
What Makes Us Secure in a Pluralistic World?

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Abstract

What is it that makes us secure in today's complex, dynamic, post-national and post-secular world? The 21st century is characterised by increasing global interdependency and insecurity brought about by a combination of features of the networked political economy and a 'collision of civilizations'. Insecurity emerges as much from societal changes related to scientific and technological developments as to human aggression associated with tensions of intersecting communities of different socio-economic levels and religious traditions. This chapter critically examines the European experience of S&T cooperation and how it contributes to security building, identifying research strategies, policies and instruments with which to enhance security within Europe and beyond.

Introduction

Whenever science and technology are mentioned in connection with security, the immediate presumption is that this concerns the development of technologies for new, more capable weapons for defence; arms control verification; and surveillance in support of the so-called 'war on terrorism'. There is certainly a role for research on technological means for reducing the threats posed by attacks from organised hostile forces, both external and internal. This is the traditional understanding of 'security'. However, when the question is inverted and focused on the causes of contemporary insecurity and ways to address these, a very different set of issues and approaches emerges. And the question arises: does the traditional approach to security-related R&D actually make us more secure?

This chapter identifies some of the principal threats to social and international security and analyses how science and technology can be enlisted to promote genuine security within and beyond territorial borders. The chapter takes European security as a case study, on the basis that the past

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six decades have seen a transformation from a war-torn continent to a Eurosphere of relative political and economic stability—although accompanied by a diminution of social capital and the implications of this for the erosion of internal European security. As such, it reviews and critiques the achievements and the organisation of European research and innovation policy, evaluating what approaches have proven successful in promoting European security, and the disjuncture with current ‘security’-based R&D priorities.

Having examined the European case, the chapter goes on to explore ways in which science and technology can contribute both to the understanding of security in human terms, and to suggesting practical approaches to promote security in a pluralistic world.

The greatest insecurities facing European society now derive less from external threats from hostile nations than from the by-products of modernism. We live in a ‘risk society’ in which the adverse effects of technological developments, from chemical pollutants in our food and the environment to damaging impacts of information technologies on living, working and social life, such as identity theft, damage the fabric of society. At the same time, managerialism and short-termism create damaging instabilities in democratic, employment and financial systems. Security is also threatened by the erosion of social cohesion and the ‘internalisation of colonialism’. Pluralistic societies have developed in Europe through complex patterns of migration, in which conflicts arise locally stemming from different economic, social and religious realities of diverse groups of people living in close proximity.

The chapter goes on to consider prospects for extending the successful elements of the European model. The proposals outlined derive from European Union (EU) experience of security building strategies based on cooperation, including in research, while critically appraising more recent moves towards the Europeanization of more traditional approaches to maintaining security associated with the nation state, such as military capacity and border control. The argument is made that such traditional approaches are increasingly irrelevant in an age in which the mobility of people, ideas, trade in both goods and services, finance and production have made territorial defence superfluous. And in some cases, these approaches, no matter how well intentioned, may be doing more to undermine security than to promote it.

Globalisation processes and interdependencies have extended the geographical basis for 'a destiny henceforward shared' that was the impetus behind the establishment of the European Community over half a century ago. European and indeed global 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 that have been demonstrably successful in building prosperity and harmony within the European Union. And security depends on different types of understanding, different scientific and socio-technical approaches in the context of our post-national, post-secular world.

European S&T cooperation as a security-building enterprise

Europe has never been so prosperous, so secure nor 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 27-member European Union (Stein 2002b). Just as economic performance can be linked to investment in innovation, post-War Europeanization 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 (Stein 2005).

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European Community S&T cooperation excluded military R&D by design in accordance with Article 223 of the 1957 Treaty of Rome. It was not until relatively recently that the EU explicitly integrated technological aspects of security-related research into the 7th Framework Programme. Prior to this, cooperation in military technology development has occurred through intergovernmental agreements, and through small-scale programmes such as EUCLID (European Cooperation for the Long-Term in Defence). However, mainstream S&T cooperation in the EC/EU and in other organisations such as COST (European Cooperation in the Field of Scientific and Technological Research) and Eureka, has been overwhelmingly non-military.

