallizing in the years 1954 and 1955. During these years, a special relationship and style of dialogue between scientists and politicians evolved of great significance for the establishment and consolidation of Sweden's position as a leading industrial nation. At the centre of this relationship, and receiving recognition as the initiator of dialogue, stands the figure of Tage Erlander, the social democratic Prime Minister of Sweden between 1946 and 1969. His relations with leading scientists like Torsten Gustafson, Arne Tiselius and Hannes Alfvén grew after 1945 to become 'practically symbiotic' (Grandin 1999: 345) and, as Elzinga (1990: 49) has interpreted them, defined by a 'defensive rationalism' from the side of government. Erlander's position was one where powers of national self-determination in eras of rapid scientific and technological change are accepted as the fruit of

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<sup>14</sup> A figure who has achieved a reputation for plain speaking in defense of hard science in Sweden from the mid-1990s is Torbjörn Fagerström: 'Bargaining, political correctness and amateurism are winning ground as methods in the competition for scarce resources. At the head of the troops dismantling the university is a political leadership which thinks the university should firstly be an arena for equal opportunities policies, employment policies, regional policies and God knows what other policies' (Fagerström 1996). Fagerström, who is Professor of Theoretical Ecology at Lund University and Vice Rector of the Swedish Agricultural University, was named 'Science Educator of the Year' in 2001 by the Swedish Association for Science and Popular Education.

scientific authority properly understood and respected<sup>15</sup>. In line with the Erlander tradition, basic scientific research is to be viewed as an autonomous 'motor of progress' (Edqvist 2002: 34) or, as Arne Tiselius (1956: 223) expressed it at the time: a precious 'life nerve' (en livsnerv) of modern Swedish society.

As Edqvist (2002: 35) points out, there was a particular technological framing of the intense interactions between Erlander and scientists like Torsten Gustafson and Arne Tiselius in the 1940s and 1950s. Sweden was facing the combined threats and promises presented by the global development of atomic energy and large-scale industrial automation. The famous Swedish conference 'Technology and Tomorrow's Society' held in November 1955 at a cinema in Stockholm, where Erlander (1956: 314) spoke of the 'terror mixed with wonder' (skräckblandad förundran) he felt in the face of contemporary science and technology, and Tiselius (1956: 230) of how scientists must remain the final judges over their science, was a conference staged in an atmosphere of 'atomic fever', (Weinberger 1997: 215) following, as it did, directly on the heels of the famous 'Atoms for Peace' conference in Geneva, designed to help all civilized peoples and countries enter the Atomic Age<sup>16</sup>.

Thus, those arguing for a return to the Erlander tradition in science and society relations in Sweden after 1996 are arguing for a reaffirmation of the indispensable force and authority of basic research in Swedish society. Only real science - pure - science can securely undergird the nation. Again there is a particular technological framing of the situation. Instead of atomic energy and industrial automation, it is now the combined threats and promises of biotechnology and information technology that are being presented as requiring strong and uncorrupted scientific management and control. The sentiment is that, as at the birth of the Atomic Age, so as we stand on the brink of 'Biotech Society':

Our universities and colleges shall not stand like beggars at society's table...neither shall they feel like extortionists up against a hostile-minded government, they shall instead be certain of the priceless contribution they are able to make in all our collective efforts to make Sweden a richer, prouder and freer nation (Erlander speaking in 1946, quoted in Grandin 1999: 335).

The special interface or 'contract' (Edqvist 2002: 35) between science and politics which Erlander established, and which has achieved lasting expression in institutions like Forskningsberedningen set up in 1962<sup>17</sup>, has been celebrated after 1996 for preserving space in society for science to realise its potential for more than thirty uninterrupted years (Kasemo 1997: 62-63, Nybom 2000). The 'New Start' for Sweden that the new strategic research foundations were meant to initiate, although promising to coincide with the further enlargement of the space of scientific freedom in society, only led to the unfortunate transformation of government research policy into an 'ideological playground' (Nybom 2000) characterized by 'a crippling and destructive politicization' (Kasemo 1997: 62). Carl Tham, the social democratic Minister of Education between 1994 and 1998, is blamed by the defenders of tradition for having tragically failed to restore good order to research policy in his inability to smoothly integrate the strategic research foundations into existing policy frameworks. Instead, he only succeeded in further disrupting vital lines of communication between science and government in a fashion which testified to his personal 'incompetence' and general 'ignorance of and/or disinterest in research' (Kasemo 1997: 63).

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<sup>15</sup> In his memoirs, for example, Erlander describes how, during close consultation with leading scientists at the Harpsund Conference in March 1955, he and other politicians were carried along by the scientists' own belief in their powers to help guide the nation into the future. As he puts it: 'We felt that it was a large and important task for us politicians to make room for the researchers so that they would be able to achieve practical results from their ideas' (Erlander 1976: 30).

<sup>16</sup> Already in 1945, directly after Hiroshima, and in connection with the establishment of the Natural Science Research Council (NFR) we can witness the following argument concerning the cultural significance of basic research being advanced: 'The atom bomb provides the most powerful illustration that...basic research is now not simply a lever to raise the nation's standard of living, but also of the greatest importance for the very survival of a people as a free and independent nation.' (Naturvetenskapliga Forskningskommittén 1945:24).

<sup>17</sup> Designed to protect and advance the special relationship between science and politics Erlander had initiated, Forskningsberedningen (literally, the 'preparation of research policy') was established in the 1960s as a vital means for improving politicians understanding of science and for providing science advice on the formulation of science policy. The chairman of Forskningsberedningen was originally Erlander himself, with the other members being made up of a combination of top government ministers and prominent scientists. During the 1970s, the importance of Forskningsberedningen declined with the dominance of the 'sectoral principle' in research policy (Premfors 1986: 17). However, in various guises it has survived to the present day, achieving a new lease of life in the 1990s.

First in November 1996, and then again in September 1998, Tham and the government were subject to severe criticism in letters of collective protest, published in the leading daily newspaper *Dagens Nyheter*. In the first letter signed by 599 biomedical researchers (Ahlman et al 1996) it was emphasized that Sweden may soon lack the competence to decide worthy Nobel Prize winners, while in the second letter signed by 314 university professors (Ahlberg et al 1998), the pressing need to 'normalize' relations between the scientific community and the government after an imminent general election was stressed. In both letters, as elsewhere during the same period, emphasis was placed on the reckless endangerment by government of world class research environments that had taken decades to build up. The strength and persistence of Sweden's commitment to basic research since the 1950s is to be viewed as more or less unique internationally (Kasemo 1997: 62), showing an unprecedented level of political respect and understanding for the special dynamics of basic research. Suddenly, in the space of four or five years during the 1990s, this local universal respect and understanding evaporated, risking to destroy Sweden as a knowledge society at the very moment it had become most interested in defining itself as one.

