Science, Security and Sustainability
Global Interdependency, Diplomacy and Research Policy

Josephine Anne Stein, University of East London, UK

INTRODUCTION

Europe has never been so prosperous, so secure or so free. The violence of the first half of the 20th Century has given way to a period of peace and stability unprecedented in European history. The European Union has been central to this development. It has transformed the relations between our states, and the lives of our citizens……the European Union is inevitably a global player…..Europe should be ready to share in the responsibility for global security and in building a better world……A world seen as offering justice and opportunity for everyone will be more secure for the European Union and its citizens.

Javier Solana, adopted at the European Council in Brussels on 12 December 2003

The co-evolution of European political integration and European cooperation in research and technology has been one factor in the creation of both the prosperity and the security enjoyed by today's 25-member European Union (Stein, 2002). Just as economic performance can be linked to investment in innovation, post-War Europeanisation of innovation helped to achieve security in Europe through investment in cooperation. New partnerships, in the form of intra-European collaborations in S&T, did indeed transform relations, between communities of researchers, between universities, other research organisations and technology-based companies, and between the nations in which they were based. Sustainable development was understood implicitly as resting upon a combination of economic and social cooperation; science and technology policy co-existing and often relating to policies for regional and sectoral development.

European Community (EC) S&T policy initially focused on industrial sectors for which cooperation would bring mutual benefit to post-War Europe: the coal, steel and nuclear power industries. All three sectors were associated with warmaking capacities and the radical vision of cooperation between the former adversaries, of Jean Monnet and Robert Schuman, included scientific and technological cooperation from the outset. By the late 1960s, Europe was emerging from its post-war economic hardships, but across the Atlantic, in the USA, the economy was booming. A best-selling book, *Le défi américain* by Jean-Jacques Servan-Schreiber, highlighted the technological challenge Europe faced from American competition (Servan-Schreiber, 1968) and the "invasion" of Europe by American industry. This provided a powerful impetus for the development of European technological cooperation in the aerospace sector and in other industries.

At the start of the 1980s, the EC Commissioner for Industry, Etienne Davignon, spearheaded an initiative to support research and technological cooperation between Europe's main telecoms companies in Information and Communication Technologies (ICTs). Funding for research in ICTs dominated the Framework Programme set up in 1984 for the support of research and technological development, but substantial investment was put into manufacturing and materials technology, and into other sectors such as energy production. The Framework Programme became the primary vehicle for supporting European S&T cooperation, with other organisations, such as the European COST (Co-operation in Science and Technology), founded in 1971 with 19 member states, complemented the industrial focus of the EC's Framework Programme.

Over time, the priorities of the Framework Programme evolved to support more horizontal themes and areas not associated with specific industrial sectors: mobility of researchers, health and environmental research, economics and social science. Mechanisms to enhance European cohesion were established to support peripheral and economically disadvanted regions within the EC, implemented both through mainstream S&T cooperation programmes and through the Structural Funds supporting regional, social and agricultural development.

European Community S&T cooperation excluded military R&D according to Article 223 of the EEC Treaty, and until relatively recently it was not explicitly linked to technological aspects of security-related research. Cooperation in military technology development has occurred through intergovernmental agreements, and through small-scale programmes, but mainstream S&T cooperation in the EC/EU and in other organisations such as COST and Eureka, has been overwhelmingly civilian. It is the focus on industrial competitiveness, on social cohesion and the support of other *non-military* approaches to building security through the adoption of common projects that has achieved the outcome described in the Solana quote above. Extending this civilian, cooperative approach to the wider world in accordance with the vision and practices within Europe suggests a similar outcome: creation of greater prosperity worldwide and a global security based on sustainable approaches. This paper explores pragmatic strategies for more widespread S&T cooperation through existing international organisations, with an emphasis of those policies that have been tried and tested in the "European laboratory". First, however, the paper explores changing concepts of security and sustainability, and the role of international collaborative research in promoting both.

SECURITY AND SUSTAINABILITY

Traditional approaches to security-related research are associated with military operations: intelligence; development and deployment of weapons systems; command, control and communication; technological warfighting capacity; and similar approaches. The Cold War saw tremendous expansion in both American and Soviet investment in military R&D, and a nuclear arms race that did more to undermine global security than to promote it. The arms race not only consumed great amounts of finance, materials and human capital, it did so at the expense of the environment and social isolation (both within the countries engaging in it, through official secrecy and between the adversarial countries). Military doctrines predicated on pre-emption and high levels of alert were prone to accident and instability, in other words quite they created an environment that was politically and militarily unsustainable, and highly insecure.