European research conducted under the Framework Programme, the EU's principle vehicle for supporting research and technological development, was so firmly civil in its orientation that the introduction of dual-use technologies in the late 1980's, such as aerospace research, generated controversy. An informal survey by the European Commission of dual-use technologies being supported through EC programmes led to the production of one very small folder containing a few papers. The commitment to European integration and development through peaceful cooperation was thoroughly internalised by the European Union and its institutions. It has been 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.

Eureka was launched in 1985 as a European response to the American Strategic Defense Initiative (SDI) programme announced two years previously. The so-called 'Star Wars' programme was perceived by many Europeans 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 in the USA (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.

European cooperation in military, dual-use and 'security' research

Until quite recently, the armaments industry, and the development of related science and technology, was predominantly a matter for sovereign Member States and for intergovernmental agreement independent of the EC/EU. Since the 1960s, there have been over two dozen cooperative weapons development programmes. Some, such as the Eurofighter, are now in service in all four cooperating countries; others are at an early stage of development. France has been the most active collaborator, followed by Germany and Italy, and the UK, but other European countries, even Luxembourg, have cooperated on military projects. EUCLID, set up in 1990 by the Western European Armaments Group (WEAG, since closed in 2005), supported over a hundred collaborative Research and Technology Projects, with an expenditure that reached as high as € 100 million / year (WEAG, 2005).

Once the Maastricht Treaty on European Union established the Common Foreign and Security Policy (CFSP) in 1992, military matters entered into the sphere of EU responsibility. This gradually led to an assessment of innovation in the European defence industry as an extension of policies to promote industrial competitiveness that had formed the basis for the Framework Programme. Thus, the orientation shifted—though using the discourse of 'security' in place of 'military' or 'defence':

security research at Community level will reinforce the competitiveness of the European security industry (EC 2005).

Such a statement would seem self-evident. But in order to unpack this statement for what it means for R&D, we first consider the traditional considerations surrounding security and industrial competitiveness, which have been closely associated with the armaments—now the 'security' industry.

The arms export market has been worth roughly £ 37 billion / year, with the USA holding roughly half of the market share (Norton-Taylor 2000). British military exports were worth roughly £ 7 billion in 1999, and France exported more than £ 4 billion. The European armaments industry is dependent upon exports for about 1/3 of their sales, competing mainly against the USA but also against manufacturers in other countries.

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Technology is a major selling factor, with capabilities of weapons systems on display through various marketing activities such as international arms fairs. For example, 77 delegations from 50 countries attended the Defence Systems and Equipment International exhibition in London in September 2007 (DSEi 2007, Facts and Figures).

A report commissioned by the UK Defence Manufacturers Association from Oxford Economic Forecasting (Economic Impact of UK Defence Exports), the value of British exports in 2002 was £ 4.1 billion, around 1.5% of total UK exports (Hartley 2002).

In both the USA and Europe, about 7% of the turnover from arms sales is spent on military R&D, although the structure of the financing differs, with about twice as much public finance being invested in the USA as in Europe. From 1998–2001, military R&D spending in France remained constant at about € 2.5 billion / year; combined British and German spending was about twice this amount, growing gradually in the UK and declining in Germany by comparable amounts. European military R&D spending as a whole has also not changed much over the past six years (Schmitt et al. 2005), and is expected to remain flat at around \$ 10 billion / year. In the USA, however, military R&D spending grew from about € 28 billion to over € 45 billion in 2001 (Thales, based on NATO data). The implication is that the USA may improve its competitive position with respect to arms exports by promoting the technological prowess of its weaponry.

Does competitiveness in arms sales result in greater security, not only in those countries importing weapons, but within Europe and the rest of the world? It goes beyond the scope of this chapter to assess the security implications of importing weapons for the recipient countries, beyond making a few observations. Firstly, so-called 'civil' wars (those within national boundaries) have become the predominant form of armed conflict over the past half century, and are not easily amenable to international controls. These civil wars create vast humanitarian problems that also resound in and demand responses from the international community. Conflicts amongst non-state actors spread across national boundaries with repercussions far beyond the region of origin. But there is an even more fundamental question about the role of military technology in respect of what it can achieve in terms of enhancing security.