Some natural scientists have been willing to accept part of the blame for the vulnerable position they found themselves in the mid-1990s. They can admit to having consistently failed to publicly communicate the already long-standing identity of Sweden as a knowledge society and the centrality of just basic research in securing this identity (Öquist 1997: 308). There has been a failure to generate the same sense of national pride in Sweden's leading natural scientists as is routinely enjoyed by the country's leading ice-hockey players (Fagerström 1996). In this connection, one vintage argument clarifying the indispensability of basic research to Swedish society has come to be ceaselessly reiterated after 1996: because the future of knowledge will always remain unknown, the path towards it can never be a directed one<sup>18</sup>. Despite the shift of the national research system towards prioritizing strategic and 'goal-oriented' research programmes, this cannot be allowed to override the culturally-ingrained truth that, as Arne Tiselius expressed back in 1956: 'fortune favours only the prepared researcher' ('slumpen träffar endast en förberedd forskare'). The idea that the advance of science and technology cannot be planned for, but only 'prepared for' by an unflinching commitment in support of self-governing basic research, is not an issue easily open to discussion in Sweden; instead it is an issue heavily-guarded and culturally black-boxed. Questioning its validity, especially after 1996, is not accepted as an intellectual exercise, but rather, as an attempt to speak in denial of an important slice of the nation's cultural heritage.<sup>19</sup>

The first important step towards a 'normalization' of science and society relations during the period 1996-97 came already in November 1996 with the passing of a new law allowing the government to decide who should sit on the governing boards of the strategic research foundations. Taking SSF as an instructive example, this led in January 1997 to the appearance of both the chairman and head secretary of the Natural Science, Medical and Engineering Science Research Councils, as well as the general director of NUTEK on SSF's board. The new chairman of SSF's board for the period 1997-2002 became the former social democratic Prime Minister, Ingvar Carlsson, well-recognized for his allegiance to the 'Erlander tradition' in science and society relations.

In March 1997, SSF agreed to allocate 500 million crowns over three years in order to assume financial and operative control over university-industry consortia projects in new materials and microelectronics previously funded by the Natural Science Research Council and NUTEK (Welin 1997: 56). In 1998, KVA and IVA published a joint evaluation of SSF's first four years of activity. They concluded that SSF had succeeded in acquiring a very good reputation among Swedish researchers and that they should continue to defend and develop their 'strategically-relevant' focus in close consultation with the leaders of the academic

<sup>18</sup> Politically-speaking, the most important italicized reiteration of this argument is probably to be found on page 4 of the policy document *Research 2000* (Utbildningsdepartementet 1998): 'Research 2000 considers that too much interest has been directed at trying to decide *in advance* the usefulness of different research initiatives, instead of at cultivating an appreciation of the results that are actually emerging out of research' (original emphasis).

<sup>19</sup> Explicit confirmation of this was provided recently by a debate article in *Dagens Nyheter* in October 2002, authored by three leading Swedish bioscientists whose views were also featured during televised coverage of the Nobel Prize Awards for 2002. Witnessing the growing influence of the strategic research foundations they claim that the legacy of Erlander and Tiselius is 'a precious cultural political inheritance in the process of being squandered' ('ett politiskt-kulturellt arv som nu håller på att förlösas') (Edlund et al 2002).

community. If they were to be criticised, it was for having relied too heavily on contacts with individual researchers and research groups rather than starting out by trying to establish broader contact surfaces with the academic world (KVA and IVA 1998: 4). Also in 1998 the social democrats were re-elected to power and a new Minister of Education replaced Carl Tham. The new minister, Thomas Östros has since his appointment continually proclaimed his belief in the centrality of basic research in Swedish knowledge society and his determination to 'retie the band to Erlander' that his predecessor played such an unfortunate role in helping to sever (e.g. Östros 1999, Hansson and Samuelsson 2002).<sup>20</sup>

*Investing in 'The New Production of Knowledge' Without Buying It*

Without a doubt, one of the most widely discussed books of the 1990s describing and prescribing a transition from industrial to knowledge society was the collaborative volume *The New Production of Knowledge* (1994) written by a team of scholars headed by Michael Gibbons. In 2001, a follow-up volume appeared entitled *Re-Thinking Science* put together by three members of the original collective of six authors. Both books have a particular association with Sweden. It was the Swedish Council for the Planning and Co-ordination of Research (FRN)<sup>21</sup>, a body specially tasked with advancing interdisciplinary research, which in consultation with Michael Gibbons, set in motion and then funded over a three year period the project which resulted in the 1994 volume. The 2001 volume was commissioned by a special expert group for studies of knowledge society assembled by the Bank of Sweden Tercentenary Foundation.

*The New Production of Knowledge* appeared in the same year as the first strategic research foundations designed to provide a 'New Start' for Sweden as a knowledge society. Links between the book and the new foundations, however, remain tenuous. As the book has been criticized, it offers a highly stylized and 'prepackaged' account of a transition between Mode 1 and Mode 2 knowledge production which aspires to global relevance (Shinn 2002)<sup>22</sup>. Although funded by a Swedish research council, the authors were under no obligation to feel accountable to the circumstances of Swedish knowledge production. The authors' hands were free, and disinterest in Sweden was accepted – Sweden was neither defined nor understood as the 'context of application' for *The New Production of Knowledge*<sup>23</sup>. Making use of the book's own terminology, FRN's funding of the project was the enshrinement of classic Mode 1-style respect for autonomous international academic authority accepting that no nationally-relevant return on their money could be guaranteed. The same pattern applied for the second book *Re-Thinking Science*. Again, regardless of the book's conclusions concerning the future of autonomous expertise, the generous financing of three 'foreign' experts, with only minor connection to Sweden, to freely 're-think science' on their own terms in whatever global location they chose, can only be seen as testifying to a strong, or even exaggerated, faith in the virtues of de-contextualized (i.e. Mode 1) knowledge production.

Within the context of Sweden's internal science war, however, both *The New Production of Knowledge* and *Re-Thinking Science* have been tarred and feathered as not just poor quality academic texts, but as unequivocally political tracts masquerading as expert opinion. Rather than independent authorities, Gibbons et al have been portrayed as 'hired guns' recruited into the service of bureaucratic and corporatist interests helping them to tighten their grip on Swedish science (e.g. Gustavsson 1997a, 2000, Rothstein 2002). While outside of Sweden, the mutually exclusive nature of Mode 1 and Mode 2 knowledge production has been condemned as empirically unsustainable (e.g. Godin 1998: 470-471), inside of Sweden it has been presented as frighteningly real, and used by domestic policy experts to mount a passionate

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<sup>20</sup> Assistance in maintaining the Erlander tradition in science and society relations as a living tradition was also provided in 2001 by the establishment of the Tage Erlander Prize in Science and Technology, a joint initiative of the Tage Erlander Memorial Foundation for Science and Technology and the Swedish Royal Academy of Science (KVA). Awarded annually, the recipients of the prize are to be young outstanding researchers in the natural and engineering sciences under 40 years of age.

<sup>21</sup> FRN was abolished in 2001 with the creation of the new federation of Swedish research councils.

<sup>22</sup> The transition from Mode 1 to Mode 2 knowledge production is seen as coinciding with a growing socialisation and 'contextualisation' of research. From being formulated largely in accordance with academic interests, Mode 2 research problems are formulated in closer liaison with their 'contexts of application'. Research itself becomes transdisciplinary rather than disciplinary in orientation, being pursued by a new heterogeneity of actors across a new heterogeneity of sites. The quality of Mode 2 research is associated more with its subjection to open rather than closed peer review, and judgement according to new mixes of intellectual, social, political and economic criteria (see Gibbons et al 1994).

