

**European Integration and National Governance: A Comparative Analysis of the
Implementation of EU Regulatory Policy on Medical Devices**

**Preliminary Report
(Only published sources are footnoted here)**

by

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Introduction

Regulatory integration is a central aspect of European integration. Yet the debate about a “European regulatory state.” (Majone 1996, 1992; McGowan and Wallace, 1996; Begg, 1996; and Wilks, 1996) largely avoids a fundamental question: who in this emerging “European regulatory state” *translates the intent of EU decisions into action*? Who disposes of the capacities—organizational, professional, financial, information and communication--necessary for implementing EU regulatory policy? While recent research on the role of European agencies begins to address this issue at the European level (Shapiro 1997; Majone 1997; Dehousse 1997; Kreher 1997; McGowan and Wallace 1996), the findings are often specific to the policy sector (Héritier et al. 1996; American Institute of Contemporary German Studies 1997; Vogel 1997). The following research contributes empirical information to this debate through a detailed discussion of one policy sector—medical devices.

Unlike the creation of the European Agency for the Evaluation of Medicinal Products in London in 1995, which is modeled on the independent regulatory agencies in the U.S. (Shapiro 1997; Majone 1996), there is no European body in the medical devices field. France made strong political demands for the creation of a European Agency for Medical Devices from 1997 to 1998 but faced strong opposition by other member states, which did not embrace this idea any more than European industry.

In previous decades, to the extent that medical devices were regulated in a few European countries, they were embedded in a “set of principles, norms, rules and decision-making procedures around which actors’ expectations converge in a given issue-area” (Krasner 1983) specific to the regulatory regime for pharmaceutical drugs based on compliance with the European Pharmacopeia (Pharm). Routine activities, routine interactions and mutual dependence of the participants formed around the regulatory regime specific to pharmaceuticals, with state institutions playing an important role as regulators.

If the creation of a “European regulatory state” is based on a market-oriented philosophy, it has brought to the fore a critical issue concerning the nature of rules and where they are applied. This controversy is splitting observers and the academic communities into those who argue that the “competition of rules” matters, irrespective of context, and those who argue that

such a position is untenable because rules always are applied in a specific institutional context such as a close connection between the market and government (Bogason 1991; Wilks 1996:539).

Starting in the early 1980s, European and national policymakers began to feel pressures from global actors and from the scientific community(ies) for developing a European regulatory regime specific for medical devices in order to trade across borders more effectively. Over the course of a lengthy period of more than ten years, health protection concerns gradually became more important. In opting for home country control rather than a European agency, they assigned an important role to domestic implementing agents for carrying out all operational responsibilities. They also created new regulatory tasks for application in both the pre-market and post-market phases. One would assume that, as a result of this, existing channels of implementation in each country shifted in favor of the private sector.

On June 14, 1998, the new European regulatory regime became mandatory, ending the diversity of national rules and eliminating the extra cost and uncertainty associated with them. All medical devices now have to comply with European law and medical products have to bear the CE-mark to connote compliance with European law. By that time, all 15 EU countries had transposed the directives. Most had also issued the necessary administrative provisions, reorganized responsibilities for medical devices to the extent required by EU regulatory policy, and, in several instances, reassigned operational responsibilities from one organization to another. Through the fairly expeditious transposition of these EU directives, a few countries-- mostly the leaders in regulating medical devices in the past-- built European leadership in medical device regulation by writing crucial components of their previous regulatory routines into European law, Commission guidelines and other guidance documents. Although uniform accreditation and certification has replaced most national rules, the mix of EU and national practices remains daunting.

In summary, the new regime has a considerable reach. Beyond the single market of the fifteen, all remaining EFTA countries follow the new EU regulatory regime. The five candidate countries in Central Europe are being asked in the on-going accession negotiations to prepare legislation to bring them into compliance with EU directives. After the next enlargement, if and

when it occurs, the EU regime will extend to another five Eastern European countries. In the future all European countries will follow the EU initiated regulatory approach, which will co-exist with that prevailing in the United States. Before discussing the analytical framework pursued by this research in the next section, it is important to provide an explanation of the meaning of medical devices.

What is a *medical device*?

Noting the EU frame of reference, medical devices are products which are neither medicines, nor blood products, nor cell tissues, nor organs, nor cosmetic products. The Medical Devices Directive (as amended by the IVD Directive 98/79/EEC of 7 December 1998), which provides the overall legal architecture for the remaining directives, defines a medical device as: "Any instrument, apparatus, appliance, material or other article, whether used alone or in combination, including the software necessary for its proper application intended by the manufacturer to be used on human beings for the purpose of

- diagnosis, prevention, monitoring, treatment or alleviation of disease;
 - diagnosis, monitoring, treatment, alleviation or compensation for an injury or handicap;
 - investigation, replacement or modification of the anatomy or of a physiological process;
 - control of conception,
- and which does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means" (MDD) (Commission 1999).

According to Commission guidelines, which reflect a high consensus among the major parties --national authorities and regulators, notified bodies, scientists and company experts--, *the principal intended action* by the manufacturer is crucial in the definition of medical devices based on two items: (a) a manufacturer's labeling and claims and (b) scientific data regarding mechanisms of action. The principal intended purpose of a medical device is defined this way:

"Typically the medical device function is fulfilled by physical means (including mechanical action, physical barrier, replacement of or support to organs or body functions,....).

In contrast,

"The action of a medicinal product is generally achieved by pharmacological, immunological means or by metabolism."

A medical device for drug delivery--e.g. a drug delivery pump, an implantable infusion pump, a nebulizer, a syringe or jet injector--is considered a medical device (article 1 (3) MDD), while the medicinal substance which the device is intended to deliver must be approved as a medicinal product. (European Commission 1999).¹

In-vitro diagnostic devices are a subgroup of medical devices. As laboratory testing products, they are vital to prevent, diagnose, treat and monitor disease. Primary users of IVD

products (reagents, kits, instruments, and equipment for medical laboratories) are professionals and laboratory technicians. But the directive also covers devices for self-testing used by patients and consumers. In addition, the directive covers control materials and calibrators intended for use in combination with the reagents and equipment mentioned above. The directive excludes devices, in particular reagents, produced primarily by hospital laboratories for their own use.

These illustrations highlight the nature, range and complexity of substantive issues raised when making decisions on regulatory policy and implementation (Gruting 1994). It is almost impossible to distinguish among *substantive, process* and *product regulation*. The lines are blurred in important ways. For example, in theory, the EU has no authority over the regulation of clinical practice standards, professional training and requirements for specialty licensing of users of medical devices in patient care and scientific medicine. These issues are of concern to an array of professions—medical specialists, engineers, biologists, materials specialists etc., and these issues are handled differently in individual countries. Nor is the EU competent to adopt directives covering the organization and delivery of health services and medical care. All these treaty-based distinctions need qualification. Both the implementation of market-oriented directives and the broad interpretations of the principle of direct applicability (Art.100A) of decisions and directives by the European Court of Justice (ECJ) produce effects that cut across neat jurisdictional distinctions in the allocation of powers between the European Union and the member states under the subsidiarity principle. As the history of regulatory federalism and harmonization of law in the European Union so vividly demonstrate (Berman 1997), the balance is necessarily a dynamic one.

The reality of medical devices is more complex than these definitions indicate. Indeed, medical devices are at the intersection of *policy, politics, professional-scientific* and *ethical issues*. They also lie at the intersection of market building and business practices.

Methods, data and scope.

The preliminary analysis that follows is based on European and national documentation, desk research of data and document analysis (EU directives, national laws, rules, decision-making procedures, administrative provisions, internal memoranda, guidelines etc.), “grey” literature from various sources, website-based information (up to April 1999), as well as previous research

combined with related interviews in 1994 and 1998 (Altenstetter 1994, 1996, 1998a, 1998b). This qualitative research uses multiple methods and research practices to eventually reach an understanding of the actual, process-driven results of implementing regulatory policy on medical devices, in contrast to intended regulatory goals. A discussion of how “problem-oriented” implementation differs in actuality from legal and procedural implementation must be postponed until empirical data from field interviews in 1999-2000 are available and real-world situations can be reconstructed. Because this account addresses only the *formal* aspects of implementation in France, Germany and the United Kingdom there will be some unevenness in the information that will need to be supplemented with interview data. The emphasis on formal elements of implementation does not imply a preference for a “top-down” approach over a “bottom-up” approach. Rather, the research incorporates both perspectives.

This paper is in three parts. Part I describes implementation from a *problem-oriented* perspective and then introduces the theoretical framework for this comparative study. After a brief history of medical device regulation in the European Union, Part II reviews the regulatory goals and instruments and also outlines the new responsibilities for national implementers. Part III explores how (a) France, Germany and the United Kingdom have organized the translation of EU intentions into domestic law and action (legislative and administrative), (b) who was assigned new regulatory responsibilities and (c) tracing which key actors participate in implementation. The conclusion discusses the implications of the findings and raises questions for future research.

Part I Regulating medical devices in the European Union and EFTA countries

The starting point for this preliminary report on domestic implementation is the general policy on the single market (Art. 100 and 100a) and three medical device-specific directives. *The Council directive on active implantable medical devices (AIMD, 90385/EEC) of June 20, 1990, on the approximation of the laws of the Member States* has been in force in the member states since January 1, 1993, and *the Council directive on medical devices (MDD, 93/42/EEC) since January 1, 1995*. The so-called “ash tray” directive covers all products which are neither implants nor in-vitro diagnostic products. After a delay of more than seven years, *The IVD Directive (98/79/EC) of the European Parliament and of the Council of 27*

October 1998 on in vitro diagnostic devices was finally published on 7 December 1998 in the *Official Journal of the European Communities*. Not unexpectedly, the IVD directive of 1998 amended the MDD directive of 1993 in important ways detailed below. The new IVD directive of December 7, 1998, will come into force on December 7, 1999, with variable transition periods for placing on the market in 2003, and putting into service in 2005.

France, Germany and the United Kingdom are good test cases for answering questions about the effectiveness of EU rules over national rules, because they had previously regulated medical devices. These cases also allow for consideration of two broader questions. First, which of four clusters of influential factors are most important in shaping the implementation process: EU policy, national regulatory traditions, sector traditions or the issue characteristics of a sector? Second, does EU regulation change the role of the state as a regulator of medical devices, public health and the health care delivery system and forge new relationships between public and private interests? To the extent that current materials allow specific comments about individual countries, they should be seen as preliminary and tentative.

Theoretical framework for problem-oriented implementation research

This paper does not claim to explain cause and effect with regard to the factors influencing implementation and outcomes. Nor does it discuss the distinction or lack of distinction between economic or social regulation *per se* (Majone 1996), or whether regulation is a distinct type of policy making (Majone 1996; Lowi 1964). The paper is not concerned with explaining supranational governance (Sandholtz and Stone Sweet 1998), neo-functionalism or intergovernmentalism. Rather, it focuses on fairly standard questions raised in the literature on implementation (Najam 1995; Goggin *et al.* 1990; Yanow 1996).

The core issue for this research is: *What happens to EU directives after they are transposed into national law?* Who is doing what, when, how and with what accountability to whom? This research seeks to find out how the three countries altered, adapted or maintained their pre-existing practices and regulatory structure--defined as covering the "totality of institutional arrangements--including rules and rule-making agents--that regulate transactions inside and across the boundaries of an economic system" (Hollingsworth *et al.*, 1994:5).