Does military technology make us more secure?

Arms technology is transferable. In an age of globalising knowledge and increasing researcher mobility, the idea of keeping scientific and technological secrets is increasingly futile. Knowledge transfer no longer occurs simply through physical mobility; the increasing use of educational franchising, distance learning and internet-based conferences and publication has become a feature of the 'globalising learning economy' (Borrás & Lundvall 1999). So many military systems depend upon the use of technology developed commercially that controls on knowledge with military application would be nearly impossible. Even research in areas like cryptography, for which there are economically significant applications in banking and finance, may be ahead of military research, because private R&D can be more flexible, more innovative and better organised (Smith & Udis 2001). And even remotely piloted vehicles developed for crop spraying may be more sophisticated technologically than those developed for military reconnaissance or warhead delivery.

Protecting the secrecy of test results and data is certainly possible, so that details of weapons capabilities, for example, can be kept secret. However, when so much armaments production is for export, and one main selling point is technological capability, it is counterproductive to withhold information on weapons capabilities. Determined adversaries can relatively easily ascertain the scientific and technological aspects of weapons systems, and given adequate resources can reproduce them even without going to the trouble of reverse engineering. But terrorism can employ household chemicals and simple techniques, and thus maintaining technological secrecy would seem as irrelevant as it would be ineffective, if not counterproductive. Just as it is said that publicity is the oxygen of terrorists, highlighting the dangers of readily-accessible technologies may be the best way to encourage their use by organised hostile forces.

Moreover, many technologies relevant to military applications are developed by multinational companies and diffuse around the world without reference to national boundaries, export controls or security policies. According to JP Contzen (quoted in Gummett & Stein 1997), 'most of the

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demands of the military market could be met by using civilian driven technological developments provided the pull from the civilian market is sufficiently ambitious and demanding’.

Exercising restraint through attempts to control the flow of such knowledge is seemingly impossible. The alternative strategy, of international cooperation in security-related science and technology, would seem to be far more effective than the attempted imposition of controls.

Furthermore, the impact of arms exports on global security is highly contentious, with military, political and economic considerations sometimes very difficult to decouple. From a European perspective, comparisons on military and social expenditure (World Council of Churches 2005) in arms importing countries (often very poor countries suffering from extreme economic hardship and internal conflict) would be a useful indicator with which to assess the relative merits of R&D expenditure on military vs. non-military contributors to security. European security derives from cooperation and its focus on non-military solutions to common problems. Why should this be any different for other regions of the world?

A stronger European role for military R&D might improve the competitive position of the European armaments industry, but would it actually improve European security? And given the permeability of territorial boundaries, not only to the mobility of people and goods, but of ideas, diasporic communities, finance, and global systems of all kinds, what are the implications for world security in the 21st century?

Shifting from military to security research and development

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.

In a changing security environment, it is therefore important to anticipate the types of research that are orientated not just towards traditional military requirements, but towards 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.

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 the management of a 'declining' industry, through support mechanisms, such as the KONVER programme, to reorient 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 many of the most serious threats to our security have become internalised, and many are conceptually different from the threats of international war and conflicts of the past. 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 'Clash of Civilisation' 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.

The coordinator of the EU XENOPHOB project, Professor Masoud Kamali, of Sweden's Uppsala University, reported in January 2005 that their research left no doubt that racial discrimination is part of everyday life in the eight countries studied. 'Europe has a dilemma. Its philosophy of enlightenment is embedded in racism (...) 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' (EU 2005).

Terrorism does constitute an appreciable threat which is not unrelated to the dissolution of national boundaries. Tragically, this has been demonstrated by the attacks on London on 7 July 2005, just as the 9/11 attacks on

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targets in the USA in 2001 brought home borderless realities of terrorist organisation and action. However, the actual threat posed by terrorism needs to be kept in perspective, lest the fear provoked by both terrorists and responses to it prove more damaging than the threat itself. For years, Londoners have endured bomb attacks by Christian terrorists (Irish republicans), and have learned to take this in stride without a backlash against Christianity. Tolerance, understanding and forgiveness would appear to be a more effective response to terrorism than the sorts of provocative actions being taken with respect to Islam in the name of countering Muslim extremism. Where is the research on the causes of terrorism and how to address them with practical and non-provocative solutions?