<sup>23</sup> Helga Nowotny personal communication with Hans Glimell, August 2002.

defence of what is seen as actually existing and historically ideal Mode 1 knowledge production under global siege. Therefore, while escaping criticism for drawing such a sharp distinction between Mode 1 and Mode 2 knowledge production, Gibbons et al have been publicly vilified in Sweden for their 'resignation', 'defeatism' and 'unsupportable optimism' in the face of Mode 2's inevitable dominance (Gustavsson 1997a: 126-131, 1997b: 44, Björklund 1996: 45-46). Most ferocious in his attacks on Gibbons et al has been Sverker Gustavsson, Professor of Political Science at Uppsala University and previously Under-Secretary of State in the Department of Education (1986-91). Since the mid-90s, Gustavsson has been able to act upon Swedish research and education policy, both as a grey eminence exerting a strong behind the scenes influence, and as a highly visible science warrior displaying, what he himself calls, 'public valour' (civil-kurage) in his championing of Mode 1 as an 'oppositional project' (motprojekt) insulating Swedish science from the global freeplay of power politics and rampant commercialism (Gustavsson 1997b: 58-59, 2000a, 1998, Rådahl 2001).

Gustavsson (e.g. 1998: 67) presents himself as engaged in a principled defence of Enlightenment values in Sweden, currently subject to widespread betrayal. Gibbons et al, in their willingness to 're-think science', are guilty of surrendering to the forces of post-modern relativism which are progressively depriving 'truth, intellectual discipline and conceptual stringency' of meaning and value (Gustavsson 1997a: 127)<sup>24</sup>. The distinction between Mode 1 and Mode 2 knowledge production, however, is conceptually stringent enough for Gustavsson (1997b: 41) due to its ability to cut deeper than the traditional distinction between basic and applied research, clinically laying bare the 'constitutional' relations he sees as determining the balance between scientific and non-scientific knowledge production in contemporary society. To successfully defend the science base of Swedish knowledge society, beyond the protection of investment in basic research as opposed to applied, it is necessary, argues Gustavsson, to defend the rights and powers of scientists to rule over and quality control their own scientific affairs. Genuine Swedish knowledge society must be, and can only be, the republic of science self-enlarged, or as Gustavsson proclaims it beyond ambiguity: 'Power to the scientists!' (Gustavsson 2000b).

For Gustavsson (1997b: 41), the palpable threat of Swedish capitulation to Mode 2 knowledge production focuses attention on the key issues of who should set the agenda for, and exercise quality control over science in society. Unfortunately, due to his conceptual stringency, Gustavsson can only envisage two possible answers to these closely-related questions, where the final answer is already a politically foregone conclusion. According to him, in knowledge society, as in industrial society before it, research is either controlled by the researchers who carry it out (utövarstyrd/forskarstyrd forskning), or by the particular political and commercial interests commissioning and funding research (beställarstyrd / ställföreträdarstyrd forskning). The former corresponds with genuine 'free basic research' (den fria grundforskningen), initiated and evaluated within the self-governing institutions of science, while the latter can be pursued under a range of different titles (such as applied research, sector research and strategic research) depending upon whether it is pursued more in accordance with the interests of State or Market (Gustavsson 1997b: 47-49, 2000c: 46-47). While the value of other forms of research can be subject to open political debate and discussion, the value of 'den fria grundforskningen' and its centrality for the survival of Swedish liberal democracy cannot (see also Rothstein 2000). As Gustavsson (1997a: 129) expresses it: 'if we capitulate before the inevitability of the Mode 2 knowledge production, there will in the long-term, be no third power in our society alongside the State and the Market'.

The clear conception of science as a legitimate and necessary 'third power' in liberal democratic society, and of modern government as a 'triangle drama' between Science, State and Industry (see Elzinga 1990) can be seen as testifying to the long-standing strength and radicalism of Swedish Enlightenment tradition. It is in relation to this tradition that basic research is awarded the prefix 'free' in Sweden which is not commonly encountered elsewhere. The relative cultural specificity of the notion of 'free basic research' (den fria

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<sup>24</sup> As Landberg and Svensson (1998: 52) point out Gustavsson's attack on Gibbons et al knows no bounds. They are easy foreign meat to be butchered at will in the internal Swedish science war. So Michael Gibbons is directly compared by Gustavsson (1997b: 44) to the literary historian Fredrik Böök, who is famous for a speech he delivered at Lund University in October 1940 arguing for sensible Swedish resignation in the face of Nazi fascism.

grundforskningen) speaks explicitly of science's 'will to power' in Sweden, and its ambition to defend and consolidate its position as an accepted sovereign body within the Swedish body-politic at large. While Michael Polanyi's vision of the *Republic of Science* (1962) as a 'free society' within society is broadly seen today as belonging to the political imagination of another time and another country (e.g. Ziman 2000: 25), it remains vivid and potent in the Swedish context. As Gustavsson (1997a: 119) argues, displaying the most righteous nostalgia, the 1990s should have been recognized as an opportunity to turn the clock back fifty years, and correct mistakes made in the aftermath of World War II. For him, the end of the Cold War should have coincided with not only the fall of global communism, but also of Swedish Bernalism. The superiority of 'free' researcher-controlled (forskarstyrd) research over 'unfree' socially-managed and administered (ställföreträdarstyrd) research should have been one of the historical lessons learned with the fall of the Berlin Wall (Gustavsson 1997a: 118, 1997b: 39). Instead, however, and much to his dismay, he has been forced to witness the further expansion of 'unfree' research in Sweden after 1989, both with the arrival of the new strategic research foundations<sup>25</sup> and Sweden's participation in the EU framework programmes for research. These new developments are seen by Gustavsson as just as mistaken and undesirable as the programmes of 'sector research' which have been an important element in Swedish science and technology policy since the late 1960s (Gustavsson 1997b: 57, 1998: 68). All constitute, in his eyes, policy programmes for the despoilment of Swedish science, and the corruption of the nation as a knowledge society. In his unsupportable optimism over Mode 2 knowledge production, Michael Gibbons threatens to pervert the progress of Swedish science in the same way as John Bernal did fifty years before him (Gustavsson 1997b: 56). Although Swedish bureaucrats may have been foolish enough to invest in the promotion of yet another 'New Production of Knowledge' beyond the timeless ideal of 'den fria grundforskningen', Gustavsson is dedicated to preventing the nation from repeating and exacerbating past mistakes by buying into it.

*'Research 2000': An Exercise in Politics by Other Means*

Beyond his identity as a highly visible 'science warrior' in Sweden, Sverker Gustavsson is also recognized for having acted as a grey eminence in connection with the production of the Report of the Swedish Government Committee on Research Policy (*Research 2000*), published in 1998 (Utbildningsdepartementet 1998). As Mats Benner (2001: 169) has commented, the significance of *Research 2000* has been that ever since its publication, Swedish research policy debate has centred upon how to come to terms with its legacy. It is a policy document through which the organized interests of Swedish science, understanding themselves as a legitimate 'third power' in society, have successfully reasserted their authority over the national science and technology policy process.