The conventional wisdom holds that it makes little difference for implementation and

outcome whether national civil servants apply European or domestic law (Siedentopf and Ziller 1988; Mény 1988; Butt Philip and Baron 1988). “They simply apply law” (Pag and Wessels 1988:229). If this interpretation is accurate, then the implementation of EU directives would be solely about legal and procedural issues. Even if this were true, one can argue that most substantive issues are too complex to permit clear-cut legal definitions. Where law fails, is inappropriate, or ill-adjusted to a task, professional judgements and professional norms of behavior and ethics fill the void. Most important, for most citizens, the issue of regulating medical devices is ultimately one of public health, safety, consumer health protection and patients' concerns and sometimes rights. A major lesson can be learned from implementation research

“...The study of implementation requires understanding that apparently simple sequences of events depend on a complex chain of reciprocal interaction. Hence, each part of the chain must be built with the others in view. *The separation of policy design from implementation is fatal* (italics added, Pressman and Wildavsky, 1973:xv-xvii, as quoted by Najam 1995:39).

The next section focuses on the key factors addressed in this on-going research. Five clusters of factors are assumed to interact with each other in the process of implementation:

- *the content* of European regulatory policy both before and after transposition. Content includes goals, addresses issues of substance, and is expressed in policy tools or instruments which are chosen to carry out policy.
- *the context*, that is, the legacy of prior policy and implementation arrangements. The key questions are: what has been the nature and extent of the involvement of major organizational actors—public and private—in medical device implementation past and present? Do the newly emerging institutional forms differ from the old ones and, if so, how?
- *the commitment* of the major political and organizational actors to the pre-existing national regulatory regime and the new European regulatory system of medical devices. What have been their stakes and prior commitments to the new regulatory policy? What have been the main responses of subnational policy actors and clients to European regulatory policy?
- *the capacities* in the field. Capacities include organizational capacities, resources, knowledge, and skill levels of a myriad of implementers from different walks of life and areas of activities. Following Edwards (1980), resources include 1. size and skill levels of agency staff, i.e. knowledge about the substantive issues, 2. information concerning the implementation of policy and access to compliance information for monitoring, 3. mandated authority to provide incentives or to sanction behavior. When no such authority exists, Edward argues higher level agencies take on a certain service orientation and tend to use lower level agencies for assistance rather than for enforcing compliance with a mandate, and, finally, facilities, including equipment and technology. Questions to be answered are: What is the flow of information and communication among them and how do these affect implementation? What are the emerging trends in subnational implementation? Are “Europeanizing” influences changing the patterns of national governance and existing relations between public and private interests?
- *clients and coalitions*. These comprise the *target-groups* or stakeholders whose behavior and actions the EU rules intend to change. Different types of target groups have had different responsibilities in distinct phases of the regulatory cycle. Although, theoretically, some play a role in the pre-market phase while

others in the post-production phase only, they are bound together through quality, safety and performance requirements, requirements for notification for all kinds of activities, for an operative alert system in case of defects and need for recalls and, finally, notification of incidents or near incidents with medical devices.

The direct targets of EU regulation are primarily companies in several industrial sectors: electro-medical, medical/personal, implantables, and IVD products. Secondary and indirect targets are national health care systems, providers, payers and purchasers of health services, as summarized below:

- a. manufacturers, suppliers, agents, retailers/distributors, and dealers, as well trade associations serving as mediators and participants in policy development;
- b. competent authorities (Device Competent Authority and Medicinal Product Competent Authority)
- c. third party certification bodies, in EU legalese called Notified Bodies (NBs);
- d. authorized agents, medical device consultants, and persons who act as liaisons between manufacturer and operators of medical equipment, who may not be the purchasers
- e. authorized distributors
- f. hospitals (professionals, technicians, maintenance & servicing, free standing clinical laboratories, hospital laboratories and hospital pharmacies)
- g. doctors' offices
- h. researchers, scientists, clinicians, innovators;
- i. patients and care givers

This preliminary report outlines the new regulatory tasks, traces the triangular relationship between the competent authority, the notified body and companies, and maps the domestic regulatory structure. It also touches on substantive issues such as medical/health vigilance and clinical investigations, as they are approached in each country.

Part II. European Regulation and Implementation in the Post-Transposition Phase

Historical background. European regulatory policy on medical devices shares a number of characteristics with other sectors. Policy has evolved over time. It is not expressed in one single EU directive, and it applies to a highly complex and knowledge-based technological sector. The development of a politically and economically acceptable regulatory approach was relatively quick, starting around 1987 when the SEA came into effect and continuing to the present day. Much of the leadership for strategic and operational policy development in this sector came from ministries of health in France, Germany and the United Kingdom, experts from global companies, including U.S. subsidiaries, and European trade associations. How the early promoters of European regulation have written their own preferences into the new regime, how

they are altering or reversing the decisions regarding regulatory policy and channels for implementation that they inherited from the pre-Community regulatory system, and how EU directives are shaping their path in the post-Community system, are among a few intriguing issues for research.

The delay of almost eight years in adopting the in vitro diagnostics directive (IVDD) in December 1998 was due in large part to political and strategic differences of opinion between the Commission and the Council, conflicts among the companies in the targeted industrial sector, and widespread resistance to moving away from self-regulation in the IVD product sector toward an EU-imposed regulatory approach. Other events beyond the control of the major political forces also left their mark on the first draft (available since 1991). A revised, second draft (1995) became embroiled in the application of the new co-decision procedure between the European Parliament and the Council adopted by the Maastricht Treaty of 1992. Having placed health issues high on the agenda of the Environment Committee, the European Parliament made full use of its new power by proposing numerous amendments and additions to the draft IVD directive. After several rounds of revisions, the Council and the European Parliament finally agreed on a common position (March 23, 1998) which was revised still further before the final directive was adopted in December 1998.

In recent years, European parliamentarians from a wide spectrum of political groupings have become increasingly concerned about health and consumer protection issues and health risks arising from unsafe food, including salmonella in eggs and poultry and other issues in the European Union. As a result, European parliamentarians and health advocates share a widespread perception that the Commission and the Council cannot be trusted to guarantee high standards of health protection in the European Union.

The single most important crisis, which set off intense debate in all political arenas and particularly in the European Parliament, was the BSE scare (Jacob-Creutzfeld disease) and the risks associated with Transmissible Spongiform Encephalopathies. This was of great concern to consumers, health advocates, scientists, and policymakers, as well as farmers, the industry and distributors. After heated debates, national and European policy makers agreed on an EU ban on the use of specific risk materials² stemming from bovine, ovine and caprine animals, which has

had particular implications for medical devices which uses such materials in their manufacture.³ The objective of the ban was to eliminate any risk associated with such materials entering the human and animal food and feed chains. European regulation of the use of medical devices incorporating human tissue and the use of animal tissues and their derivatives remains unresolved and has been postponed indefinitely, due to heavy controversy among national governments, health authorities, regulators, the industry and the scientific communities.⁴ At times, the movement for higher health standards seems to be undercut by a failure of political will among most national governments who appear more interested in trade and global competition than in human health issues to which they pay lip services. If, however, more public health advocates coalesce around these issues with supportive European and national policy makers, they may develop into a force that will have to be dealt with.

In consequence, heightened health awareness among all European policymakers led to the restructuring of the existing governance structure (formal and informal). This included the addition of a new layer to a highly complex, exceedingly opaque and largely unaccountable multi-level “comitology”⁵ system. Scientific committees for medical products, medical devices, and veterinary science were established, although scientific advice-giving in EU policy-making has always been available through the Commissions’ advisory, management and regulatory committees. Consensus on the need for scientific advice and new institutional dynamics may actually combine to mask more than ever the political-ideological and inter-professional conflicts over these issues among the major stakeholders. The public in most countries, however, still is hesitant to accept even consensus-based scientific evidence.

In the process of amending the draft IVD directive in 1997 and 1998, France, along with several prominent scientists and European parliamentarians, wanted to adopt a tougher policy for public health considerations. Other EU member states, particularly the UK and Germany but also seven other countries, saw the French plea for public health as an attempt to divert attention from France’s traditional protectionist and state-interventionist position. While the two claims are not without merit, who is to say that France is entirely wrong? Even the supporters of the IVD directive seem unconvinced. A cursory comparison of the first draft of 1990 with the final IVD directive of 1998 suggests that most EU member countries were willing to endorse a higher level

of health protection, despite controversies in the Commission, Council and the European Parliament on specific details. For example, despite opposition to a precautionary clause by the UK, Germany and seven other countries, regulatory action on grounds of public health is now legitimate and being institutionalized at the European level.

France: a special case. Although some argued that French legislation imposing a three-month pre-market declaration for specific medical products would violate the principle of free trade in medical devices, France begged to differ. The French parliament adopted a new law to reinforce sanitary surveillance and safety of products for humans on June 13, 1998, despite the virulent opposition of practically all other EU member states and the industry. The debates within France predated the election of the new socialist government in France in September 1997.

For a decade now, controversy over the regulation of the use of human or animal tissues and derivatives in medical devices has raged in the Council, the Commission and the European Parliament. The original draft MDD contained a related provision in 1990 but was removed by the Council in 1992. At that time, the use of human tissue was regulated only in Germany under the Drug Law and in France under regulations pertaining to Tissue Banks. France adopted regulation in 1994 (Audry and Poutout 1994) and Spain in 1996. The European Parliament also favored stiffer regulations in this area and supported pertinent amendments in March 1996. For the moment, this issue is tabled in the Council, with one informed source characterizing it as “neither dead nor alive.” Failure to agree on the use of human tissue meant delay and almost derailed the adoption of the IVD directive in 1998. At a meeting in November 1997, the Commission and representatives of other EU countries accepted the majority of French requests, except for her request for a 60 or 90-day pre-market approval (EUCOMED 1998/99, pp16-17). For more details, see Part III. It was only saved by decoupling this issue from the IVD directive in 1998, which provided a solution palatable to all policy makers.

The political and professional communities are split by controversies over acceptable benefits and risks. There are also divergent opinions about how to conduct clinical investigations, how to provide clinical data and how to document the evaluation of clinical data in order to comply with the relevant requirements for conformity assessment procedures under

the new EU regulatory regime. Opinions are strong on both sides of the issue—strict regulation by the state versus reliance on professional codes of ethics, and commercial *laissez faire* versus the pursuit of the public interest? In these debates, the influence of a myriad of professions is present. These powers over the regulatory process stem from their control over three major resources: knowledge, expertise and mastery of the necessary techniques and skills.

Are these fundamental differences due to strong clinical traditions in Europe's medical schools, and differences in training and the development and application of clinical practice guidelines and health technology assessment in each country? Or are they due to entrenched national industrial practices, previous interventions and regulatory practices? Perhaps it is all of the above. It is hoped that field research will provide at least some of the answers.

Feedback of experience. The amendment of the draft IVD directive offered multiple "opportunities for adaptive policy redefinition" (Elmore 1979) through newly gained experience and information on the pitfalls and strengths of implementing the AIMD and the MDD between 1993 and 1998. This also allowed for the incorporation of stricter national practices into European legislation. But sorting out claims of leadership by one country or countries from facts and actual developments is next to impossible without a step by step review of decision-making. One illustration of an opportunity to redefine European regulatory policy is article 14 (b), which now provides a legal basis for particular health monitoring measures.⁶ By invoking the safety clause in the interest of public health, member states can take preventive measures provided such action is within the parameters set by the Commission, which is the case when an action is (a) proportional with the perceived risk, (b) product specific, and (c) temporary only. So far, only France has taken action regarding condoms, breast implants and animal tissues and has an open query about electrical safety. The UK has taken action in regard to class III implants (still open in mid-1998).

The IVD directive draws a distinction between placing on the market and putting into service: *Placing on the market* is defined as "the first making available in return for payment or free of charge of a device other than intended for performance evaluation, with a view to distribution and/or use on the Community market". *Putting into service* is defined as "the stage at which a device has been available to the final users as being ready for use on the Community market for the first time of its intended purpose." The IVD directive now must be transposed by the member states by December 7, 1999.

Member states will have to enforce the new IVD directive by June 7, 2000, when IVD products

can carry the CE mark with all transition periods ending in 2005. By all accounts, however, regulatory integration is a never ending process of evolution, learning and adaptation and issues such as clinical investigations, medical waste management, eco-auditing and eco-labeling will have to be resolved eventually.