There is more to security than protecting national boundaries, and more and different threats exist than terrorism. So far, the changing conceptualisation of technologies for 'security' has been largely defined by the industry itself, as it seeks to find markets in this new, post-Cold War, post-national environment.

To some extent, existing or derivative military technology will find applications in limited application in counter-terrorism, and 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 policing eligibility for social security benefits and combating 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 (Lyon 2001). 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.

Rethinking 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 by-products 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 economic, social and environmental terms. This is, of course, precisely what European S&T cooperation policy set out to achieve.

In addition to these risks, financial insecurity is rife. The UK financial services industry in the early 1990s provides one illustration of how the collapse of banks (BCCI in 1990 and Barings in 1993), systematic mis-selling of endowment mortgages uncovered in 1995, the bankruptcy of the Maxwell corporate pension schemes and the collapse of Lloyds of London's insurance syndicates, along with the exit from the European Exchange Rate Mechanism in 1992, were hugely damaging to investors and taxpayers alike, as well as damaging business confidence in 'The City' as an important British industry. The impoverishment of European citizens due to these incidents may well have considerably exceeded overall losses from credit card fraud, identity theft and other forms of individual financial crime; the losses certainly exceeded those due plunder by invading armies. Similar impacts have been felt in cases such as the collapse of Enron in the USA in 2004.

Not that financial markets in Europe are isolated from instability and impropriety in places like the Far East, North America and Latin America; it is just that the people, and even the institutions involved, need not cross borders to wreak economic havoc within Europe. It would

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appear that technologies for *commercial* surveillance, including of the globalised financial markets, would be far more important to enhancing European security than those directed at citizen surveillance.

Certain categories of surveillance and intelligence do provide legitimate bases for early warning of threats and are vital to military operations, as they are for verifying compliance with arms control treaties, and for monitoring non-military threats such as environmental conditions. To the extent that intelligence falls under international control, it can be used to build confidence and security. There is likely to be, therefore, a close link between cooperation in military intelligence technology and political cooperation in sharing operationally significant data.

The internationalisation of military intelligence R&D may most naturally be orientated towards bilateral EU/US cooperation, but participation by other countries such as Australia (which hosts important intelligence-gathering facilities in Alice Springs) could be accommodated fairly easily on the basis of existing cooperation with the USA. The expansion of participation to other countries could be used as an instrument of security building, and could be of global significance if organised in cooperation with the United Nations, which currently maintains a global arms register.

But the most important transition needed is a reconceptualisation of security that identifies the most important threats in today's world, and integrates the main lessons of existing successful models for security building. Can the European model, which has been so successful in using non-military S&T cooperation as an instrument to build collective prosperity and security, accommodate a more explicit focus on security without the pitfalls associated with traditional and mainstream thinking?

European security policy and S&T

Is European security policy an industrial policy focusing on making military industry more competitive in the global armaments market, or a policy to enhance security for the citizens of Europe? It is, of course, both. This has implications for the organisation and trajectory of S&T policy over the next decade as part of a transition to prioritising international cooperation in S&T for global-scale community building and global security.

As we have argued above, the security needs of the future will involve consolidating and rationalising military R&D for a declining armaments industry while supporting a transition within the industry and in others to support emerging concepts of security based largely on those that were effective in building security through European integration. In the first instance, this has meant focusing on existing and derivative applications of military technology.

In the initial phase of constructing a 'Security and Space' theme within the 7th Framework Programme, the consultative process was conducted largely within those industries and communities associated with the development of armaments and military systems (Altman et al. 2006). Thus, it is not surprising that the priorities identified as part of the proposed FP7 (2007–2013, COM (2005) 119 final) reflect the interests of the military industrial sector:

- Protection against terrorism and crime
- Security of infrastructures and utilities (e.g. transport, energy, ICT)
- Border security
- Restoring security in case of crisis (emergency management)

and within the subcategory of space, the development of a Global Monitoring for Environment and Security (GMES) activity.