At the heart of *Research 2000* stands Gustavsson's distinction between 'free' researcher-controlled research (forskarstyrd forskning) versus 'unfree' contract research (beställarstyrd forskning) as the single most important partition for the future co-ordination of Swedish research policy (Utbildningsdepartementet 1998: 22)<sup>26</sup>. This distinction, however, not only ends up ruling over the content of *Research 2000*, but can also be successfully used to define the process through which the report itself came into being. *Research 2000* started off life, when it was ordered by Carl Tham, the Minister of Education in May 1997, as contract research on research (beställarstyrd forskning om forskning), but ended up when it was delivered in October 1998, as a clear case of researcher-controlled research on research (forskarstyrd forskning om forskning). What was ordered as a tool of politics was fashioned into an anti-

<sup>25</sup> Commenting upon the controversy surrounding the new foundations, Gustavsson speculates over how the ability of the government to directly appoint their governing boards after 1<sup>st</sup> January 1997 might transform them into the friends rather than the enemies of Mode 1 knowledge production. Although he sees researcher-control being improved, he still sees the foundations being ruled by their statutes which insist upon the strategic relevance of the research projects they fund. This Gustavsson sees as something government and industry representatives might be able to exploit to interfere with researcher control of designated research priorities (Gustavsson 1997b: 48).

<sup>26</sup> The distinction is also complemented by the closely associated one between 'basic research' (grundforskning) and 'research for particular societal needs' (forskning för särskilda samhällsbehov). The former is presented as the well-known activity of free, curiosity-driven knowledge search, while the latter is described as research motivated and evaluated according to its relevance to more or less well-specified *non-scientific* problems (Utbildningsdepartementet 1998: 21). What this amounts to again, is a strict and clinical distinction between non-negotiable research (free research) and socially-negotiated research (unfree research).

political device for the imposition of a science-controlled vision of appropriate science and society relations on the policy process.

The government directive setting out the issues to be addressed by *Research 2000* was uncommonly long and detailed. It was hoped that the resulting document would be one of reconciliation helping to bring to an end the public quarrels and disagreements that had characterised the research policy field since the appearance of the new strategic research foundations (Benner 2001: 167). The task was to lay the basis for a new political consensus on the current potentials of research in respect of the present needs of society. In fulfillment of this task, *Research 2000* was to provide guidance regarding the most appropriate divisions of responsibility and patterns of co-operation in the organization of emerging knowledge society. In its detail, however, the directive behind *Research 2000* was also designed to guarantee that the resulting report would not be in serious contradiction of current government policy, as it was being pursued under Carl Tham during his term of office as Minister of Education (Benner 2001: 171). Thus, the expectation was that the report would concern itself firstly with the future accountability of research to society: how was society to remain confident that its expanding investments in research during the 1990s would continue to be translated into increasing returns, in terms of jobs, profitable innovations and improved living standards. (Utbildningsdepartementet 1998: 251).

On publication it was discovered that *Research 2000* had succeeded in cutting itself free from its directive. It starts by explaining how it had been set a completely unrealistic task, which even with the allocation of considerably more time would still have been impossible to fully-execute. Therefore, the presumption was made, given the exhaustive nature of its directive, that *Research 2000* was free to address just those issues it judged most important, leaving others aside (Utbildningsdepartementet 1998: 11-12). As the chairman of *Research 2000* has openly admitted, the ambition was to deliver the equivalent of a political manifesto calling forth a radical shift in research policy (see Hagström quoted in Benner 2001: 172). As the arrival of the report was announced in the media – 'Research policy must take a new course' (Dahl and Hagström 1998, Dahl 1998). In its preparation, *Research 2000* was tightly co-ordinated by its appointed chairman and head secretary, Stig Hagström and Sonja Dahl, who maintained a strategic distance from the Ministry of Education, while encouraging the parliamentarians in the report's committee to garner support among their respective parties for the re-orientation of research policy to be proposed (Benner 2001: 173). Although Sverker Gustavsson's name appears nowhere in the final report, the whole basis for the redirection of Swedish research policy proposed in *Research 2000* is clearly derived from the conceptual tools he has developed and launched in his policy studies<sup>27</sup>.

In a highly telling fashion, the content of *Research 2000* matches the style of its production. The political accountability of Swedish science is revoked in favour of the reassertion of its rightful autonomy. The bottom line is that 'strong and free basic research is the best guarantee for both international excellence and social relevance in Swedish research' (Dahl and Hagström 1998). Without qualification, and in the resurrected spirit of Michael Polanyi, *Research 2000* affirms that 'the most fundamental breakthroughs in research have come about through free basic research', and that 'without basic research there are no radically new results to analyse and develop within applied research and development' (Utbildningsdepartementet 1998: 68). Having reinstated 'free basic research' as the gold standard of Swedish research, in relation to which the value of all other research efforts must be gauged, *Research 2000* addresses the question of research co-ordination. Aware that it is in imminent danger of reinstating the 'linear model' of technical change, *Research 2000* concedes to the last 30 years of innovation studies that: 'applied research and development work interplay with, and give impulses to basic research and vice versa' (ibid: 62). This concession, however, is deftly used, not to tone down a policy commitment to the freedom of basic research, but to accentuate it much further: Just because basic and applied research interact with each other so extensively in contemporary knowledge society, so it is to everyone's disadvantage to draw unnecessary administrative boundaries between them (ibid: 62). The administrative boundaries governing

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<sup>27</sup> Gustavsson was interviewed by the *Research 2000* Committee in November 1997, and submitted together with a colleague a written memorandum to the Committee, which Benner (2001: 175) identifies as 'perhaps its most important intellectual influence'. As Hans Landberg (1999), former chairman of FRN, has also publicly stated it, *Research 2000* adopts Gustavsson's conceptual apparatus 'hook, line and sinker' ('med hull och hår').

over Swedish science and technology policy need to be simplified and streamlined: either research should be researcher-controlled (forskarstyrd) or contractually-controlled (beställarstyrd); *nothing* should come in-between. Since the 1960s, the institutions of Swedish sector research have come in-between: that is the institutions of politically accountable and socially-negotiable research. These are institutions that *Research 2000* finds itself obliged to condemn as unnecessary obstructions blocking the free and creative interplay of the correctly configured institutions of basic and applied research. For this reason, *Research 2000* recommends that government funds allocated to sector research should in future be delivered into the hands of a new constellation of researcher-controlled research councils. In other words, in Swedish knowledge society the traditional institutional arrangements supporting free basic research should extend their field of institutional coverage further downstream and interface directly with worlds of applied and industrial research, with a minimum of intermediate interference (ibid: 193).

For *Research 2000*, sector research amounts to an inappropriate hybrid of researcher-controlled and contractually-controlled research. The two forms of control are allowed to despoil each other. What results is corrupted research<sup>28</sup> subject to growing bureaucratic control and a proneness to manufacture visions of its own relevance and utility in accordance with its own particularistic standards of scientific quality and originality (cf ibid: 61). Such negative judgement, however, is not passed by *Research 2000* on the new strategic research foundations. Although they, perhaps even more explicitly than sector research institutions, aim to hybridize pure and applied research in pursuit of new programmes of strategic research, they are paradoxically accepted by *Research 2000* as deserving of a more, rather than a less, permanent position in the co-ordination of Swedish research policy (ibid: 65). It would seem that, a clean and sharp interface between researcher-controlled and contractually-controlled research is still imagined possible to uphold within the foundations. Within strategic research, unlike within sector research, Swedish science and Swedish industry may be able to interplay and give impulses to each other without their mutual despoilment and a damaging bureaucratization and/or politicization of their relations.