Boundary issues. Because medical devices were formerly anchored in pharmaceutical drugs regulation, European and national policy makers making decisions on regulatory policy in the medical devices sector have been plagued by complex boundary issues between the two sectors. In negotiating these issues ever since the early 1990, members of different Commission services, business interests and national authorities were pitted against each other. Sometimes, the Commission and company experts were pitted against national authorities. At other times coalitions of actors agreed on the need for European legislation at the high politics and policy level while disagreeing over specific issues. Indeed, coalitions have formed around specific issues and were replaced by other coalitions forming around other issues. For the moment, the thorniest borderline issues between medical devices and medicinal products seem to have been resolved through collective consensus and a shared willingness to address new issues as they arise.⁷

At the same time, new boundary issues arise from advances in biotechnology (e.g. tissue engineered skin, bone cement and fillers, cultured cartilage and tissue engineered wound dressings). As the Director-General of the International Association of Prosthesis Manufacturers (IAPM), recently said: "The areas between medicinal products, biologics and medical devices have become significantly grayed in recent years." She went on to say "the current European regulatory scheme has no provision for biologics at this time and none is currently anticipated." Yet "biotechnology offers an unparalleled sweep of new opportunity" while recognizing the inadequacy of the existing regimes regulating drugs and medical devices. But current safety reporting regulations differ depending on the product--a drug, a biologic, a device or a biological entity-presenting challenges to regulatory affairs specialists and company experts.

Capacity. The implementation of the EU directives on medical devices requires a high knowledge-level and highly trained staff. But knowledgeable individuals who understand regulatory objectives and can translate intentions into action are in short supply: a handful of

civil servants in national departments, regulatory affairs staff in companies, legal specialists in law firms, clinical and dental specialists and subspecialists, experts in laboratory medicine, experts in engineering, materials processing and data specialists. However, the bulk of knowledge capacity derives from professional and scientific associations of different disciplines and industry staff.

Administrative capacity varies greatly across the fifteen EU member states. In most, it is below capacity, notably the Mediterranean rim and in Central and Eastern Europe, with France having.....? and Germany?. Even staff capacity at the Commission is below capacity with three individuals down from five in mid-1998. With a staff of about 150 individuals at the UK Medical Devices Agency, the United Kingdom is in a unique position. It is probably the only country in the European Union that has sufficient regulatory manpower capacity and a diversity of professional skills required under one roof (specialists, administrators, medical and nursing staff, professionally qualified technologists and scientists including biologists, chemists, engineers, toxicologists, pharmacists and physicists; and specialists in quality assurance). The existence of a centralized NHS structure and considerable experience in user reporting since 1946 (?) seems to explain this unusual situation.

Despite the collective will of European and national policymakers to emphasize not only quality, safety and performance but also vigilance and health surveillance, the actual resources available are extremely limited. Neither the Commission nor national governments seem to have authorized more staff or raised the budget for this purpose. If the claims of European and national regulators that high protection and health safety of patients and consumers are the ultimate goals of the EU regulatory regime are to be credible, more funding and staff are required.

II.2. Policy goals and instruments

If EU directives specific to medical devices are intended not only to ensure the free movement of these products across borders, non-discrimination and competitiveness but also to ensure high safety, quality, and performance levels during the entire life cycle of products, we need to look more closely at how these goals and legal-administrative instruments are framed, and whether "statutory objectives" are "precise and, if multiple, clearly ranked in importance" (Sabatier and

Mazmanian 1980). From a brief look at the textbox, this requirement appears abstract and unreachable.

Multiple and diverse goals

- to harmonize European rules and procedures for placing medical devices on the market;
- to harmonize European rules and procedures for putting into service;
- to encourage uniform application;
- to secure the safety, quality and performance of medical devices during the entire life cycle of a product;
- to improve the safety of patients, users and other persons;
- to enhance the recall system of defect products and for tracking and tracing medical devices (general and patient-specific);
- to improve cooperation between the member states; and, finally,
- to facilitate the exchange of information and experience in medical vigilance among the member states and beyond when necessary

Pre-market Controls. The three most important aspects to know about the regulation of medical devices are the ways in which the directives intend to realize their high emphasis on product quality, safety and performance standards through:

- mutual recognition of licensing and certification of conformity assessment with essential requirements,
- reference to European standards⁸
- legally binding annexes⁹

The legal components (annexes and references to European standards) differ for the AIMDD, the MDD and the IVDD. For each, the quality instruments and essential requirements are specified in eight modules, including the classification of medical devices according to risk levels and product classes.¹⁰ The higher the risk levels, the higher the regulatory requirements. Each module specifies in great detail the activities that accreditors, certifiers, verifiers and site inspectors are to engage in to bring routine practice in compliance with EU directives. Twenty articles constitute the core of the IVVD.

Table 1 **The core elements of European regulatory policy on medical devices**

The scope and definitions	Vigilance
Placing on the market and putting into services	European database
Essential requirements	Particular health surveillance measures (new)
Free movement	Amendment to Annex 2, derogation clause
Reference to standards	Notified bodies
Committee on Standards and Technical Regulation	CE marking and Wrongly affixed CE marking
Committee on Medical Devices (new)	Decision in respect to refusal or restriction
Safeguard clause	Confidentiality
Conformity assessment procedures	Cooperation between Member States
Registration of manufacturers and devices	Amendment of the Directives

Post-market surveillance: The two most innovative components of the EU regulatory regime is the introduction of post-market surveillance measures and the development of a vigilance system (MDVS), including a safeguard clause, across Europe.

“The purpose of the Vigilance system is to improve the protection of health and safety of patients, users and others by reducing the likelihood of the same type of adverse incident being repeated in different places at different times. This is to be achieved by the evaluation of reported incidents and, where appropriate, dissemination of information which could be used to prevent such repetition, or to alleviate the consequences of such incidents.”¹¹

An adverse incident is defined as “an event which gives rise to, or has the potential to produce, unexpected or unwarranted effects involving the safety of patients, users or other persons. Adverse incidents in medical devices may arise due to shortcomings in:

- the device itself
- instructions for use
- servicing and maintenance
- locally initiated modifications or adjustments
- user practices, including training management procedures
- the environment in which it is used or stored
- incorrect prescription

Conditions of use may also give rise to adverse incidents, e.g. environmental conditions (electromagnetic interference) location (e.g. devices designed for hospitals may not be suitable for use in the Community or ambulances).¹²

Considering that between 4 to 15 percent of all hospitalized patients in the EU member states contract an infection while hospitalized, the vigilance over medical devices may need to be complemented by vigilance over the hospital environment.¹³ Depending on the country and the resources, national regulators may define vigilance broadly or narrowly. Incidents are to be reported within ten days and near incidents within 30 days.

Serious controversies arise over the issue of responsibility and liability in the case of an accident or near incident. On one side, the industry(ies) claim that most accidents or incidents are due to the misuse of a medical device by an inexperienced and unskilled user (who could be a physician, a dentist, a technician, a nurse or even a patient using a device at home). By targeting professionals, patients and care givers, the industry is eager to lay the blame at their doorstep. On the other side, professionals, public health and consumer advocates, and even scientists and clinicians, say that products are on the market which should not be granted market access and that inappropriate products account for a substantial share of such incidents. While there may be

some truth on both sides, it is hard to find empirical information about these complex, technological issues that is comparable and reliable rather than anecdotal and partial. There are multiple causes of adverse incidents which do not fit into an easy category of guilt or no guilt.

Another core policy element for market surveillance is the new mandatory European database on medical devices (EUDAMED) accessible to Competent Authorities. EUDAMED will have administrative data bases regarding the registration of manufacturers and devices and distinguishing between (i) placing on the market; (ii) putting into service; (iii) tracking and tracing medical devices in contrast to (iv) tracking and tracing patient-specific devices (patient records); and (v) verification of measuring devices. Once EUDAMED is fully operational, regulators will know the number of certificates issued, modified, suspended, withdrawn or refused. However, overall, progress is slow. Controversies abound over confidentiality issues and data privacy. Clinical data in the European Union and the member states are handled as personal data and enjoy a high level of protection under the EU Data Protection Directive (95/46/EEC), which can block data transfer to other countries with a lower level of protection, and national legislation.

If available manpower for the operation of a vigilance system and EUDAMED is any indication of what is in store, both will come into use only slowly and they are likely to operate primarily as observers of legal and procedural compliance rather than as vigilance systems concerned with consumer health and patients' rights.

As to transparency and free flow of information and experience, field work is expected to reveal even more differences in the handling of these issues than the formal materials presently available suggest. For example, the UK Competent Authority has published information on accidents and incidents on the Internet and presented them in a public forum. France and Germany are releasing information bearing on procedures and documentation. The benefits of electronic information and communication will accrue to regulators/administrators rather than consumers, the public and the research community.

Claims that decisions on regulatory policy comprise a lowest-common-denominator among member states are exaggerated and obscure what the directives actually do. From drafting the AIMDD and the MDD to redrafting the IVDD a process of differentiation and

toughening took place in which ever stricter health protection levels and more stringent requirements for comprehensive procedures for enforcement were included while retaining high level national regulatory practices in European legislation. Experts agree that the amended MDD has raised the bar for product safety, quality and performance of medical devices under the Medical Devices Vigilance System (MDVS) higher than under general product safety standards (Council Directive 92/59/EEC of 29/6/1992 on General Product Safety) and that the purpose of the directives is to ensure that products perform and deliver what manufacturers promise and claim they will do in their declarations of conformity and required documentation.

In addition, consensus-based guidelines of the Commission, the so-called *MEDDEVs*, are intended to put the vigilance and recall system into action, and they were revised upward rather than downward over the last few years. *MEDDEVs* are written by and for all interested parties—device Competent Authorities, Commission services, industries, representatives of health-care organizations and personnel. Each participant in the *MEDDEV*-writing process—through direct participation in a focus group or working party—represented an interested party concerned with some aspect of safety, quality and performance of medical devices, and each seems to have drawn some benefit from sharing experience, expertise and knowledge. Spokesmen of more than 26 European professional associations and over 30 European trade associations representing the various industrial sectors in the medical devices field have been intermittent participants in this process, as have been nationally appointed scientific advisors.

Even if *MEDDEVs* have no legal force, they reflect a common understanding of necessary action for implementation that has emerged over the last few years and specified procedures for the recall of products and the reporting of incidents or near incidents. The same can be said about the *European NB-Recommendations*, which are prepared by and for Notified Bodies to assist them in developing uniform certification practices across Europe.

II. 3 Responsibilities in the Regulatory Cycle as Intended by EU directives

Responsibilities in the regulatory cycle are assigned to three organizations: manufacturers, state-based competent authorities and third party and mostly private certification organizations called notified bodies (NBs).

Competent Authority

Manufacturers



Notified Body

Table 2 below shows the allocation of responsibilities for specific tasks. Mapping the organizations in charge of operations based on field information will eventually help to establish how this triangular relationship will play out in actuality.

Table: 2 Roles and responsibilities in the regulatory cycle

Organization	Design	Classifi- cation	Clinical Investiga- tion	CE marking tests & inspection	Notification of class IIa class IIb class III	Notification of class I & custom devices*	Post-market surveillance, vigilance/ safeguard action
Manufacturer	x	x	x	x	x	x	x
Competent authority	(x)	(x)	x		x	x	x
Notified body	x	x	(x)	x	x	sterile products & measuring devices	

* For class I and Custom devices, technical documentation (design data, descriptions, results of risk analysis, test reports, clinical data where appropriate and labeling) must be made available when the relevant national authority requests it for inspection.
 (x) In the event of an incident or near incident.