Although the reasons for the collapse of the Soviet system are contested, there is no question that cooperation in science and technology played a role in building mutual confidence and security, even at the height of the Cold War. Thus, the Apollo-Soyuz dockings and the inclusion of Russia as a major partner in the International Space Station, and ironically US/Russian cooperation in such sensitive areas as measuring the yields of underground nuclear explosions, helped to overcome the destructive and dangerous dynamics of the nuclear arms race.

Europe too lives with the inheritance of a military industry and a military mindset as it was, particularly through NATO, in opposition to the Warsaw Pact during the Cold War. With moves towards a European Constitution in progress, despite the rejection in the spring of 2005 of the current draft by French and Dutch voters, European military industry has been seeking an industrial policy that would rationalise its R&D and production of military systems.

On 6 July 1998, the British, Italian, German, French, Swedish and Spanish governments signed a letter of intent indicating a commitment to greater European consolidation of military industry, two years later agreeing to measures designed to facilitate restructuring and other transnational corporate cooperation (Global Defence Review, 2001). Whether this six-country process is a precursor to a systematic industrial policy for the military industry at EU25 level is far from clear.

What is clear, however, is that the armaments industry and national governments are responding to changing economic and market conditions, and can be expected to seek an industrial policy as has been implemented at European level in other sectors since the European Coal and Steel Community was established in 1951. Cooperation in research and technology development would underpin the strategic business of the armaments industry, which is increasingly concerned with global marketing as opposed to the military defence of Europe against war and invasion, particularly since the integration of former Warsaw Pact countries into the EU.

Traditional approaches to military research and technology development based on the idea of territorial defence will become increasingly remote from the main security issues facing Europe. As internal borders in Europe have dissolved, obviating the need for national territorial defence within Europe, so too will the dissolving "boundaries of Europe" make territorial defence of the EU as a whole increasingly irrelevant. Policy towards the military industrial sector will inevitably be about encouraging the reorientation of resources towards areas where there is societal demand, either commercial or through public sector services.

The expertise and orientation of the armaments industry is not necessarily irrelevant to defence against threats. It is just that the threats have become internalised. As globalisation processes increasingly influence every aspect of our lives, from the socioeconomic impacts of the networked knowledge economy (Castells, 2000), to the influences associated with increased travel and migration, the challenge in industrialised countries has shifted from territorial protectionism (Huntington, 1993) to management of pluralistic societies in which "conflicts" arise locally from different economic, social and religious realities of people living in close proximity. According to Kamali (2005) racial discrimination is part of everyday life in the eight countries studied in the European *XENOPHOB* project. "We have created an internal colonialism with segregated areas for migrants….we also need to redefine what society means by concepts such as security, cohesion and globalisation".

As Europe's external borders become progressively more permeable to goods, people, capital, ideas and other elements intrinsic to the nation-state, traditional military approaches to territorial defence become less and less relevant to European security. Tragically, this has been demonstrated by the attacks on London on 7 July 2005.

To some extent, existing or derivative military technology will find applications in limited application in the control of smuggling of illegal goods, drugs and immigrants, but the perceived "growth area" is likely to be in the implementation of internal surveillance systems such as the introduction of biometric identification cards, and data mining activities, ostensibly as measures against "terrorism" (and secondarily to police eligibility for social security benefits and to combat organised crime). The effectiveness of these methods to increase security has not been demonstrated, whilst threats to privacy and civil liberties would increase, along with social inequalities associated with the institutionalised racism identified in the *XENOPHOB* project. It is thus possible that such state-sponsored surveillance would undermine social trust and *decrease* security. It is therefore important that appropriate assessment of security impacts be conducted at an early stage in the development of technologies that are traditionally associated with security, to ascertain whether they would serve or undermine the provision of genuine, societal security. This implies a need for the industry to consider how its business requirements may shift, including attention to conversion to areas that have previously not been associated with security.

The European experience of overcoming post-World War II hostilities has demonstrated the viability of an approach based on cooperation, innovation, economic convergence and social cohesion in creating security through stabilising, sustainable practices. Yet, European society, technologically advanced as it is, is subject to tremendous insecurities. From a sociological perspective (Beck, 1992), the greatest insecurities facing European society now derive less from external threats from hostile nations than from the byproducts of modernism: a "risk society" in which industrial environmental hazards, the vagaries of the labour market and the impacts of the information age threaten health, employment security, privacy and community, often in indirect and insidious ways. An approach to

building security through science should thus be directed at building healthy, sustainable communities, in the economic, social and environmental terms. This is, of course, precisely what European S&T cooperation policy set out to achieve.