Like the vision of Swedish knowledge society advanced under Carl Bildt's government, *Research 2000* also envisages autonomous scientific authority at larger liberty in future, and legitimately ruling over significant areas of applied as well as basic research. However, it stops short of envisaging Swedish science radically revising the bases of its authority, to the extent that it seeks to defend the sources of its social power from fully within society in future, rather from without. For *Research 2000* the traditional realm of autonomous scientific authority (i.e. exterritorial basic research) is to retain its privileged status, and only to extend its sphere of influence as far as is realizable through the imposition of a new fundamental divide between researcher-controlled research and contractually-controlled research. This divide does promise to bring autonomous Swedish scientists into much more intimate, and potentially profitable contact, with Schumpeterian entrepreneurs, but it also functions to prevent the two creatures from consuming each other completely. Rather than committing to the society-wide enterprising up of Swedish republic of science through the union of the two 'invisible hands' of independent scientific<sup>29</sup> and entrepreneurial initiative, *Research 2000* is content to try and seal the fate, once and for all, of Swedish Bernalism. In the context of new knowledge society, Swedish science should at last to be allowed to become the undisputed master of its own house from the high windows of basic research to the surrounding gardens of applied science.

*Research 2000* does not support a neo-liberal research policy in Sweden, so much as a neo-classic liberal research policy. The freedom it privileges and seeks to extend is very clearly 'academic freedom' - its objective: to relaunch collective scientific opinion as a concentrated source of social power in Swedish knowledge society. The difference between *Research 2000*'s neo-classic liberalism and the neo-liberalism which gave rise to the new strategic research councils is most visible in the line taken on the Swedish university system's so-called 'third undertaking' (den tredje uppgiften). The first two undertakings are research and education; the

<sup>28</sup> The common term *Research 2000* and Gustavsson use for this type of research is 'ställföreträdarstyrd forskning' (Utbildningsdepartementet 1998: 61, Gustavsson 2000b, 2000c: 47).

<sup>29</sup> As Polanyi (1962: 55) wrote of the virtues of spontaneous scientific initiative: 'Their coordination is guided as by an "invisible hand" towards the joint discovery of a hidden system of things. Since its end result is unknown, this kind of cooperation can only advance stepwise, and the total performance will be the best possible if each consecutive step is decided upon by the person most competent to do so'.

third has come to be defined as 'working together' (samverkan) with surrounding society. The design of this open door on to society was subject to continuous change during the 1990s. As *Research 2000* notes, at the beginning of the decade it was officially restricted to 'acquainting society with the activities of research and with how the results of research should be able to be applied' (Utbildningsdepartementet 1998: 153). By 1997, however, it had become law that Swedish universities 'shall work together with surrounding society and inform about their activities' (ibid). *Research 2000* finds this change in definition completely unacceptable, as it implies serious infringement of the primary duty of Swedish universities to engage in the pursuit of basic research. Free basic research must continue to be recognized as 'the very fundament of research and research policy' (ibid: 70)<sup>30</sup>. For *Research 2000*, science's door on to society must remain one, opened and closed by science itself, to its own best advantage – which beyond all dispute, must also be seen as to society's long-term best advantage as well. Scientific initiative based on academic freedom remains exceptional initiative which cannot be combined willy-nilly with other forms of initiative (free or otherwise) in society at large. As a consequence of this line of reasoning, *Research 2000* recommends further legal redefinition of the 'third undertaking' restricting it once again, in the first instance, to an obligation for Swedish universities to keep society informed of, and acquainted with, the latest developments in research. In addition to this, Swedish universities should also be active in the establishment and clarification of intellectual property rights on the results of their research, guaranteeing that where appropriate these results can be productively applied (ibid: 142). If neo-liberal research policy at the beginning of the 1990s sought to lever Swedish science out into society; neo-classic liberal research policy after 1998, has aimed to place the socialization of science in knowledge society under firm scientific control.

### The New Federation of Swedish Science 2001

For me, Tage Erlander has meant an enormous amount regarding how to look upon research and higher education. His strong support for science was founded upon a belief in the fundamental importance of basic research for the development of society, and in a complete confidence in the scientific community. Erlander was convinced that increased resources for basic research and the allocation of these resources according to scientists' own evaluation of the most promising research initiatives will always in the long-run give very great rewards for society as a whole (Östros 2002).

#### *The Founding of the New Swedish Research Council*

Upon publication *Research 2000* did meet with stern opposition for its uncompromising reassertion of academic authority in Swedish knowledge society. In the first instance, the proposed extension of the duties of researcher-controlled research councils, charging them with co-ordinating applied as well as basic research brought the Ministry of Education into direct confrontation with the newly formed Ministry of Industry, Employment and Communication (Edqvist 2002: 41, Benner 2001: 218). The latter's yearly expenditure of approximately 1,500 million crowns on sector-related research was argued to be basically none of the Ministry of Education's business, and certainly not money that could be simply lifted over to their research councils. Sector-related research, it was argued, should remain understandable as research of another kind, and if the Ministry of Education wanted to make the research they co-ordinate more exclusively researcher-controlled that must remain their own affair (Erngren et al 1998, Benner 2001: 183). In addition, several large trade union and employer organizations condemned *Research 2000* for what they saw as the proposed withdrawal of Swedish universities from their third undertaking. For them, *Research 2000* solely concerns itself with science policy to the unsupportable exclusion of technology and innovation policy (Duker et al 1999).

Despite this criticism, *Research 2000* experienced no immediate difficulty in achieving what it most desired: the creation of a new identity between the goals of autonomous Swedish science and the goals of government research policy.<sup>31</sup> Its success in this respect was also augmented

<sup>30</sup> English translation can not capture the rhetorical force of the statement in Swedish: 'Den fria forskningen är själva fundamentet i forskning och forskningspolitik'.

<sup>31</sup> As even *Research 2000*'s sternest critics expressed it: 'Who opposes free basic research? The only problem is if it is financed through the closing down of sector research ...' (Erngren et al 1998).

when, in March 2000, the new social democratic Minister of Education, Thomas Östros, was also appointed Minister of Research with the task of co-ordinating *all* government-financed research efforts. By this time, Östros had already devoted considerable energy to declaring his allegiance to the 'Erlander tradition' of science-government relations. In word perfect sync with the main tenets of this tradition, he has confirmed that:

With researcher-controlled free search for new knowledge follow the routines of organized scepticism so vital for democratic and cultural development. I also believe that free basic research plays an ever more crucial part in any long-term strategy for economic growth...With the rapid development of knowledge today it becomes ever harder to "pick winners". Thereby, basic research becomes ever more central for the transformation of Swedish industry into knowledge-based enterprises. It is very positive with a strong commitment from industry to research and development. But this makes it all the more important for government to focus on its primary responsibility – free basic research (Östros 2000).

Although, the government found it impossible to accept *Research 2000's* blanket condemnation of sector research, the report set in motion a reform process that has firmly reinstalled free basic research at the heavily fortified centre of Swedish research policy. To settle the new differences between the Ministry of Education and the Ministry of Industry, Employment and Communication that *Research 2000* had created, each Ministry commissioned new reports in an effort to work towards a jointly acceptable solution to the reorganization of government research policy. *Research 2000's* proposals had amounted to a total subordination of government technology policy to government science policy. Now, a measure of recognition was to be offered to the technology policy field, although still separated from, and downplayed in relation to, the main business of Swedish research policy: science policy.