Device Competent Authority-based implementation. The IVD directive clarified that, ultimately, Device Competent authorities--typically but not exclusively the ministry of health--are politically and legally responsible for oversight, enforcement and compliance (European Commission 1999). Asked to step out of their traditional bureaucratic role and stop perceiving their responsibilities under European legislation as merely bureaucratic procedures, they are called to engage in a number of new activities: step up the reporting of adverse events by users; improve oversight and monitor notified bodies more closely and ensure a more uniform level of certification by notified bodies. Lack of oversight and monitoring of NBs by Competent Authorities, and different perceptions and interpretations of what their responsibilities are to be, are reported as major implementation problems. Under the new regulatory regime, enforcement behavior is reported to differ considerably across the member states. Therein lies the crux of the problem.

In other ways, the IVD directive authorizes Competent Authorities to issue health alerts and safety notices when necessary. In the past, most have done so, although with varying degrees of intensity. Now, they are asked to consult with notified bodies in certain cases, and with the Competent Authority for Medicinal Products for medical devices having an ancillary action

when necessary. The IVD directive widened the possibility for member states to gather information on medical devices in their market regardless of product class.

In addition, Competent Authorities are responsible for all notifications to the Commission, subject to the complex, internal mechanisms for handling European affairs, which differ from country to country. Despite opposition by the industry to multi-language requirements, the new article 14 of the IVD directive empowers them to request information on labels and instructions for use for class IIB and class III devices when these are put into service in their country.

Moreover, approval of clinical investigations by the Competent Authority is mandatory giving national regulators an important role in the approval of clinical investigations, custom-made devices and safeguard measures when incidents or near incidents have occurred, or when there is a justified threat to public health. A custom-made device is tailored to a patient's special need by a surgeon.

Next, Competent Authorities are responsible for keeping any information obtained through vigilance in strict confidence (AIMD 15 and MDD 20). However, they must provide information to another Competent Authority upon request and do so confidentially. To assist in enforcement and implementation, the Commission's guidelines clarify how to interpret Article 2 of AIMD and MDD, and article 8 of AIMD and Article 10 of MDD. Currently, the Commission wants them to improve the coordination of their activities and transmit information on health and market surveillance more efficiently.

Contrary to the pre-Community regulatory era, Competent Authorities are responsible for establishing whether a manufacturer followed-up on reported incidents, how this was done, and whether the manufacturer took additional actions suggested by a NB. Leaving discretion to Competent Authority, they are free to engage in as many different oversight functions as they wish. They "may *monitor experience with devices* of the same kind (for instance, all defibrillators or all syringes), but made by different manufacturers, in order to take measures applicable to all devices of that kind. This could include, for example, initiating *user education or suggesting re-classification*" (European Commission 1999).

These guidelines apply to "devices which carry the CE-mark; and devices which do not

carry the CE-mark, where such incidents lead to corrective action relevant to CE-marked devices.”¹⁴ Corrective action is defined as:

- device recall;
- issue of advisory notice
- additional surveillance/modification of devices in use;
- modification to future device design, components or manufacturing process;
- modification to labeling or instructions of use.”

Once a corrective action has been suggested, hospital administrators, medical practitioners and other health-care professionals, and user representatives responsible for the maintenance and the safety of medical devices should take the necessary steps to remedy a problem. Such steps should, where practicable, be taken in co-operation with the manufacturer. It remains to be seen whether the procedures that trigger a reporting of an adverse incident are workable and have the support of all implementing agents involved— notified bodies, manufacturers, competent authorities and users. The triggering depends on many factors but, above all, on the reporting behavior of all users in healthcare delivery sites and individuals. In the meantime, for the future monitoring of implementation, the Commission places a high emphasis on improving the links among Competent Authorities and between them and NBs through better cooperation and exchange of experience.

Company-based implementation. Manufacturers are responsible for pre-market conformity assessment procedures and the preparation of product documentation for all medical devices, including auditing quality systems in manufacturing sites. They must (i) determine the class of their product, (ii) meet the essential requirements for quality systems and essential requirements in product development, design controls and good laboratory practices; (iii) prepare a Declaration of Conformity, (iv) apply the appropriate conformity assessment scheme, and (v) apply the CE Marking. Obviously, internal document preparation and SPOs have legal implications for civil action and trial in court under liability law, a dimension not pursued here.

For class I devices manufacturers self-declare that their products meet the essential requirements. In this case, there is a presumption of compliance where harmonized standards are met. No certification by a notified body is necessary, except for sterile products and measuring devices which require certification by a notified body. For all other classes—class IIa, IIb and III—the involvement of an independent certification body (NB) is required which approves the manufacturer’s declarations that a product meets the essential requirements stipulated in the

directives¹⁵ and all related documentation, along with clinical data and scientific literature, supporting this claim. The IVD directive has toughened the requirements for class II (a and b). Manufacturers must meet all notification requirements for new products, and design improvements, and they must have an approval of clinical investigation by a Competent Authority prior to testing. In addition, in many EU countries, clinical investigations must be approved by ethics committees and/or professional committees. Manufacturers must report to the Competent Authority for transfer to the operator of EUDAMED any information on the medical device consultant in their company and his/her qualifications.

Under the vigilance system, as users, manufactures must report any incident or near incident to the Competent Authority for recording and evaluation and take corrective action through a recall or design improvements. By clarifying that reporting an incident does not constitute “admission of liability for the incident and its consequences” regulators hope to achieve a higher rate of reporting than could be expected without such clarification. In any event, for each incident a final report should be developed. Manufacturers must also inform their “authorized representative within the European Economic Area, persons responsible for placing devices on the market and any other agents authorized to act on their behalf for purposes relating to medical devices vigilance.”¹⁶ In addition, manufacturers should consider informing official distributors etc. as appropriate during the procedure. But their right to determine a person authorized to be the principle contact point for this purposes is not affected. Finally, while manufacturers should inform their NB of those incidents which may affect the certification provided by that NB, as was already pointed out, it is the role of the Competent Authority to monitor whether such investigation has been carried out by the manufacturer. “Depending on the outcome to the investigation, any information necessary for the prevention of further incidents (or the limitation of their consequences) should be disseminated” (European Commission 1999).

Notified body-based implementation. Notified bodies (NBs) are certification organizations appointed by EU member countries to conduct formal audits of products and quality systems.¹⁷ They are primarily private organizations but, as in Germany, they can also include public bodies that accredit NBs to certify and test medical products and inspect manufacturing sites. Irrespective of status, NBs act on behalf of the public authority and work on

a contractual basis for a fee.

NBs must be independent, impartial and competent. Independence is defined as having no association with the manufacturer, supplier or installer and being "free from all pressures and inducements, particularly financial, which might influence their judgement or the results of the inspection, especially from persons or groups with an interest in the results of verification."¹⁸ Impartiality of inspection staff must be guaranteed. This is to be achieved by ensuring that "[t]heir remuneration will not depend on the number of controls carried out, nor on the results of such controls."¹⁹ Competency is defined as having qualified staff with special training and all the necessary evaluation and verification experience, the confidential handling of manufacturers' dossiers, the application of appropriate methods and testing equipment, the ability to draw up certificates, records and reports to demonstrate that the controls have been carried out, and carrying of liability insurance.

In the past, accreditation and certification practices by about 61 NBs (up from 40 in 1995) in the European Union are reported to have been liberal and uneven, but no specific information about which NBs in which countries are engaging in lax practices or which Competent Authorities do not do their job is available. Most EU member states have one or two NBs, while Italy has eight, Norway three, and Sweden three. Of the three country cases included in this study Germany has 25, the United Kingdom 9 and France one.

The European Diagnostic Manufacturing Association (EDMA) reports that major differences of opinion exist between the industry and some Notified Bodies concerning the risk inherent in IVD products. According to some NBs, the Directive is expected to change the practice of laboratory medicine whereas the industry insist that the IVDD intended to regulate the products only. In the view of some NBs, IVD products are dangerous products and need strict regulation in order to avoid negative outcomes. The industry argues that the products are safe and that past mistakes in the case of HIV were made because users made poor decisions on the use of existing products and failed to use confirmatory tests or made transposition errors.²⁰

Due to inadmissible monitoring, the IVD directive stiffened the conditions for the designation and surveillance by NBs by adding a new rule to Annex XI on the designation of NBs. The IVD directive now specifies that "sufficient scientific staff within the Notified Body

shall be available who possess experience and knowledge sufficient to assess the medical functionality and performance of devices having particular regard to essential requirements.”

In other ways, NBs are to coordinate their activities and judgments Europe-wide by improving the exchange of information and experience among each other and between them and the device Competent Authority, elaborating *European NB-Recommendations*²¹, addressing issues of electro-magnetic compatibility (EMC), and applying stricter rules for enforcing new and significant changes relating to quality systems, product ranges and clinical investigations, including clinical evaluations. The representatives of NBs began to meet on a regular basis at the European level in 1997 in order to standardize requirements for internal procedures, gain necessary expertise and documentation of evaluations carried out by other NBs, and develop recommendations for the collection and presentation of clinical data and guidance documents for the assessment of certain categories of medical devices. By July 1998, five workshops had been conducted on risk analysis and risk management. Although attendance is not mandatory, it is reported to be high at about 80% of all European NBs, but with a lower representation of NBs from the UK.

From a British practitioner’s perspective, there is room for “improvement and consistency.” Speaking to the heart of problem-oriented implementation he went on to say: “Although it is not the role of Notified Bodies (NBs) to enforce the regulations, because of their close relationship with manufacturers in most instances it is the NBs who in practice enforce and implement the MDD. Although in many instances NBs have the sanction of refusing or withdrawing certification, much implementation is undertaken by persuasion.”

Medical devices that have an ancillary action present a special case for implementation. Before making any decisions on these medical devices, notified bodies must consult with the Competent Authority for Medicinal Products. Commission guidelines (MEDDEV.2/12/1) provide clarification on a) the purpose of the consultation procedure, b) the notified body action to initiate a consultation process c) the documentation to be provided by the Notified Body to the competent authority for medicinal products, and d) the consultation process. There are also guidelines on a pharmaco-vigilance system. Because in the words of the head of the European Agency for the Evaluation of Medicinal Products, medicines regulation may not keep pace with the changing market place and environment, much scientific work to further harmonize pharmacological regulation is under way at the European level.

Other organization-based implementation. For the EU regulatory regime to be effective, it requires a uniform and integrated system of tracking and tracing devices and monitoring as well as tracking and tracing patients. In the past, accounting varied greatly among the member states, and they used different product classifications. For the new purpose, the Universal Medical Devices Nomenclature (UMDNS), developed by the Emergency Care Research Institute (ECRI), USA, is considered workable in the European context, with a recognized need for adaptations to European conditions.²²

For the development of a European database on medical devices, the European Commission chose the German Institute for Medical Documentation and Information in Cologne (Deutsches Institut für medizinische Dokumentation und Information--DIMDI),²³ which is accountable to the federal ministry of health, from among the bidders for the development of EUDAMED. With finances from the Commission, DIMDI will have to produce a workable database within a two-year framework. When regulatory intergration is complete, all enterprises selling medical products in the European Union, independent of headquarter location in the EU, USA or Japan, will be required to follow the UMDNS nomenclature as adapted to Europe by DIMDI.

Under European and German law, DIMDI has a number of responsibilities Europe-wide and within Germany: to generate, collect, evaluate and assess data concerning all classes of products under the EU regulatory regime, and to provide and transfer data to databanks of member states and EU institutions and EFTA countries, which are signatory parties to the EEA. The new responsibilities for DIMDI include the registration of all notifications on medical devices or design improvements by manufacturers before they are launched on the market. DIMDI keeps track of certificates issued by NBs. Based on information from the Competent Authorities, DIMDI registers all adverse incidents or near incidents (# 29 MPG, bilingual), all notifications of clinical investigations using medical devices (# 17 Abs.6 MPG, bilingual) and general notifications (#25 and 31 Abs.4 MPG, bilingual). Moreover, DIMDI makes other data accessible to other public authorities (DITR = databank on technical rules, HDS = Health Devices Alerts; IHTA International Health Technology Assessment).