EUROPEAN S&T COOPERATION: INSTRUMENTS AND PRACTICES

Implicit in the organisation of European S&T partnerships are a set of practices that reflect the structures and institutions of the EU itself (Stein & Ahmed, 2005). Transnationality and inclusivity are essential elements which both complement and reinforce the scientific and technological objectives of cooperative research; mutual recognition and distributed leadership and responsibility are used to reinforce European cohesion as knowledge and technology are collectively advanced. The combination of stability, balance and dynamism underpins the European model of international cooperation, exemplifying an approach to sustainable development that has wider applicability in the world at large.

The most striking thing about how S&T supports the European integration agenda is the extent and diversity of cooperation programmes, mechanisms, organisations and support schemes in place. It is then possible to discern patterns, common features and increasing coherence in how European S&T cooperation is organised and implemented (Stein, 2002, 2004). European S&T cooperation was aligned with scientific, political, economic and cultural dimensions of integration, with the underlying aim of competing economically with the USA (and later Japan and other technologically advanced countries). S&T cooperation was also used in support of integration and enlarging the European Union. The European Research Area (EC, 2000) is driving forward the integration process with new instruments designed to achieve greater coordination of research.

The ways in which European S&T cooperation is organised, and the achievements of the "European model" are described in detail by Stein & Ahmed (2005). This model has successfully dealt with organisational, scientific, legal, disciplinary, management, commercial, geographical, intellectual property, financial and human aspects of S&T partnership. It has achieved an overall penetration into S&T systems of all kinds within Europe such that scarcely any serious research organisation is unaffected by European partnership. It has demonstrated the efficacy of pooling capacity along with a commitment to both scientific and non-scientific objectives of European research, and has emplaced a distinctive working style based on collective decision-making and the distribution of research responsibility. Over time, the growing extent of shared experience and the emergence of European norms of collaboration have created a sustainable system for S&T partnership within the European ambit. It is a model that extends beyond European borders in several ways, as described below.

The objective laid out in the European Coal and Steel Treaty in 1951, to merge essential economic interests to create peaceful co-development in "a destiny henceforward shared" (EC, 1951), introduced technological cooperation. As Europe developed its cooperation in several spheres, including research, it succeeded in achieving prosperity and security,

"A DESTINY HENCEFORWARD SHARED"

Globalisation processes and interdependencies have extended the geographical basis for "shared destiny". European security now depends upon extending the regime it has itself so effectively applied internally to cooperation with external partners, including forms of S&T cooperation similar to those that helped to pave the way for the accession of ten new Member States in 2004.

It is a given contemporary reality of a world in transition that European cooperation in military R& will have to evolve to accommodate changing perceptions of security challenges. Much as "Our Common Future" (WCED, 1987) defined global interdependency in environmental terms, this paper takes the view that global security depends upon mutual investment in common projects. It builds upon prior work (Stein & Ahmed, 2005) seeking to position Europe in a leadership role in

implementing global cooperation in science, technology and innovation that will build prosperity along with security, in a sustainable fashion.

European international cooperation (INCO) policy for research and technological development is also in transition. Initially it brought together S&T cooperation policies that had been set up at different times for different purposes, often related to solving particular problems in developing countries, or to do with nuclear safety. With the publication of *the international dimension of the European Research Area* in 2001 (EC, 2001), EU research and technology policy became linked with foreign policy objectives for the first time. Actions in the 6th Framework Programme aimed to enlist "the scientific and technological resources of the EU and of third countries" to respond jointly to world problems such as food safety, environmental protection, health and diseases associated with poverty. While these priorities, like mainstream intra-European S&T cooperation policy, focus on civilian research and technology, they differ in one important way; rather than being tied to industrial competitiveness that was the *raison d'être* of the Framework Programme (SEA 1987), policy for INCO focused on largely *non-economic* objectives more typically associated with public sector responsibilities and services. There is precedent for global research cooperation in commercially-sensitive areas (the Intelligent Manufacturing Systems programme being one example), but the research priorities identified with foreign policy had a clear association with global security objectives – of the non-military kind.