The co-ordinator of the new report commissioned by the Ministry of Education was to be Hans Wigzell, Rector of the Karolinska Institute in Stockholm, and the Chief Scientific Advisor to the government. The report that resulted, *To Finance Research and Development* (Utbildningsdepartementet 1999) is characterized firstly by its proposal for the creation of a new 'federation' of Swedish research councils gathered together in a single body called simply The Swedish Research Council (Vetenskapsrådet). Within this new council there would be three confederated disciplinary councils (ämnesråd): one for the natural and technological sciences, one for medicine and one for the humanities and social sciences. The primary motivation for establishing a new federation of research councils is that this will ease the initiation and support of large-scale, and often transdisciplinary, research programmes (kraftsamlingar) in areas of special importance for Swedish science. These programmes will be long-term commitments typically financed together with other bodies, such as SSF and MISTRA. It is also argued that the new federation will bring greater flexibility to Swedish science enabling the effective recombination of research fields in response to global developments in science (Utbildningsdepartementet 1999: 34).

While *Research 2000* had simply proposed four new researcher-controlled research councils (for natural science, technology, medicine and the humanities/social sciences) with combined responsibilities for basic and applied research, the so-called Wigzellska report proposes, in addition to the new Swedish Research Council, three new 'area-oriented research authorities' as well. The latter are to remain sector-like in appearance, but in concession to *Research 2000's* line of argumentation, they are to be recognized as firmly dedicated to supporting researcher-controlled research (ibid: 8). This applies in particular to the two new authorities now in existence: the Swedish Council for Working Life and Social Research (FAS) and the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS). The third authority, however, which has come into being as the Swedish Agency for Innovations Systems (VINNOVA) after the Ministry of Industry, Employment and Communication's own evaluation of research requirements within its area of governance (Näringsdepartementet 1999), is already accepted in the Wigzellska report as more legitimately co-ordinating research jointly controlled by science and industry (Utbildningsdepartementet 1999: 65).

The continuities between *Research 2000* and the Wigzellska report are very strong when it comes to the issue of the quality control of research in Swedish knowledge society. It is stressed that those who judge research must have in principle 'the same or higher scientific competence than those who carry out the research...therefore, the scientific self-evaluation of science, "the peer-review system", remains of fundamental importance' (ibid: 32). In identical

fashion to *Research 2000*, the Wigzellska report frames its policy recommendations on the basis of a fundamental division between institutions supporting researcher-controlled research (forskningsstöd) and institutions participating in contract research (uppdragsforskning). While *Research 2000* argued that *no* research should come in-between these two purified worlds of science-controlled research and non-science controlled research, the Wigzellska report admits that between the two there exist many hybrid forms (mellanformer) in Sweden today (ibid: 8). However, no attempt is made to outline and further discuss these hybrid forms, and no advantage whatsoever is attached to their existence. They exist, legitimacy is no longer explicitly denied them as in *Research 2000*, but they still remain non-objects of policy.

Compensating for the invisibility of any policy relevant research between the two extremes of science-controlled research and straightforward contract research, the Wigzellska report argues, in line with *Research 2000*, the growing importance of both the competences and procedures of science-controlled research in the fields of its practical application (ibid: 32). The growth of knowledge society coincides with a growing subordination of technology to science. While the success of technology remains firstly determined by considerations of functionality and commercial viability it is also true today that:

Technical know-how demands an ever greater scientific know-how, and scientific methods have shown themselves effective within technological development work. The products and processes now built into our industrial products and public services are becoming ever more advanced, and dependent upon ever deeper scientific knowledge and experience. Therefore, those authorities financing technological development must acquire the competences, and adopt the working practices needed to meet this challenge (ibid: 32)

In other words, pure scientists have a legitimate and expanding role to play in Sweden today in evaluating and deciding over the allocation of resources to applied research and technological development work. The growing relevance of free basic research to the advance of Swedish knowledge society has resulted from its ability to remain faithful to its traditional ideals and fully in command of itself.

The new federation of Swedish science with the new Swedish Research Council as its centrepiece came into being of 1<sup>st</sup> January 2001. The government bill laying out the final outlines of the new federation bears the title *Research and Renewal* (Regeringens proposition 2000/01: 3), and yet it could just as well have been entitled *Research and Retrieval*. As Benner points out, it is a remarkable document for the introductory song of praise it delivers to the basic tenets of mid-twentieth century liberal research policy as enshrined in writings of individuals like Robert Merton, Michael Polanyi and Karl Popper (cf Benner 2001: 196). It is a document that, in more specifically Swedish terms, explicitly reties the band to Erlander in its unequivocal privileging of the role of free basic research in Swedish social and economic development:

The significance of research increases through the rapid development and globalization of science and society alike...Scientific research forms the very foundation for the development of knowledge in society. It is driven forward by the curiosity of scientific researchers, their desire to solve practical and theoretical problems alike, and the continuous testing and critical evaluation of existing knowledge and established truths (Regeringens proposition 2000/01: 3, section 4.1).

What does this triumph of neo-classic liberalism mean for the governance of Swedish knowledge society? It would seem that now, as in the 1950s, globally pervasive science and technology has been accepted as introducing a state of cultural emergency. Following in the Erlander tradition, biotechnology and information technology are cast as the keepers of Sweden's future, as atomic energy and industrial automation were so cast 50 years ago. Now as then, the force of global science and technology is seen as calling for an enlargement of the space of scientific action and initiative in Swedish society at the expense of the space of politics. Now as then, securing the survival of culture and society, is seen as requiring the acceptance of science and technology as legitimately coinciding with the continuation of politics by other means. Once again, free-standing Swedish science is being cast as the only reliable guardian of Swedish democracy; a role it can only continue to fulfil by remaining immune to democratization itself.

*The New Scientific Guardianship in Action*

Two illustrative examples can be provided of the currently expanding rule of guardianship and expert discretion over democracy and political discussion in the governance of Swedish knowledge society: the setting of ethical guidelines for Swedish stem-cell research at the end of 2001 and SSF's 'INGVAR' programme for the advancement of Swedish 'research leaders' initiated in 2000.

After President George W. Bush's televised address to the American nation on the 9<sup>th</sup> August 2001 concerning the future of federal funding to human stem-cell research, much attention has been paid to Sweden's strong engagement in the field. The gist of Bush's address was that federal funds would only be made available to those embryonic stem-cell lines already in existence and conforming to criteria established by the US National Institutes of Health (NIH). As it turned out, of the 64 cell lines the NIH identified, 24 of them were reputed to be in Sweden. This highlighting of Sweden's early prominence in the field came at a time when the domestic debate over the ethical implications of human stem-cell research was just getting underway. In April 2001, the leader of the Swedish Christian Democrats had raised the issue in Parliament and expressed his strong opposition to the use of human embryos for research purposes. He had also asked the Minister of Health and Social Affairs to make clear the ethical guidelines to apply in the Swedish case. At this time, however, the new Swedish Research Council was already fully-occupied formulating such guidelines in advance of more extended political discussions. The Swedish Medical Research Council had embarked on the preparation of guidelines as early as spring 2000 and had a proposal to put forward within the new confederated research council by June 2001. After this time it was considered desirable that their proposal 'be debated as widely as possible' before being officially adopted (Vetenskapsrådet 2002). It was also decided to expand the membership of the working group designing the guidelines so that representatives from the natural and technological sciences, as well as the social sciences and the humanities could be included. Thus, the guidelines would be able to be seen as the product of collective scientific opinion in Sweden, and not collective medical opinion alone.