The implementation of EUDAMED is some way from being realized. It will take a

few years, if not a decade, before it can operate as a full-fledged European regulatory database. This will require good cooperation among all interested parties and a considerable amount of coordination among multiple actors--public and private.

Remedies for the future. In view of the unequal certification practices by NBs,, the Commission wants to achieve more European uniformity in two ways: by stressing and speeding up standardization even more than in the past and by getting notified bodies to develop consensus-based *European NB recommendations*. To improve levels of protection through standardization, the Commission mandated new standardization work concerning risk management elements and clinical investigation plans.²⁴

In conclusion, most European countries are asked for the first time to engage in a vigilance process and ensure the safety of users and patients when using medical devices, France (statutory), Germany (statutory) and the UK (voluntary) had some kind of regulatory tradition in the past, although enforcement capacities in terms of staff and budgets seem rather limited. For them, the big challenges are now how to overcome the legacy of prior practices and rules, and apply European legislation for medical vigilance and incident reporting while also maintaining the health protection standards they have achieved prior to the Community-system. The result may be reliance on a complex mix of European and national rules that shape implementation behavior and process.

PART III Translating EU into action in France, Germany and the United Kingdom

In considering how state traditions and previous practices affect the organization of the implementation process specific to medical devices, the three-country comparison yields interesting, though not unexpected, insights into the centralization and decentralization of regulatory authority and operational responsibilities. In theory, with the launch of the transposed EU directives in each country, the ministry serving as the Competent Authority has three roles: as rule-maker and direct participant in European-level policy processes, as rule-maker for implementing decrees, guidelines and provisions and, finally, as overseer of domestic implementation. In practice, the situation is far more complex. Current governments in France, Germany and the United Kingdom have inherited from their predecessors negotiated

understandings about medical devices, pharmaceuticals, biomedical research and every matter concerning the delivery of health care. Representatives of the ministry of health have lobbied for the incorporation of their past practices into EU directives.²⁵

Unsurprisingly, in the centralized political systems (France and the United Kingdom), authority for regulatory policy is also centralized and operational responsibilities are concentrated in a number of organizational units within the Medical Device Agency in the United Kingdom (prior to 1994 the Medical Devices Directorate) and the Ministry of Employment and Solidarity in France (until 1997 the ministry of health). If they are at all dispersed, it is only among a limited number of other national organizations. At present it is unclear whether these organizational actors act concurrently as rule-maker, rule applier and rule adjudicator. In any case, there is little organizational division of responsibilities for drafting and enforcing regulatory controls. Regulatory controls in this field, as in all others, are, of course, subject to the arrangements specific to each country for managing European affairs as well as a hierarchy of pre-existing legal and policy instruments in the medical devices field.

In contrast, in the decentralized political system of Germany, a variety of implementation approaches are used, with regulatory authority for policy over different facets of medical devices decentralized vertically between federal and state-level agencies and operational responsibilities diffused among a maze of national, regional and local organizations. Apart from the federal ministry of health, which lacks enforcement powers, three federal supervisory authorities have some operational responsibility over pre-market approvals and post-production health surveillance and vigilance. Below the federal level, implementation runs through regional, district and local offices responsible for notification, certification and approving clinical investigations.

The power that accrues to different professions in the regulatory process in each country stems from their control over knowledge and expertise, and their mastery of all kinds of techniques for the conduct of clinical investigations and required tests for manufacturing quality products and manufacturing sites. They are also experienced with data-collecting techniques. Competition for scientific reputation, visibility and breakthroughs now takes place in a single European market and therefore demands clarification of open issues on the European level.

Individuals representing one of the more than 26 European professional associations or nationally assigned experts have participated in TC committees and working groups (often in more than one committee) since the late 1980s, as have representatives from over 30 European trade associations representing different industrial sectors in the medical devices field, and scientists and professionals from multinational companies.

1. France: Sectoral Regulatory Structure.

If France wanted to remain true to her previous efforts at consumer health protection—patients rights, conditions for the conduct of clinical trials and product-safety-- policymakers had to go further than simply transposing European Law into French law. Among industry experts France is considered a “notable exception” in Europe in terms of protecting people in clinical trials.

France continues on the course it embarked upon in 1988 when the Loi Huriet of 20 December 1988 stipulated the conditions for clinical trials and the conduct of biomedical research in articles 209-I to L.209-23 of book IIA of the French code of public health, as quoted by Senator Huriet (1998:237):

“No biomedical research may be conducted on human subjects:

- if it is not based on the latest scientific knowledge and on sufficient pre-clinical testing;
- if the foreseeable risk to the persons undergoing the research is out of proportion with the expected benefits for these persons or with the interests of such research;
- if it does not aim to further the scientific knowledge of man and the methods likely to improve his condition.”

Special protection is accorded pregnant women, children, prisoners, adults under guardianship, persons in medical or social institutions, patients in emergency situations. The law prohibits the receipt of extra compensation for such research: “biomedical research does not generate any direct or indirect financial gain for the persons undergoing it over and above the reimbursement of expenses incurred.”(as quoted by Huriet, 1998: 237).

In the aftermath of the AIDS crisis, France founded a public health network in 1992 and passed a bioethics law to regulate the use of human tissue in 1994. It passed legislation on cell therapy in May 1996. In June 1998, the French Parliament approved the Descours-Huriet bill (named after two senators sponsoring it) which imposed stricter stipulations for health surveillance, product safety and the use of animal-derived tissue in medical devices. By all accounts, the reaction of the Commission, other EU member states and the European trade

associations representing the relevant industrial sectors to the French action was immediate and strong. The issue was hotly debated in all formal and informal political arenas throughout 1997 and 1998.²⁶ But France seems determined to pursue her distinct approach to balancing the need for clinical trials and biomedical research with the patients' needs and rights. In the words of the French Secretary of State for Health, France needed these "tools for assessment, inspection and regulation that have been set up to ensure a better level of health care security, while at the same time controlling expenditure for health care."²⁷

Two elements really underpin both the recent French legislation and past practice, which is based on a maze of implementing provisions. First, primary responsibility for ensuring the safety of medical devices, their use in patient care and clinical experimentation, rests with the State, which ultimately decides the tolerance level for acceptable risk based on advice from scientific and biological committees. Under French law, the Secretary of State for Health Care--previously the Minister of Health--within the Ministry of Employment and Solidarité, has authority to control and regulate all medical devices containing animal-derived products and medical devices of biological origin. The Ministry of Employment and Solidarité is responsible for hospitals, hospital care and hospital payments. Responsibility for EUDAMED, the European-wide vigilance system, rests with that Ministry's Hospital Directorate (Division des Matériels, Matériels Médicaux et Innovations Technologiques)

A newly created Agency for Health Products Safety (Agence de Sécurité des Produits Sanitaires--ASPS) within the Ministry of Employment and Solidarité is responsible for all operational responsibilities for the implementation of the transposed EU directives and vigilance in this agency and will be set up in conjunction with the French Medicines Agency. Responsibility for public hospitals previously in the Public Hospital Directors' Office is in the process of being transferred to the new agency. European legislation has created new tasks: record keeping of standardization, the registration of clinical investigations, and monitoring contacts with the organizations authorized to grant EC labels of approval. It is also responsible for tracking the work of the European Commission. ASPS will work closely with other government offices in charge of prices and rates for medical services and authorizations for heavy equipment resulting from French legislation and regulation, thus closing the loop between

medical devices and the health care system.

The primacy of the State in all matters pertaining to the safety of medical devices and the statutory health insurance program--a distinctive element to health care in France-- is vividly reflected in the organization that makes up the regulatory structure for medical devices. It is a tri-partite structure of unequal partners: the ministry of health as Competent Authority (within Employment and Solidarité), the corporate organization of French statutory health insurance (CNAMS) and professional bodies.²⁸ In all matters relating to the cost of health care, the State has had the upperhand while allowing professional bodies considerable influence over professional affairs.

French *étatisme* is further reflected in the way France has gone about putting into effect the three defining features of a Notified Body: independence, impartiality and competence. Unlike Germany and the United Kingdom, France has one notified body for the entire country. Founded in 1994, G-MED is the *Groupement pour l'Evaluation des Dispositifs Médicaux* formed as *Groupement d'Intérêt Economique* (GIE). Responsibilities are shared between four national organizational actors: ASPS, the ministry of industry, the *Association Française pour l'Assurance de la Qualité* (AFAQ), the *Laboratoire Central des Industries Électriques* (LCIE) and the *Laboratoire Nationale d'Essais* (LNE). G-MED is fully responsible for certifying a wide spectrum of medical devices for compliance with the essential requirements for the CE mark, auditing medical device manufacturers, and testing the intended purpose of devices. In its official brochure, referring to the organizational structure G-MED proudly writes: "It therefore has the confidence of the regulatory authorities and benefits from the long experience of its laboratory members, already associated for over 15 years in the medical sector in the context of GLEM."

The second distinctive element of the French approach, which underlies the 1998 law as prior legislation and administrative provisions, is evident in the requirement that manufacturers, clinicians and scientists, including the committees mentioned above, fully observe a number of guiding principles, restrictions and safeguards established over a number of years through a maze of administrative provisions and laws. Under the 1998 law, clinicians and scientists are to provide scientific advice to the ministry of health under certain conditions

through a so-called Group of Experts on Microbiological Safety. Scientific advice-giving to the ministry of health is required

1. "where bovine, ovine and caprine products are involved: for CE marking in France, for the import and placement on the French market of medical devices which obtained a CE mark outside of France, for the import and placement on the French market of non CE-marked medical devices during the transition period;
2. for clinical trials involving medical devices of animal origin
3. for TIPS reimbursement purposes of medical devices made from derived animal tissue rendered non viable;
4. for clinical trials involving medical devices of biological origin where there is a viral safety risk."

Independent consultative committees for the protection of persons in biomedical research were set up, according to the 1988 law. According to Claude Huriet, co-sponsor of the 1998 and the 1988 laws, their mission is slightly different from the ethics committees in other countries, as they do not define rules of ethics. Formulating rules of ethics is the responsibility of the CCNE, the consultative national ethics committee on life and health sciences.

These consultative committees operate in every region of France. Their members include the whole range of expertise needed in the biomedical field covering "ethical, social, psychological and legal questions." No investigator can start a research project without having submitted his/her project to one of these committees. A committee must give its opinion within five weeks on how to protect the persons participating in a research project, what information to submit, how to obtain the subjects' consent, the amount subjects are to be paid, the relevance of the project, the appropriateness of the means used to achieve the stated objectives, and the qualifications of the investigator. If the committee rejects a project, it must inform the administrative authority, which then makes a decision within two months.

By addressing the issue of research with no or limited benefit to individuals, France seems to have ventured further into territory of medical science and clinical innovators than the United Kingdom or Germany, and other EU member states. Article L.209-14 clarifies that "biomedical research without direct benefit to the individual should not carry any serious foreseeable risk for the health of persons undergoing it." Penalties for offenders are set, but to date no judicial action has been taken. Senateur Huriet (1998:240) clarified:

For ten years now, the law has been implemented and all those who have had to work within its rules, practitioners, pharmaceutical firms, hospitals and patients admit that it has improved the relationships during the trials and that French biomedical research has gained from it as regards to its international credit.

The new implementing *décrets* and *circulaires* are not yet available nor is the list of products for which French policymakers invoked a precautionary clause in the interest of public health. As with draft technical legislation, the Commission must be notified about implementing decrees under the EU requirements for technical legislation and standardization (Standstill Directive (3/189/EEC). France has done this and is committed to doing so in the future. Once completed, the list will probably include medical devices using animal tissues, breast implants and transmyocardic lasers.

European industry remains concerned about the French initiative for several reasons: the financing of the new agency, the resources it has available, the future of the microbiological committee (active under a safeguard clause) and whether the industry should expect inspectors to show up at manufacturing sites, under the *matéριο-vigilance* scheme.²⁹ Currently, safeguard clauses are in place for high risk materials (bovine, ovine and caprine materials and any other animal (arrêté, 29 May 1997) and for breast implants (arrêté, 28 May 1997) and condoms (arrêté, 29 May 1997). It is unclear whether a clause in the French legislation authorizing anyone to report an adverse incident makes France unique when compared to the UK and Germany.