Three of the four priorities of the security subcategory are already orientated towards security *within* Europe as opposed to more traditional territorial defence, which focuses on border control. Furthermore, GMES incorporates environmental security. Thus, the seeds of flexibility with which to reorient S&T priorities for European security towards non-military applications are already present.

The cross-cutting themes within the security subcategory are:

- Security Systems Integration and interoperability
- Security and society
- Security Research Co-ordination and structuring

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of which 'Security and society' has the potential for identifying 'mission orientated research' based on citizens' perception of security-related needs, e.g. technologies for crime prevention, detection and prosecution; for safeguarding privacy and civil liberties; and research on ethics.

The inclusion of socio-economic analyses and scenario building offers the prospect of orienting European security-related research to the concerns of its citizens, which, as argued above, are more likely to reflect 'risk society' conditions than military or terrorist threats. To ensure that the definition of security challenges and responses to them are not dominated by the discourse of traditional territorial defence, it will be important to involve social science disciplines such as sociology, anthropology, law, human sciences, economics, organisational theory, psychology, political theory, business studies and other areas to investigate and to analyse how risks and security are perceived. To translate this into an agenda for S&T to ameliorate risk, research can draw upon fields such as science, technology and society; public health; innovation studies; and science policy.

Other priority areas of S&T relevant to European security enhancement could be identified within other parts of the Framework Programme. Biotechnology poses a range of new threats and opportunities that need careful assessment and application within an extremely diverse research environment globally, to include the developing as well as the developed world. Security related themes could be associated with fields such as epidemiology, public health education, and pharmaceuticals research, HIV/AIDS being one example of how a global pandemic threatening to Europe can be addressed through these fields of research working in partnership with other countries and international organisations such as the World Health Organization.

The Global Monitoring for Environment and Security (GMES) activity provides a platform for space technology focusing on satellite systems for global navigation and remote sensing, relevant for both military and non-military use.

The theme 'Security Research Co-ordination and structuring' provides an approach for observing developments related to all aspects of science, technology and security, and the structures by which it is organised. It has the prospect of taking the ideas presented in this chapter into account to promote genuine security for all.

S&T for global security building: Building on European experience

There are three principal means by which Europe could engage with emerging technologies and new ways of thinking about approaches to enhancing global security.

The first concerns the integration of scientific and technological advice into the development of international agreements. This would systematise the inclusion of scientific and technological advice to European representatives responsible for negotiating treaties and other governance structures related to security, directly and indirectly. Closely associated with this approach would be the development of European and global S&T advisory structures focusing on strategies to address global security concerns informed by new and emerging areas of research.

The second approach is to apply strategy that was demonstrably successful in promoting security within post-War Europe to the wider international arena through systematic cooperation, taking the broadest possible view of the relationship between non-military S&T cooperation, diplomacy and security. This could be done by making greater use of instruments for international cooperation in S&T that are already in place, as described below.

The thirdly and perhaps most importantly would be to support and conduct research specifically on security and insecurity—but not from the starting point that derives from the military / territorial approach and seeks derivative applications for the products of the ‘security’ industry and greater ‘competitiveness’ for the armaments sector. This would require a radical and creative inversion of thinking about the nature and promotion of genuine security through research addressing wide-ranging security-related issues.

Science, technology and international diplomacy

Globalisation has progressed to such an extent that it is no longer possible for national policymakers to ignore the domestic impacts of decisions taken elsewhere, whether by other countries, supranational entities such as the European Union or by multinational corporations. S&T-based public

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issues such as controlling the spread of AIDS and other infectious diseases, trade in biotechnological products, the impacts of information technology systems on world financial markets, and climate change span the globe. It has become important to consider how S&T expertise could become more systematically embedded into the negotiation of international agreements to address global problems, including through research itself. Security, as the European example has demonstrated, is achieved through cooperation on common problems.