The media debate on stem-cell research had been gaining in intensity since the beginning of 2001 and had become most visible in the pages of the leading daily newspaper *Dagens Nyheter*. The focus of controversy, however, was more the nature of the Christian Democrats' opposition to stem-cell research, than the nature of the research itself. The Chief Editor of *Dagens Nyheter* did not hesitate to identify himself as a champion of Swedish stem-cell research with the duty to draw comparisons between the inflexibility of the Christian Democrats in their position on this new research, and the historical inflexibility of the Swedish Centre Party in their sustained opposition to nuclear energy. Once again, the Swedish bourgeois parties were set to become hopelessly divided over science and technology thanks to one party's dogmatism (Bergström 2001a). The upshot of debate was that two days before the Swedish Research Council presented the final draft of its research guidelines, the leader of the Christian Democrats announced in *Dagens Nyheter* a reversal of his party's position on embryonic stem-cell research. Now such research was judged to be not only motivated, but also necessary in the search for cures for chronic diseases. The only remaining qualifications were that research on adult stem-cells should still be given priority and that ethical discussion should continue to accompany the development of research (Svensson 2001, see also Bergström 2001b<sup>32</sup> as well as commentary in Persson and Welin 2001: 31-32).

The Swedish Research Council announced its ethical guidelines for stem-cell research on 4<sup>th</sup> December 2001. Among its rulings, it is stated that the use of human embryos for research 'is permissible if there are no acceptable alternative ways to achieve corresponding results, and the project is judged necessary to advance research on stem cells'. Furthermore, it is judged that the creation of embryos through therapeutic cloning 'may be ethically defensible but cannot be allowed in the present legal situation' (Vetenskapsrådet 2001). The appearance of

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<sup>32</sup> Showing the support of the liberal press in Sweden for neo-classic liberal science policy, Bergström (2001b) commented the Christian Democrats' change of position on stem-cell research as follows: 'If politicians demand ethical reflection from the research community, the latter have reason to demand that politicians show respect for the character of research. The openness of science to unexpected connections and innovative methods, with the aim of winning new knowledge and new perspectives, is in direct contrast to the desire of politics to order everything into secure and established categories for decision. When politicians cast themselves into the heart of science, beyond financial and other framing issues, they typically behave like bulls in a china shop'.

these guidelines carrying the collective weight of Swedish scientific opinion, pre-empted and totally overshadowed the announcement of a further set of ethical guidelines six weeks later from the Swedish National Council on Medical Ethics (SMER), a body affiliated with the Ministry of Health and Social Affairs. SMER was established in 1985 to advise the government on ethical issues raised by advances in biomedicine. It encompasses representatives from all seven of the major political parties in Sweden; representatives from agencies and interest groups within the health sector, as well as experts from the fields of medicine, law and philosophy. Fortunately for the government, SMER's ethical guidelines more or less match those put forward by the Swedish Research Council, with the exception of a less positive view of therapeutic cloning. Comparing the manner in which the two sets of guidelines were received and publicized, however, the outcome was clearly a case of, as Welin (2001) puts it: 1-0 to the Swedish Research Council – a victory for a new and purer scientific guardianship of research ethics<sup>33</sup> over pre-existing arrangements emphasizing a form of democratic accountability.

On January 29<sup>th</sup> 2002, Thomas Östros together with the Minister for Health and Social Affairs published a statement in *Dagens Nyheter* expressing the positive attitude of the government towards therapeutic cloning in Sweden (Engqvist and Östros 2002). However, as the Swedish Research Council had rightly pointed out, the current legal situation did not permit its practice. The law from 1991 initially allowing research on embryonic stem-cells does not cover therapeutic cloning as it is formulated in order to advance research in the field of assisted reproduction. The major point with therapeutic cloning is that it should be seen as a technology apart from reproductive cloning making the introduction of new legal guidelines in Sweden an urgent requirement if research should proceed. The two ministers in their joint statement confirmed that the government would immediately initiate an investigation into the new legal measures required. Furthermore, in order to broaden public knowledge and stimulate debate around the issues at hand, the government had also decided to allocate 3 million crowns to the Swedish Research Council during 2002 to organize new public education initiatives dealing with the biosciences.

There is no clearer example in Sweden today of the will to maintain the 'Erlander tradition' of science and society relations as a living tradition than SSF's new INGVAR Programme initiated in January 2000. Ingvar stands for Individual Grants for the Advancement of Research Leaders and has coincided with prolonged selection process<sup>34</sup> leading to the appointment in April 2001 of 21 young 'Research Leaders of the Future' each receiving a grant of 10 million crowns over six years to enable them to build up their own internationally-recognized research groups (SSF 2002a). All 21 in the first consignment of 'Ingvars' are based at Swedish universities and research establishments; all are in their thirties, and 5 of them are women. They represent fields of research stretching across the natural and technological sciences and medicine, but with a strong emphasis on research in the fields of nanotechnology and biomedicine. Provided the funds are available, SSF intends to embark upon the selection of a second batch of 10 Ingvars during 2003 (SSF 2002b).

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<sup>33</sup> This victory was in fact a tainted victory, although no extended controversy has resulted from this. In connection with the Swedish Research Council's announcement on December 4<sup>th</sup> 2001, but not during the official press conference, it came to light that the appointed head of the working group formulating the ethical guidelines on stem-cell research – Madeleine Leijonhufvud, Professor in Criminal Law – had registered her reservations about the legitimacy of Research Council's actions in putting forward such guidelines. The strategy to make the guidelines into the product of collective scientific opinion in Sweden had partly failed as political and legal experts within the Swedish Research Council had taken it upon themselves to seriously question the sufficiency of legal rulings from 1991 for permitting the embryonic stem-cell research already taking place in Sweden. According to these experts, parliamentary debate followed by new legal measures was the preferable course of action, as had been opted for in the UK, before embryonic stem-cell research could be allowed to proceed at all in Sweden. However, as all the major political parties in Sweden, including now the Christian Democrats, had expressed their support for Swedish stem-cell research before December 4<sup>th</sup> 2001, the grounds for insisting upon further parliamentary debate could be seen as having fallen away. Therefore, Leijonhufvud's expert reservations concerning the extended powers of self-guidance being offered to Swedish medical research could be, and were, conveniently ignored. For further commentary on the Leijonhufvud incidence see Persson and Welin (2001: 33) and Leijonhufvud and Welin (2002).

<sup>34</sup> 504 applications for the grants were received. 115 were selected by SSF for international evaluation by at least two internationally chosen scientists and one Swedish 'strategic assessor'. Then 43 applicants were selected to submit comprehensive applications which were again assessed by foreign scientific experts. These remaining applicants were also invited to interview with the aim of assessing their 'leadership qualities, commitment and scientific and popular scientific communication skills'. The interviews were carried out by three researchers and three industry representatives. On the basis of the interviews and the written assessments, the final 21 'Research Leaders of the Future' were selected (SSF 2002a).