Moving from the regulatory structure to the substance of vigilance, in adopting the Descours-Huriet law of June 1998, French policy-makers took the opportunity to overhaul the existing public health surveillance system and improve arrangements under the French National *Matéριο Vigilance* Commission, which was set up in late 1996. The legislation gave the ASPS responsibility for the security of blood. It also distinguished the collection, production and distribution of blood and placed them under the responsibility of the French Blood Bank. France also intends to improve food safety by concentrating all competences in a Food Health Care Security Agency, along with the current Veterinary Medicines Agency and the (French) National Centre for Veterinary and Food Surveys.

The law also aims at setting up an Institute for Health Care Vigilance which would be in charge of health surveillance for at-risk population groups and set up in conjunction with the national public health network. Finally, a National Committee on Health Care Security will report to the Ministry in charge of health. The Secretary of Health, Mr. Krouchner, speaking to the French *Syndicat National de l'Industrie des Technologies Médicales* (SNITEM) on June 18,

1998 noted that “the French settled on an organization which rests on the users of medical devices and on an assessment made by independent surveyors who give me their opinion as to the measures to be taken in the event of incidents.” The principles of the French approach are:

- a competent policing authority for the entire medico-technical chain of products for health care use:
- a quick alarm ability:
- a strong and independent scientific surveyor system
- concern to take the principle of precaution systematically into account
- strict independence with respect to sectorial economic interests
- transparency in decision making.

Mr. Kouchner defended the rationale for action by the government.

“French government authorities are not the result of unilateral thinking. For your own part, you have managed to take into account the institutional logic and the important evolutions that have been conducted in connection with government policy. This same institutional logic sometimes leads me to make decisions that do not necessarily correspond with the expectations of industrialists. This much being said, the essential bit remains namely, a continual and open exchange of views which provides for as closely cooperative an effort as is possible.”

Other provisions in the new law are:

- The idea of a compulsory statement for nosocomial infections and iatrogenic affections to be defined by means of government regulations.
- The need for health care establishments to set up a system that allows them to provide high quality sterilization of the medical devices they use.
- Requiring these establishments to provide maintenance on certain pieces of equipment so that this equipment will continue to reach the performance levels provided by their manufacturer when they were placed on the market.
- Requiring owners of equipment who put a medical device on the market for resale to carry out a technical inspection so as to guarantee that the medical device concerned still meets the essential requirements provided for by the French and EC regulations. This inspection is to be carried out under the owner's responsibility at his expense.

The Secretary for Health Care noted a “a sharp rise in reported incidents” since the French Matério Vigilance Commission was set up in November 1996. He expects the number of reported incidents in 1998 to be 4,000.³⁰ It is unclear whether these figures reflect an actual rise in the number of incidents or near incidents or increased awareness among providers and staff of the importance of materio-vigilance since it was made mandatory in late 1996.

In summary, France's plea for stiffer interpretation of EU directives and the use of a precautionary clause was accepted by other EU member states and indirectly by the industry, but her request for a three-month authorization was not. In sum, all parties had to compromise. As the seminar on health safety organized by the École Nationale d'Administration (1998) suggests,

France may be doing a lot in certain areas, notably in protecting individuals in clinical trials, clinical practice guidelines and health care technology assessment. Yet in other areas France may lag behind some of her neighbors, and may act more slowly than other countries.

2. Germany: Sectoral Regulatory Structure.

The foundations for the EU-based regulatory structure on medical devices were put into place by the Act on Medical Devices of 4 August 1994 (Medizinproduktegesetz-MPG), amended on 6 August 1998, and four federal ordinances to date.³¹ The bulk of implementing ordinances, notably on health surveillance and vigilance, are still under preparation. Germany has been taking a great deal of time to develop the necessary rules for different types of circumstances, and it has not been easy to transpose EU intentions into federalism and professional corporatism, which is the jurisdictional and organizational reality in Germany. Seemingly final agreements on who was to do what in 1995, for example, kept changing. Only now is some jurisdictional and organizational stability being achieved.

The federal ministry of health took the leadership and participated in the EU negotiations over the AIMD, the MDD and the IVDD between 1985 and 1995. Domestically, the transposed German MPG of 1994 (as amended in 1998) was drafted in consultation with the ministry of economics, social affairs and environment and nuclear safety, and adopted with the approval of the Bundesrat representing the 16 Länder. Repeated attempts to overcome existing hurdles due to preexisting routines and administrative practices, and streamline a diversity of legal and administrative sources into a single piece of legislation, finally came to fruition. The end product is by no means perfect, with notable inconsistencies stemming from both European and national legislation. In several instances, implementation is still only on paper. It is impossible for Germany to escape the complications of implementation that arise from a federal system, or even contain the sometimes pernicious results of legalism and a public bureaucracy, that have been so well captured by Dyson's (1992) study of the regulatory structure in Germany.

Like the state-centric regulatory structure in France and the United Kingdom, the structure in Germany is characterized by executive dominance on both the federal and the *Land* levels. As is typical in executive-dominated regulatory regimes, the MPG authorized the executive branch to issue implementing provisions in 19 instances. To draft and adopt them,

however, the approval of the 16 *Länder* governments is required. Of these only four ordinances are currently in effect.

Unlike France and the United Kingdom, where authority for policymaking is centralized, in Germany, authority to decide on policy is shared between the federal government and the 16 *Land* governments. Externally, the federal ministry of health has served as a contact and liaison to the Commission and other member states, but in the domestic sphere it lacks essential enforcement and monitoring powers. These powers rest either with federal agencies or with *Land* authorities primarily responsible for health oversight, health surveillance and monitoring machine safety (GA). These responsibilities, in turn, are organized into two separate regional offices at the *Land* level.

Three federal agencies serve as implementing agents: The German Institute for Medical Documentation and Information (DIMDI) is responsible for the European regulatory database, the Federal Institute for Drugs and Medical Devices (BfArM, which reports to the federal ministry of health) for notification and vigilance, and the Physikalisch-Technische Bundesanstalt (PTB, which reports to federal ministry of economics) for metrology. Through a cooperative arrangement, the 16 *Land* authorities have set up two separate regional public offices which accredit Notified Bodies (NBs). The NBs, in turn, are responsible for the certification of conformity assessment in line with EU law. The two offices are the central body for safety (ZLS), attached to the Bavarian authority, and the central office for health (ZLG), attached to the Northrhine Westfalian *Land* authority. In addition, two *Land* offices are responsible for metrology along with district and local offices. In total, notification from manufacturers about new products or design improvements may be received by about 70 different offices, which also enforce health-related provisions under German law.³²

The BfArM in Berlin (scheduled to move from Berlin to Bonn in October 1999) is Germany's Device Competent Authority and the Medicinal Product Competent Authority. It reports to and advises the ministry of health and regional health authorities on all matters relating to the safety of drugs and devices, and participates in EU expert groups and committees. The BfArM is to assist the *Länder* with classification of medical devices, conformity assessment procedures and clinical investigations. It employs about 700 staff (physicians, pharmacists,

chemists, biologists, technical assistants).

With the launch of the EU regulatory regime, the agenda of BfArM--specifically two sections, one on regulatory affairs (# 1) and the other on medical devices (# 9)-- has deepened and widened due to the scope and definitions of medical devices outlined in parts I and II of this paper. The agenda of new activities pretty much matches the spectrum of EU-legislated activities. IVD products are not yet covered by the MPG nor by a German implementing ordinance. Under the EU regulatory regime, section 9 on medical devices is responsible for the following new tasks: central recording, evaluations in terms of technical and medical requirements, the reporting of observed and reported risks, safety of medical devices, and, when necessary, the coordination of measures. Based on the monitoring of implementation by the Commission, like all Competent Authorities in the European Union, it is also responsible for following up on reports in case of reported incidents, near incidents and recalls. It is called upon to investigate actively how a manufacturer or distributor remedied a reported risk, and whether the manufacturer responded to a measure suggested by a NB and how. It is also called upon to relay information to and from the competent regional health authorities.

Germany's legacy of prior choices is also reflected in the organization of responsibilities relating to medical device. Some *Länder* always have drawn a distinction between active and non-active medical products and assigned responsibility to two different offices. Building on this tradition, when BfArM was founded in 1995 it followed the same organizational structure for section 9. Section 9 of BfArM³³ serves as focal point for manufacturers, authorized representatives, and importers, as well as for users who are defined as professionals and health care facilities. Unlike French and British law (?), German law does not seem to specify that an individual can report an incident or a near incident (?). Section 9 is also contact point for a number of regional authorities and non-governmental actors: health, occupational health and safety, metrology, notified bodies, statutory accident insurance, professional associations and the operator of EUDAMED, the German Institute for Medical Documentation and Information (DIMDI).

The Act on Medical Devices that transposes EU law into German law reinforced a number of provisions arising from pre-Community regulation of heavy equipment in health

facilities and doctors' offices (MedGV). Although the federal ministry of health was authorized to issue a safety plan for medical devices, none exists as yet due to the need for coordination among 80 organizational units, some federal but most regional. In this field, BfArM reports a need for European-wide action and harmonization with other EU member states and the Commission. In the absence of such a safety plan or a European consensus, regional health authorities probably do what they deem necessary.

Beyond the federal level, implementation is carried out by 16 regional authorities. These are also competent authorities, which may but need not engage in the same practices for monitoring the market, carrying out site inspections, overseeing health facilities, and enforcing the MPG. They also play a crucial role in health surveillance and vigilance. Although it is hard to make predictions, there are likely to be some expected variations in implementation due to regional differences in public administration, with the *Länder* handling their health-related responsibilities in different ways.

In summary, many questions about implementation and enforcement remain open. For example, do implementers—national, regional and district—follow the meticulously outlined legally non-binding MEDDEVs, the newly developed *European NB-Recommendations* and Commission's guidance documents when interpreting the directives and responding to implementation problems? Or do they simply rely on the legal texts which admittedly are often lacking in clarity, precision and sometimes even common sense? Moreover, at the time of writing it is not clear what the 27 member committee on medical devices established by the MPG (article 35 MPG) is doing, how experts are recruited, where they come from, or to whom this committee is accountable. Running a secretariat at BfArM does not answer this question. Little information is available about the participation of expert committees of medical professionals and other scientific communities in vigilance and health surveillance, or what regional authorities are actually doing. Next, the MPG required the establishment of a joint federal-land committee which is meeting on a regular basis. It has been successful in revising a few existing ordinances in order to be in line with EU directives, but it has failed to adopt the remaining ordinances, notably on a vigilance system. With the publication of the MPBetreibV on the operation, installation and use of medical devices on June 29, 1998, some progress was made.

At issue is also the extent to which the Act on Medical Devices has added requirements stemming from prior laws and ordinances in addition to those that stem from EU directives. Mr. Will (1998), who now seems to be heading section 9 within BfArM, provided a summary when he was still working in the private sector:

- “Any clinical investigation project involving facilities in Germany
- Any clinical investigation activity to be performed in Germany
- Production of medical devices*
- Placing medical devices on the market (for the first time, including information on the devices or categories of devices)*
- Further distribution, if distribution channel is regulated, including.....*
- Import of medical devices, including...*
- Assembling and sterilisation of medical devices*
- Responsible safety manager* ”

Requirements marked with an asterisk apply only to manufacturers, representatives, importers and other entities, whose registered place of business is located in Germany.