Foreign policy has traditionally been the province of professional diplomats and driven by economic and political forces, yet scientific and technological issues have always had relevance to international relations. The diplomatic landscape is littered with scientific cooperation agreements, some painstakingly negotiated in order to enable research that could not have been done otherwise; others mere expressions of international goodwill. At the same time, international agreements, whether on trade, the environment or on research cooperation itself, concern issues that are intrinsically bound up with the state of scientific and / or technological knowledge. Yet the scientific and diplomatic professions are today still structured differently, around scientific rationality and the universalism of Mertonian science in the case of the former, in contrast to human-centred notions of history, identity and nationalism which underpin international diplomacy (Stein 2002a).

If the lessons of European cooperation are to be realised on a global scale, this will require new approaches to integrating science, technology and diplomacy. New approaches to public policy, and especially new, more flexible forms of multilateral cooperation and effective expert advisory systems, would help to address the complex challenges confronting the world community. The ultimate objectives of prosperity and security can be supported through international cooperation in S&T areas from archaeology, bioengineering, chemistry and dentistry to zoology, as well as through intelligent, appropriate cooperation in more mainstream security research to reduce the real threats posed by aggression and crime, both individual and organised.

Extending European S&T cooperation worldwide

There are a full range of instruments for research and technological development (RTD) cooperation that have been developed and refined within Europe. Most provide for international cooperation through European collaborative programmes and projects, although a few, for example in the nuclear research area, have been fully coordinated internationally for decades.

Many of these European RTD instruments can be extended to wider cooperation for security building, either by incorporating non-European partners into European schemes or through targeted cooperation between the EU and specific countries, other world regions, multilateral schemes and global organisations such as the United Nations and its S&T-related agencies (Stein 2005; Stein & Ahmed 2007). The European experience of Community support for RTD has benefited from strategic approaches to both rationalisation and pluralism in both sectorial and disciplinary aspects of science, technology and innovation.

The 'International Dimension of the ERA' document (EC 2001) specifies various technologies that are priorities for cooperation with Mediterranean and Western Balkan countries as part of the 6th Framework Programme. There is specific reference to the promotion of co-development for greater 'stability, prosperity and security', and there is an implied need for technology transfer. Priority areas include 'integrated management of water, agriculture and the agro-food industry, health and environmental protection, seismology, energy and transport, preservation of the cultural heritage, the digital divide'. These are consistent with the types of security-building activities identified earlier in this chapter, related not only to public service delivery but to infrastructure and the agri-food industry, where social and economic benefits can be realised directly and indirectly.

Perhaps most interestingly, two measures are specifically aimed at social challenges. Preservation of cultural heritage is vitally important to upholding the value and dignity of a nation. The prioritisation of such action thus directly addresses issues of mutual respect that can be particularly important when building trust and good relations between the predominantly Christian European nations, the Muslim nations of North Africa and the Middle East, and the predominantly Jewish state of Israel.

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The inclusion of seismology acknowledges the importance of this field for Turkey, which suffered a disastrous earthquake in 1999. It would seem sensible to extend this recognition to cooperation in civil engineering, including housing and infrastructure.

EU cooperation with certain neighbouring countries is further developed and formalised through Association Agreements. In FP6, such agreements have been concluded by memoranda of understanding with three candidate countries (Bulgaria, Romania and Turkey, of which the first two countries acceded to the European Union on 1 January 2007, while 'open-ended' negotiations on accession are expected to continue with Turkey for a decade or more), through the European Economic Area (Iceland, Liechtenstein and Norway), and by specific agreements with Israel and Switzerland. This form of cooperation also links the EU with countries in other parts of the world.

The 'International Dimension of the ERA' (EC 2001) specified research priorities for cooperation with Russia and the Newly Independent States: these are 'to stabilise the research capacities of these countries, with particular attention to conversion of military research to civil applications, and cooperation on problems such as 'non-proliferation, health and environmental safety related to industrial change, including nuclear safety and energy issues'. These relate more closely to technologies that are related to traditional notions of security and derived from military technology than EU policies towards S&T cooperation with any other geographical area.

It would seem appropriate to develop existing S&T cooperation between the EU and its neighbours that support identified foreign policies; all are conceived with European security in mind. Such cooperation should be evaluated at appropriate intervals, in order to allow successful developments to flourish and to identify new needs, either institutional, instrumental or thematic.