Eureka was launched in 1985 as a European response to the American Strategic Defence Initiative (SDI) programme announced two years previously. The so-called "Star Wars" programme was perceived as less of a military/security project than a form of industrial policy designed to support technology with commercial potential as well as possible military application (Chabbal, 2000). Designed to complement the centralised organisation of the Framework Programme and more "upstream" pre-competitive collaboration, Eureka was oriented towards industrial innovation. But like the Framework Programme, Eureka was explicitly civilian. The European notion of security rested more upon economic performance than military technological adventurism of the "Star Wars" variety. And insofar as intra-European relations are concerned, it works.

The link between innovation and economic growth is well established, and if global disparities in wealth are contributors to the sorts of threats associated inequalities and imbalances in power, the European experience of linking cooperation in research and technological development with support from the Structural Funds provides another model for enhancing European, and global, security. The concepts of cohesion and security are related.

The "European experiment" has demonstrated the efficacy of pooling capacity along with a commitment to both scientific and non-scientific objectives whereby proposals can be fairly evaluated by peer review and evaluation of relevance to meeting specified objectives. Europe provides a tried and tested model for S&T partnership that manages organisational, scientific, legal, disciplinary, project management, commercial, geographical, intellectual property, financial and human aspects of collaboration, for the most part successfully (Stein & Ahmed, 2005). Evaluation of proposals with reference to existing foreign policy objectives already takes place; adjusting this to address security policy objectives is a natural extension to this.

Europe has shown that collective decision-making and the distribution of research responsibility are not only workable but help to build capacity and stability within distributed research communities. This experience is translatable to the wider world in the interests of building greater security worldwide. Just as European social science has identified ways to promote European economic development, cohesion and well-being, and developed this research into policy-relevant outcomes, further socio-economic research related to Europe's role in a globalising world could be useful for the design of realistic strategies and policies for European and global security. For example, there has been very little research on the amelioration of poverty, which may be one of the greatest causes of insecurity. The implications of the "Risk Society" have not received focused attention in terms of palliatives or innovations which directly address what some regard as the

greatest threat to security. Such research, focusing on global issues, would clearly benefit from partnership with researchers in other parts of the world.

European researchers will be quick to appreciate the need for genuine partnership with collaborative partners, but this style of cooperation is unfamiliar to most of the rest of the world, accustomed to more hierarchical, established and non-collaborative models. However, Europeans too need to overcome historical, traditional and resource-related patterns of "partnership" that do not adequately recognise the knowledge, capacity for innovation and valuable socio-cultural assets of non-European partners, particularly within the developing world.

SCIENCE, DIPLOMACY AND SUSTAINABILITY

The EU is already highly active in external relations. The Commission currently has a diplomatic presence in over 120 Delegations and Offices abroad, with a network of science counselors posted around the world[1]. It maintains liaisons with various S&T-related international organisations (such as the United Nations) or their agencies (such as UNESCO and the UN's Food and Agriculture Organization). There is an "External Relations" Directorate General, but the Directorates General for Development, Enlargement, Trade, and two covering aid are also active. The Commission's own self-perception is that it has achieved relatively good S&T relations with developing countries, in comparison with other parts of the world. If one were to make a full inventory of international S&T agreements, three types are most prominent[2].

Association Agreements with the three EU candidate countries, three EEA countries and with Israel and Switzerland. Associated countries contribute financially to the Framework Programme and are eligible to coordinate research consortia as well as to participate as partners.

Since 1997, **Cooperation Agreements** have been signed between the EU and sixteen countries: Argentina, Australia, Brazil, Canada, China, Chile, Egypt, India, Japan, Mexico, Morocco, Russia, South Africa, Tunisia, Ukraine and the United States.

EURATOM International Agreements are in place or under negotiation with countries using nuclear power for electricity and district heating. These include Argentina, Canada, Japan, Kazakhstan, Russia, Switzerland, Ukraine, the United States and Uzbekistan. The emphasis is on nuclear safety associated with power generation and use.

There is significant participation by non-EU countries in the mainstream consortia of the Framework Programme. Typically this participation is self-financed, but any non-EU research or international organisation may participate in the Framework Programme and receive EC funding if this is in conformance with Community objectives and its participation can be justified as essential to achieving those objectives. COST currently involves more than 80 organisations in 11 non-COST countries and international organisations.

As innovation processes globalise, one of Europe's underutilised resources is its own immigrant populations. As Europe has been a training ground for scientists and engineers from around the world, many have remained in Europe and are employed in all types of innovation-related activities, from university-based research to the venture capital market supporting high technology development. Diasporic networks connecting communities within Europe to colleagues around the world can be used to develop collaboration in security-related sectors such as sustainable development, and also links to national S&T policy systems around the world in a way that would stabilise global systems. One way to start would be to make specific efforts to enlist expatriate researchers in the design and implementation of policies for international S&T cooperation.