According to an industry insider, the passages concerning clinical investigations which cannot yet bear the CE mark “are almost a literal copy of the German Drug Law.” In his view, “whereas drugs normally can be tested with healthy volunteers, it is normally not helpful to test medical devices in healthy people.” There are more highly telling discrepancies between the EU directives and the MPG and instances which seem to indicate that Germany “overregulates” aspects which seem unimportant in the two other countries. But they cannot be discussed here. One illustration: Annex VIII of the MDD speaks about a period of “at least five years” that documentation on “medical devices for special purposes--clinical investigations and for custom-made devices--” has to be kept. Apparently, the representatives of the *Land* governments in the Bundesrat want to extend this period to ten years.

In conclusion, there is no way of knowing at this moment whether the protection level for risk groups is higher or lower in Germany than in France or in the UK. Nor whether Germany is adding more national provisions than her two neighbors. In the end, with more policy issues being resolved through EU directives and European level consensus-documents and guidelines, German implementers, wherever and for whatever they are responsible, will no longer be able to rely solely on legal texts and procedures. Nor can the flow of information merely be considered as rerouting files and meeting legal requirements. It is by no means the

case that all actual and as yet unidentified implementation problems are of the drafters' making alone, nor of the MPG, the old and new ordinances in Germany, or the EU directives. However, a good many are.

3. United Kingdom: Sectoral regulatory structure.

The single most important influence on implementing the EU regulatory regime in the UK is the existence of the NHS, which has important implications for the post-Community regime. For more than four decades, the NHS has been the biggest purchaser of medical devices and equipment in the UK, and the largest health care provider for all population groups. It has established a distinctive vigilance and surveillance system in place over healthcare providers and health sites, which now needs to be adapted to the new situation.³⁴ The Medical Devices Agency (MDA) is the UK's Competent Authority under the EU regulatory regime. MDA and its predecessor served as the negotiator for developing the three directives throughout the European Union. MDA has a full agenda of regulation of medical devices under EU legislation. The current mix of rules and practices flow out of a mix of European legislation and previous regulatory practices under a voluntary regulatory regime and pre-existing British Consumer Law (1987), the Medicines Act of 1968 and the Health and Safety at Work Act of 1994. The MDA became an Executive Agency in 1994 headed by Alan Kent, who came from the private sector. He reports to the Secretary of Health and is accountable to Parliament on all matters concerning the agency.

The shift from a voluntary and more pragmatic to a statutory and legalistic approach marks the most important change while the organizational building blocks of regulation in the pre-Community and post-Community approaches remain fairly the same.

According to information on the Internet (as per 2/99) the MDA³⁵ is responsible for six tasks, many of which are complementary.

- as UK Competent Authority: negotiating European Directives and introducing and enforcing UK Regulations for medical devices;
- investigating adverse incidents associated with medical devices and their use, and helping to prevent further incidents by communicating findings to those who make or use the devices
- managing an on-going and independent program to evaluate medical devices, and provide a range of services, including consultancy advice, published reports and comparative surveys, which enable device users to select equipment suitable for their needs, providing information to purchasers of supplies, and contributing to improved

- equipment design and performance;
- contributing to the preparation of non-statutory safety and performance Standards for medical devices in support of the European Directives and International Standards;
- offering advice to Ministers, the Department of Health, the NHS and other healthcare providers, device users and their Professional Bodies, manufacturers and other customers, on all aspects of medical devices and their use; and
- providing support services for the activities above, including: central management; financial; information systems; personnel functions and human resource development; and clinical advice.

The Adverse Incident Centre (AIC) (within the MDA's DTS1) receives reports of incidents or near incidents from users and manufacturers. Like the German ethics commission and the group of experts in France, the UK has established an eleven-member In Vitro Diagnostic Advisory Committee (IVDAC) of independent experts in the field of pathology and laboratory medicine to advise MDA in all matters relating to IVD products. Its members are drawn from the NHS, academia, the Public Health Laboratory Service (PHSL) and The Blood Transfusion Service. IVDAC is responsible for providing expertise in the following pathology disciplines: biochemistry, haematology, general microbiology, virology, immunology and molecular biology. Meetings are held about three times a year. Recent agenda items have included near patient testing, adverse incident reporting and 'over the counter' sale of IVDs.

The MDA publishes all EU directives pertinent to medical devices, UK statutory instruments and Directives Bulletins, Guidance on The EC Medical Devices Directives, Compliance Leaflets and a range of other publications (as per 2/16/1999). It issues *Hazard Notices* and *Safety Notices* to health providers when necessary. All are distributed widely through the NHS and the independent sector supported by streamlined channels of responsibility and accountability in a two-way flow of information.³⁶

A January 1999 Notice stopped short of by-passing physicians by recommending that patients contact their general practitioner if they had questions. The MDA intends to develop an appeals system for manufacturers who wish to challenge regulatory decisions not already covered by a legislative right of appeal. Manufacturers who complain about the handling of their files can appeal to an "independent adjudicator who has considerable experience in the healthcare sector but who no longer has any direct contact with, or allegiance to, either the Agency or the medical device industry."

The MDA runs its own tests and evaluation centers (see under DTS2 and 3) but

also delegates responsibilities for testing and evaluating to independent specialists in hospitals and universities. It gives advice and consultancy to the National Health Service, healthcare providers and the community, as well to device manufacturers for the conditions of obtaining the CE mark.

Trusts are called upon to respond to the MDA's recommendation and formulate local policies, based on medical devices and communications equipment in use.

The record of oversight and monitoring activities in the UK to date cannot be taken to mean that the UK does much better than France and Germany.³⁷ Nor does it mean that the UK is more active under the EU regulatory regime than under the voluntary regime that preceded it. For a before-after evaluation to be feasible, longitudinal data are necessary. What this record means, above all, is that the leading UK officials do not hesitate to share information with an international audience, albeit at a forum which took place on home territory. Representatives from France and Germany did not present such empirical data either because they do not exist, or because someone else controls them, or because their perception of what can be shared at an international gathering differs.

Conclusion and future research

Some tentative conclusions can be drawn from this report, despite the preliminary nature of this research on domestic implementation. Medical devices come in various shapes and forms and are at the center of patient care, clinical investigations, and scientific medicine. In this field, as in other policy sectors, the emerging dynamics between market integration, which is a Union task, and control over pre-market regulation, post-production surveillance and vigilance, and the financing and organizations of health care systems, which are tasks reserved to each EU member state, underpin practically all the recent developments and activities in this sector.

Supported by the leading players-- the Commission, national authorities and regulators, the global industry, European trade associations and an array of different scientific professions--the EU directives on medical devices set overall goals for the unhampered flow of a wide range of medical products. They facilitate new ideas for product development, high quality, and safety and performance levels, while building on home country controls for their implementation. In actuality, home country controls mean multiple levels of action and routines

carried out by a myriad of organizational actors in France, Germany and the United Kingdom. In addition, the directives that created the medical device vigilance system (MDVS) and adverse incident reporting emphasize health surveillance and vigilance while encouraging wider cooperation among a much larger group of interested parties. This, in turn, has created a considerable need for coordinating action among an equally large number of actors, and cooperation at numerous levels of both policy and operational tasks.

So many factors influence the degree of implementation. It has been hard to piece together scattered information on manpower, resources, communication and the flow of information within each country. At this stage, it is difficult to single out anyone as being more important than the other. In each of the three countries, a hierarchy of pre-existing legal and administrative instruments has to be adapted to European law. More importantly, comparison in this technologically highly complex field raises fundamental issues concerning the meaning of the intention of EU regulatory policy and its implementation on the ground. The requirements for cooperation and coordination have little to do with law and procedures and a great deal to do with the perception of responsibility, commitment to the new regime, as well as social interaction among the implementers in each country. Issues of meaning and interpretation will not become any easier once the information is available from the field. In sum, the shift from a pre-European to the European regulatory regime needs to be seen as an on-going process and it will be years before it is fully in place.

By all accounts, placing medical devices on the market and putting them into use service for use in patient care and scientific research through the application of uniform European rules, decision-making and compliance procedures, encounters strong and distinctive state-centric traditions of governance, public administration and law. The intention of EU directives is to shift major responsibility to manufacturers and to private sector organizations (NBs). Yet, as the developments over the last ten years have shown, the EU-initiated regulatory approach continues to rely heavily on a strong role for the Competent Authorities, which are state-based institutions. NBs also remain embedded in the medical devices sector as in the past, and the handling of certification issues has not changed markedly even though their regulatory tasks have increased and changed.

The intention of the early supporters of a separate regulatory regime for medical devices has been to clarify the organization of authority for policy and operational tasks for all parties involved. In practice, however, the jurisdictional lines which have just been drawn between routine responsibilities under the regulatory regime for medicinal products and medical devices are being blurred for reasons related to rapid advances in biomedical research and technology. This will increase the pressures to work together and coordinate activities between the two separate regulatory regimes. And the powerful multinational companies and European trade associations in the medical devices sector, which struggled for years to establish a separate medical devices regime, are determined to lend their full support to the EU regime on medical devices.

The lines between public authority and professional authority are equally mingled, regardless of whether public authority is delegated to private certification organizations (NBs), professional organizations, or advisory committees for adverse incident reporting and health surveillance. To judge by the implementation design that each country has put into place, the role of experts and regulatory specialists in the implementation of EU regulatory policy appears strong, but nothing is known about how they make decisions on implementation.

Ensuring safe products is a *sine qua non* of any advanced healthcare system. Medical devices, their use in clinical investigations and the use of human or animal tissue, open a debate that is at the intersection of other debates over: policy, professional and scientific issues, ethical issues, management and governance. From a medical and humane standpoint, stricter rules for medical devices, health surveillance and vigilance appear the right and desirable outcome. From a comparative perspective, it will be a challenge to find out after field work is completed whether and how these four clusters of issues are addressed in the public debate in France, Germany and the United Kingdom. By the same token, field work will have to explore how the ideology of giving less responsibility to the state and more responsibility to the private sector by transferring certification functions to private certification bodies actually plays out in reality given the strong state-centric tradition in each country.

If perceived market restrictions between the three countries remain important due to divergent national rules, experts agree that they can be found in safeguard clauses for public

protection. These are the subject of on-going research.

"Working for health and consumer health protection" is the logo of DIMDI, the operator of EUDAMED for Europe. If it is to be credible in an integrated European market for medical devices, there needs to be an open flow of information and experience, and considerably more transparency than is currently the case in any of these countries and, at the same time, greater protection of patients and consumers. The Commission appears to be aware of these issues and has invited representatives of the concerned parties to help to develop a code of ethics acceptable to all parties: manufacturers, national regulators, accreditors, certifiers, verifiers and those making site visits.

In summary, the first stage of the implementation of European regulatory policy on medical devices has already harmonized rules for cross-border trade, lifted restrictions on the movement of medical devices. It also began a process of revisiting implementation experience gained between 1993 and 1998. Stage two, in effect since June 14, 1998, has stiffened requirements for implementation and has focused on the need to coordinate action among a wide group of organizational actors domestically, transnationally and internationally. Stage three, when the EUDAMED covering products falling under the AIMD, MDD and IVDD is intended to be fully operational, will start around 2003 or 2005. By moving away from the registration of notifications of all sorts and bureaucratic requirements toward a genuine observatory of health risks perceived and defined more broadly, it could raise the level of health surveillance and vigilance further. During this time, it is possible that health advocates may also be seeking stricter controls on medical devices by tightening EU regulations and pressuring member states to make use of the safeguard clause more often than they have in the past.

Endnotes

1. The new IVD directive (1998) added two crucial specifications: "Whereas instruments, apparatus, appliances, materials or other articles, including software, which are intended to be used for research purposes, without any medical objective, shall not be regarded as devices for performance evaluation." Another insert speaks to health protection. "This Directive does not affect the application of Council Directive 96/29 EURATOM of 13 May 1996 laying down basic safety standards for the protection of health of workers and the general public against the dangers arising from ionizing radiation."