As well as a high level of scientific achievement each Ingvar is selected according to their possession of leadership qualities such as 'initiative, drive, organizational skills and the capacity to enthuse his or her colleagues' (SSF 2002a: 45). Each one, therefore, should be able to display the combined competences of SSF's first Executive Director Ingvar Lindgren, Professor of Physics at Chalmers University of Technology, and SSF's Chairman between 1997 and 2002, Ingvar Carlsson, the former Prime Minister of Sweden. Subsequent to selection, the first 21 Ingvars have been subject to continuous leadership training pursued in parallel with their main research activities. The co-ordinator of this training programme is another Professor of Physics at Chalmers, Bengt Kasemo. Each Ingvar has been supplied with their own individual leadership profile and subjected to a series of workshops where leaders from Swedish science, industry and government have been charged with opening discussions. Each Ingvar has also been allocated a personal 'mentor' to engage in joint activities and socialize with under specially arranged circumstances. Again these mentors are all prominent individuals in Swedish society and range from government ministers, to university rectors, to leading industrialists from Volvo and Ericsson. Special emphasis in the INGVAR Programme is placed on the media training of the research leaders of the future and their familiarization with the 'commercialization aspects' of contemporary research (SSF 2002b). With the promise they hold for rejuvenating the scientific leadership of Swedish knowledge society, Bengt Kasemo believes that the Ingvars will constitute a 'supremely interesting research object for the social sciences in ten to fifteen years time' (Kasemo quoted in Björnsson 2002).

### Summary and Conclusions

The Republic of Science is a Society of Explorers. Such a society strives towards an unknown future, which it believes to be accessible and worth achieving (Polanyi 1962: 67).

Thirteen years ago, Aant Elzinga (1990) depicted Swedish research policy as a long-standing triangle drama between Science, State and Industry with civil society typically left out in the cold. Already at this point, he could identify the new ingredient in this drama as the growing level of commercial expectation being placed on basic research. He traces the notion of strategic research back to the publication in 1984 of the book *Foresight in Science* by John Irvine and Ben Martin and maps its growing influence on Swedish policy discussions. The currency of notions like 'directed serendipity' led to a vision of the closer integration of Swedish science and industry working to the mutual advantage of both. Exercising his own technological foresight, Elzinga (1990: 58) prophesized that the new weakness of industry for science might also serve to empower science in the face of government. The new twist in the triangle drama during the 1990s might be that, as Swedish science furthers its hybridization with industry, it successively re-purifies its authority in government. In tribute to Elzinga's powers of prophecy, it can be argued, that this succinctly captures the pattern of development of Swedish knowledge society after 1991.

Neo-liberal research policy in Sweden between 1991 and 1994 made it once more only rightful and necessary to view science as an autonomous force in society. The new knowledge society was to be founded on the further liberation of scientific initiative and action allowing it to push back the walls of its traditional republic. Government was to re-orient itself to becoming the enabler of extended scientific initiative in society making its science policy into a policy of non-policy (i.e. non-interference in science unbound). The new strategic research foundations were the clearest expression of this policy of non-policy purposefully placing large amounts of quasi-public wage-earner funds into quasi-private scientific and technological hands. These funds were to be the adventure capital for a new free Society of Explorers poised to move beyond the traditional boundaries of their republic and prepared to view the whole of Swedish society as their house of experiment.

Although lionizing science and intent on enlarging its liberty, neo-liberal research policy was still understood by the traditional institutions of science in Sweden as posing a serious threat to their established standing in society. The neo-liberal invitation to treat the whole of society as their house of experiment was problematic for Swedish scientists in the way that it imagined them so easily equipped with an entrepreneurial side of self. The new paradigm of strategic science accompanying neo-liberal research policy saw scientific initiative effortlessly mutating itself into entrepreneurial initiative making it unproblematic for the new scientific leadership of

knowledge society to be founded upon an expanding marriage of old basic and new applied skills. For established scientific authority, however, strategic research was interpreted as a dangerous (if still, flattering) ideological concoction for the rapid dissolution of core scientific competences built up over decades and undergirding the development of Sweden as a modern industrial nation.

Swedish neo-liberalism, therefore, created both the conditions of possibility and, at least part<sup>35</sup> of, the felt need for neo-classic liberal research policy rising to dominance at the end of the 1990s, and culminating in the founding of the new Federation of Swedish Science in 2001. Bluntly put, Swedish neo-liberalism after 1991, launched science as the ideological substitute for democracy, re-envisaging Sweden as home to boundless scientific initiative, rather than progressive industrial democracy. Without this initial move it would hardly have been possible for traditional scientific authority to take such firm control over the design of Swedish research policy after 1997, championing a return to the science and society relations of the Erlander era; declaring these superior to all subsequent patterns of science and society relations. In effect, neo-classic liberal research policy has extended the substitution of science for democracy to the field of science policy itself, as *Research 2000* so perfectly illustrates. Building upon neo-liberalism's vision of Swedish knowledge society as the republic of science enlarged, neo-classic liberal research policy has aimed, and largely succeeded, at placing this republic in firm control of its own enlargement.

Neo-classic liberal research policy has secured its reign after first declaring a state of cultural emergency in Swedish knowledge society; a declaration most evident in the policy-relevant writings of Sverker Gustavsson. The new paradigm of strategic research was only one component in the state of cultural emergency Gustavsson and company identified; Gibbons et al's vision of Mode 2 knowledge production was another; and the current face of EU research policy yet another. All of these have been presented as constituting threats to the established strength and integrity of 'free basic research' (den fria grundforskningen) in Sweden which must remain understood as the only true foundation upon which Swedish knowledge society can be built. Free basic research (i.e. science-controlled science) is to be seen as having served as the life-blood of modern Swedish society and the external guardian of Swedish democracy from the time of Erlander onwards; a function it must continue to be allowed to perform even today in the context of the new knowledge society.

Science and society relations in the Erlander era also emerged out of a perceived state of cultural emergency; one underlain by highly invasive global science and technology making its presence felt in Sweden. During that state of emergency, the interests of the nation were considered best served if science be allowed to largely make science and technology policy. Today, with the rise to dominance of neo-classic liberal research policy after 1997, the same style of thinking applies. While the position at the centre of domestic science and politics is no longer held by atomic energy and industrial automation, but by biotechnology and information technology; the idea that domestic science and technology policy for these should largely be in the hands of the domestic scientists most closely concerned with them, is an idea very much back in currency. Something illustrated by the debate about ethical guidelines for stem-cell research in Sweden at the end of 2001.

The proceeding substitution of science for democracy in the governance of Swedish knowledge society explains why 're-thinking science' with Nowotny et al (2001) is an uninteresting thing to do in Sweden just now, even if Swedish money has opened up the opportunity for everyone to do so. In recent years, Swedish science has been much more concerned about exiting the Agora than entering it; freeing itself once more, in its own eyes, of dangerous political and commercial contamination. Forget the current European pre-occupation with socially responsible science and the democratization of expertise. In Sweden, Polanyi (1962: 67) still applies with a vengeance: 'Though scientific discoveries eventually diffuse into all people's thinking, the general public cannot participate in the milieu in which they are made'. Looking back to look forward, with the successful authors of reigning science and technology policy in Sweden, it took from the mid-1950s to 1969 for public confidence in

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<sup>35</sup> The other part of the felt need for neo-classic liberal research policy was clearly supplied by Carl Tham's recipe for the socialisation of science in Swedish knowledge society which was experienced by academic authority as just plain threatening without even the compensation of flattery.

the one-sided expert regulation of industrial automation to dramatically collapse, and a few years longer for the same to occur in relation to nuclear energy. How long will we have to wait this time? Exactly how large can the current democratic deficit in Swedish knowledge society grow before something snaps?

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