---

[1] Up-to-date information can be found at http://www.europa.eu.int/comm/external_relations/delegations/intro/index.htm

[2] Because the status of international agreements with Associated States and Third States is constantly changing, the reader is advised to consult http://www.cordis.lu/fp6/ and to follow links to "participation rules" for up-to-date information.

Expatriate researchers would be ideal collaborators to work with science diplomats; they would also be valuable contributors to international scientific advisory systems.

The United Nations (UN) provides an important framework for international scientific cooperation, especially through its agencies (UNESCO, FAO, UNIDO, IAEA, WHO etc.). Much of the UN's work is related to technical assistance and supports the renormalisation of international relations in a postcolonial world (Desai, 1997). Other primarily non-scientific organisations, such as the OECD, and especially through its Global Science Forum, are engaged with discussions between scientists, policy researchers and national representatives, through which further initiatives may emerge.

CONCLUSION

As borders dissolve with the emergence of a globalising political economy, and the tensions of colonialism have reached back into the developed world, conventional military and territorial approaches to security are becoming increasingly irrelevant. The European experience suggests that cooperation in science and technology offer the best prospects for developing a sustainable, prosperous and secure global future.

The world can build upon tried and tested mechanisms for international S&T cooperation developed over the past half century in Europe, and work through existing international institutions. Security will best be promoted by prioritising fields of scientific and technological research that address common economic, health, social, educational and environmental challenges: civilian approaches to promoting peace and stability. Employing diasporic resources and science diplomacy in creative ways can support these efforts. To echo the European Council quote with which this paper began, science will help to achieve global security and sustainability through collaboratively *"building a better world……A world seen as offering justice and opportunity for everyone"*.

REFERENCES

Beck, U. (1992) The Risk Society: Towards a new modernity, London: Sage.

Castells, M. (2000, 2nd ed.) The Rise of the Network Society, (Blackwell, UK)

Chabbal, R. (2000) 'Evolution and recent aspects of French and European policies for technology and innovation', Working Paper Series in European Studies, 3 (2) [online] Available from: http://uw-madison-ces.org/papers/chabbal.pdf [07/06/05]

Desai, P.N. (1997), Science, Technology and International Cooperation (Har-Anand, New Delhi).

EC, European Commission (2000), "Towards a European research area", COM/2000/6.

EC, European Commission (2001), "The International Dimension of the European Research Area", COM/2001/346 final.

European Communities (1987), Single European Act.

European Communities (1993), Treaty Establishing a European Union (Maastricht Treaty).

Global Defence Review (2001), "Consolidation Gives Europe Strength", [online] Available from: http://www.global-defence.com/2001/MSpart1.html accessed [01/06/05]

Huntington, S., (1993) The clash of civilizations, "Foreign Affairs", Vol. 72, No. 3, pp 22-49.

Kamali (2005) EU Research in Social Sciences and Humanities Newsletter, 27.1.2005, "XENOPHOB: Racism and xenophobia, the European dilemma" [online] Available from: http://europa.eu.int/comm/research/social-sciences/htm/newsletter/issue3/events_en.htm#3 [16/07/05]

Outlook on Science Policy (2002), "US agrees to re-join UNESCO", Vol. 24, No. 9, October 2002 (Beech Tree Publishing, Guildford).

Servan-Schreiber, J., (1968), The American Challenge (Le Défi Américain), (Hamish Hamilton, London). [English translation of 1967 original by Atheneum House].

Solana, J. (2003) "A secure Europe in a better world: European Security Strategy", adopted at the European Council in Brussels on 12 December.

Stein, J.A. (2004) "Is there a European Knowledge System?", in S. Borrás (editor), special issue of "Science and Public Policy" on a European System of Innovation, Vol. 31, No. 1, pp 435-447.

Stein, J.A. (2002) Science, technology and European foreign policy: European integration, global interaction,

Science and Public Policy", Vol. 29, No. 6, pp 463-477.
Stein, J.A. and A. Ahmed (2005), 'Global partnerships in science and technology: The European Union as a model of international cooperation' in A. Ahmed and D. Newton (eds) Global Partnerships for Sustainable Development: The Role of Academic Institutions and Societies in Achieving the Millennium Development Goals, London: Emerald.
World Commission on Environment and Development (WCED, "Brundtland Report, 1987). Our common future. Oxford: Oxford University Press.