Developing research on what makes us secure in a pluralistic world

When considering 'What makes us secure?' it quickly becomes apparent that this question is under-researched. There is tremendous scope for bringing together insights from research in education, psychology, law,

anthropology, business studies, history and the humanities, cultural studies, sociology and even theology if we are to understand the basis for genuine human security.

There will be under-developed areas of research relevant to security in Europe which may not yet be under way at the national level. So, unlike Networks of Excellence and other instruments which draw together existing research, there will be opportunities for research in new areas relevant to enhancing security in Europe. These might include, for example, the ways in which social and ethical values influence the development of institutionalised and legalised frameworks for international S&T cooperation; the relationships between social cohesion and security, focusing on areas such as the role of gender, digital divides and other social imbalances; the amelioration of poverty within Europe and globally; research on techniques for conflict prevention and security building; sustainable development; inter-faith relations; migration; and the achievement of stability in a globally networked economy.

There *is* relevant research being done, but it is fragmented and has not been recognised as having application beyond very narrow, compartmentalised areas. Human aggression may be studied by educational psychologists investigating childhood bullying; research into human rights draws heavily upon legal structures and traditions; studies of minority businesses may illustrate how different ethnic, cultural and religious values can allow certain types of companies to flourish; research on computer ethics may provide insights into strategies for protection from misuses such as cyber-stalking and identity theft; ecology and systems dynamics research can be applied to the study of social, financial and environmental sustainability. All contribute to understanding aspects of human security and could be enlisted to develop new ways to promote security. If civilisations are in collision, what common projects might be undertaken jointly through which combinations of knowledge achieve solutions while also promoting better mutual understanding and the reduction of tensions that lead to conflict? All that is required is a re-conceptualisation and a reorientation of thinking about what security *really* means in the 21st century. Once this is recognised, the approach that has been demonstrably successful in Europe can be applied more widely.

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And in addition to the European instruments mentioned above, there are certain institutions and avenues available through which such initiatives may take shape. 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. Further possibilities might be developed through other world institutions, such as multinational business having an interest in the health of the world for business and / or philanthropic reasons (Microsoft and the Bill and Melinda Gates Foundation are one such example). Perhaps most challenging of all, world religious organisations and secular movements which support social cohesion and peaceful coexistence could develop new social, theological and inter-faith projects which seek to address some of the most fundamental causes of human conflict in today's world.

Conclusion

The question of what makes us secure in a pluralistic world is complex. The traditional notion of security, which rests upon national, territorial and even tribal conceptualisations of defence from external aggression, is no longer applicable to a borderless, post-national and post-secular world. Notions of security that are derivative of the traditional view do encompass certain real threats from organised aggression such as terrorism, organised crime and fraud, but do not address those elements that most seriously threaten contemporary society, including the 'risk society' and adverse by-products of technological modernism as a socio-technical system.

The European experience has demonstrated that it is cooperation across national boundaries that builds both prosperity and security, including S&T cooperation which has been predominantly non-military in character or application. Thus when considering 'security' research as part of the 7th Framework Programme, caution is urged in assessing the

true security impacts of those types of industry-led research and technology projects, such as surveillance, that could act as a double-edged sword. Rather, international cooperation should not only remain focused on non-military objectives within Europe, but the formula that has been demonstrably effective within Europe should be extended to the rest of the world. This can be done by expanding the geographical scope of European instruments for international S&T cooperation, and it can be done by working with existing global organisations such as the United Nations and the OECD.

More importantly, the content of research related to security needs to be radically rethought, such that insights from anthropology, law, sociology, education, psychology, management science, theology and other social sciences which could contribute to better understanding of what makes us secure, in addition to the contributions from the physical and biological sciences, technology, engineering and medicine. This undertaking should be undertaken at all levels, within disciplines, across disciplines, and institutionally, nationally and internationally, stimulating interchanges not only amongst the scientific and educational spheres, but with the worlds of diplomacy, religion, business and commerce.

We know from the successful European experience of post-war cooperation that non-military, 'civil' science and technology contributes to greater security. Extending this civilian, cooperative approach to both the fragmented research disciplines and institutions, and the wider world, in accordance with the vision and practices within Europe suggests a similar outcome: creation of greater prosperity worldwide along with global security.

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