2. Commission Decision 97/534/EEC. Specific Risk Material is defined as (1) the skull brains, eyes, tonsils and spinal cord of all such animals, which are over 12 months old, and of ovine and caprine animals, which have a permanent incisor tooth, erupted, through the gum; (2) the spleen of ovine and caprine animals; and (3) the entire body of an animal in which TSE has been diagnosed.” EUCOMED SRMs/Initial Statement/12.01.98, 4pp, here p.1; Letter (dated 12 January 1998 of EUCOMED to CEC Directorate General III, Mr. Norbert Anselmann, Head of Division, Medical Devices.

3. Examples of such materials are stearic acid derivatives used in the processing of PVC, polyamide, polyester and other plastics.

4. Article 1 of the MDD does not apply to (f) transplants or tissues or cells of human origin nor to products incorporating od derived from tissues or cells of human origin. (g) transplants or tissues or cells of animal origin, unless a device is manufactured utilising animal tissue which is rendered non-viable or non-viable products derived from human tissue.

5. The latest work on comitology is EU-Committees as Influential Policymakers edited by M.P.C. Van Schendelen 1998. According to this analysis, the three major committee types are: about 150 advisory committees, about 60 management committee and about 80 regulatory committees. Wessel provides an estimate that “less than three hundred of roughly 1000 committees are part of so-called comitology. “

6. The new Article 14b on particular health surveillance measures under the following conditions says: “Where a Member State considers, in relation to a given product or group of products, that, in order to ensure protection of health and safety and/or to ensure that public health requirements are observed, the availability of such products should be prohibited, restricted or subjected to particular requirements, it may take all transitional measures necessary. It shall then inform the Commission and all the other Member States giving the reasons for its decision. The Commission shall, whenever possible, consult the interested parties and the Member States and, where appropriate, adopt necessary measures in accordance with the procedure referred to in Article 7(2).”

7. Boundaries between medical devices and pharmaceutical drugs

Directive 93/42/EEC MDD	Directive 65/65/EEC MPD	Medicinal Products Extension Directives
Art. 1 (2a) “medical devices”	Art. 1(3) medicinal product	Directive 89/343/EEC relating to radiopharmaceuticals
Art. 1 (3) “drug delivery devices”		Directive 89/342/EEC relating to immunological products
Art. 1 (4) “devices in-		Directive 89/381/EEC relating to

corporating medicinal substances with ancillary action.”

blood products

Source: The European Commission. Directorate General. “Demarcation between Medical Devices Directives and Medicinal Products Directives”

<http://europa.eu/int/comm/dg03/directs/dg3d/d2/meddev.guide/md-aimd/aborder.htm>

This document, along with many other so-called “meddev” guidelines, were prepared by expert groups including experts from the Commission, industry trade associations and competent authorities for medical devices and medicinal drugs in the member states. The source states: “The present document has no legal force.”

8. To date, some 100 harmonized standards are adopted and published. Additional standardization mandates are considered that focus in particular on risk assessment; ways to avoid or reduce the possibility of user errors and improve the decision-making process with regard to acceptability in view of risk/benefit ratio.

9. A discussion of the politics of standard setting and how it bears on EU regulatory policy is excluded from this paper.

10. *Class I*: General unpowered (non-active) devices which do not penetrate the body or non-surgically invasive devices for transient use (less than 60 minutes). Some low risk, powered (active) devices for patient support or examination.

Class IIa: Generally non-hazardous active therapeutic and diagnostic devices. Low risk, surgically invasive devices for transient use or short term use (up to 30 days)

Class IIb: Generally potentially hazardous active therapeutic and diagnostic devices (e.g. X-ray sources). Higher risk surgically invasive devices for transient use or short term use. Surgically invasive devices for long-term or implantable (non-active) use (not more than 30 days).

Class III: All devices which make contact with the heart, central circulatory system or central nervous system. All long term invasive or implantable devices which have biological effect on the body or are absorbed into it.

Source: “Understanding the Regulatory Mumbo Jumbo.” <http://www.techintl.com/cemarking.htm>. Dated 17.06.98

11. MEDDEV 3/93-rev.2. Quoted from The MEDDEV as reproduced twice verbatim by the UK competent authority and updated in The Vigilance System: Update on the Directives. June 1998.

11. Safety Notice MDA SN 1999(01) January 1999 is verbatim text from the IVD directive and/or the MDDEV. What to report? (Text is from UK Reporting of Adverse Incident.

13. Hospital Healthcare Europe 1998/99, p.15.

14. European Commission, Directorate General. Guidelines, p.3.

15. Essential requirements are outlined for chemical, physical, and biological properties, infection and microbial contamination; construction and environmental properties; devices with measuring function; protection against radiation; requirements for medical devices connected to

or equipped with an energy source (including electromagnetic compatibility); and information to be supplied by the manufacturer (EC Commission, 1994). See EUCOMED's Guidance on the practical interpretation of the Essential Requirements-ER Guidance 26/06/94.rev. I.

16. In article 1(2) the IVD directive adds a definition of an “authorized representative. “An “authorized representative” means “any natural or legal person established in the Community who, explicitly designated by the manufacturer, acts and may be addressed by authorities and bodies in the Community in substitution of the manufacturer with regard to the latter’s obligation under this Directive.”

17. “Understanding the Regulatory Mumbo Jumbo.” <http://www.techintl.com/cemarking.htm>

18. Annex 8 “Minimum criteria to be met when designating inspection bodies to be notified.” Section 2. [Http://europe.eu.int/comm/dg03d/directs/dg3/d2/meddev/aimd/diraimd/annex8/htm](http://europe.eu.int/comm/dg03d/directs/dg3/d2/meddev/aimd/diraimd/annex8/htm).

19. Annex 8 “Minimum criteria to be met when designating inspection bodies to be notified.” Section 5.

20. EDMA, “The In Vitro Diagnostic Directive Countdown.” Laboratory Testing: A Basis for Better Decisions in Health Care.” <http://www.edma-ivd.be/Press%20releases/presrelstat97.htm>.

21. *European NB-Recommendations* are guidance documents, like MEDDEVs, that is, they are legally non-binding.

22. ECRI uses UMDNS in its data banks (e.g. Health Devices Source-Base; Health Devices Alerts and other ECRI-based data banks).

23. Internet updates up to April 1999.

24. A Task Force comprised of Commission staff, NBs, and European Manufacturers Associations is in the process of preparing a recommendation for the evaluation of clinical data in the context of CE marking. It aims to address several outstanding issues:

- (i) general aspects and conditions of scientific validity of data from scientific literature,
- (ii) general aspects and conditions of scientific validity of data from clinical investigations
- (iii) conditions for the critical report to be provided by the manufacturer
- (iv) decision making process including a guidance for addressing the acceptability of the benefit/risk ratios and of the state of the art.

Work is also on-going for the assessment of particular categories of devices

- devices manufactured with animal tissues or derivatives and
- breast implants

25. In this paper, references to statutory instruments and implementing provisions specific to each country are kept to a minimum.

26. EUCOMED (1998) Annual Report 1997-1998. Corr.15/98. Date: 3 August 1998.

27. SNITEM. Syndicat National de l'Industrie des Technologies Médicales. Address of Mr. Bernard Kouchner, Secretary of State for Health Care. Annual Meeting of the SNITEM. Paris, June 18, 1998 (EUCOMED # 010030), p.3.

28. Specifically, the organizational actors are: 1. the *Ministère de la Santé: Agence de Sécurité des Produits Sanitaires (ASPS)*; 2. the *Caisse Nationale d'Assurance Maladie des Travailleurs (CNAMS)* responsible for reimbursement matters under the French TIPS scheme (*Tarif Interministériel des Prestations Sociales*, introduced in 1980 as a so-called positive list), the N.G.A.P. scheme (*Nomenclature des Actes Professionnels*) for practitioners and the ...scheme and U.C.A.N.S.S./PMSI(?).

29. EUCOMED. Annual Report 1997-1998, and Corr 15/98. Date 03 August 1998. See the section under France.

30. SNITEM. Syndicat National de l'Industrie des Technologies Médicales. Address by Mr. Bernard Kouchner, Secretary of State for Health Care. Annual Meeting of the SNITEM, Paris, June 18, 1998 (EUCOMED # 010030), p.3.

31. This section draws on the author's "Implementing EU Regulatory Policy on Medical Devices: The Case of Germany" (1998) and information from the trimesterly Medizinprodukte-Journal published by the Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart.

32. DIMDI <http://www.dimdi.de:80/engl/mpgengl/ca-list.htm> (as per April 4, 1999).

33. Reflecting the range of regulated products through EU directives, section 9 (of BfArM) consists of five subdivisions: 1. active medical devices (implantables, non-implantables, orthopaedic devices, rehabilitation and physiotherapy); 2. non-active medical devices (implants, biomaterials, dental products, dressings and other care products, control of conception and venereal disease); 3. IVD products (clinical chemistry, bio-chemistry, haematology; Radio-Immuno-Assay Sample (RIAS), microbiology, immunology); 4. coordination, standardization and research; 5. risk management.

34. In 1994, I had a lengthy interview with three representatives of what used to be the Medical Devices Directorate.

35. MDA is organized into four horizontal organizational units:

1. *Device Technology and Safety* with full responsibility for the investigation of adverse incidents has six subunits:

"DTS1 is concerned with investigating the faults of, and giving advice on, sterile, surgical, in vitro diagnostic, dental and ophthalmic devices.

DTS2 deals with rehabilitation and transfer equipment (eg artificial limbs, orthotics, walking aids, and patient lifting devices) (Out-stationed at: Hinchley Wood, Kingston by-pass Road, Surbiton, Surrey. KT6 5QN.

DTS3 deal with powered and non-powered wheelchairs and associated pressure relief cushions,

seating and supports (Out-stationed at: 241 Bristol Avenue, Bispham, Blackpool. FY2 OBR.

DTS4 is concerned with devices for diagnostic imaging, therapy, measurement, electro-surgery and disability.

DTS5 is concerned with critical care devices.

DTS6 is concerned with active (powered) and non-active implants and materials used in medical devices (including animal tissues).

2. A *Clinical Team*, comprising specialist expertise (medical and nursing) to support the entire range of responsibilities of the MDA's business, is to "increase awareness of the Agency's role in the NHS and among Professional Bodies."

3. *European and Regulatory Affairs* (ERA), the UK's Competent Authority, has responsibility for appointing and auditing Notified Bodies while also approving clinical investigations. It controlled the Manufacturer Registration Scheme (MRS), which was discontinued on June 13, 1998.

4. *Device Evaluation and Publication* (DEP) issues the Device Bulletins (DB), Hazard Notices (HN) and Safety Notices (SN). A major responsibility is to oversee independent medical device evaluations.

36. Through central guidance from the MDA, health care workers are reminded to

- establish a system to encourage the prompt reporting of adverse incidents relating to medical devices to the MDA;
- regularly review these procedures and update as necessary; and
- ensure that adverse incident reports are submitted to the MDA in accordance with this Notice.

They are to report: a death; life-threatening illness or injury; deterioration in health; temporary or permanent impairment of a body function or damage to a body structure; the necessity for medical or surgical intervention to prevent permanent impairment of a body function or permanent damage to a body structure; unreliable test results leading to inappropriate diagnosis or therapy.

37. Alan Kent, the head of the MDA in London, gave this progress report for the United Kingdom to an international forum of specialists in medical devices. By the end of February 1998, the MDA had:

- Registered 1397 manufacturers of Class I medical devices
- Registered 680 manufacturers of custom made devices, mainly dental.
- Registered 219 assemblers
- Received an average of 25 vigilance reports a month....compared with 450 adverse incident reports from users under our adverse incident scheme
- In 1997 30 of these qualified as reportable to the EU and other M-S, MDA received 28 in return during the same period
- Initiated 80 compliance investigations of manufacturers registered with MDA (i.e., self-certified devices); 41 of which remain open.
- Investigated 53 manufacturers in response to reports and vigilance, of which 26 remain open.
- Reviewed 229 applications for clinical evaluation
- Triggered the Safeguard Clause on one occasion.
- Completed 14 surveillance visits to its 9 Notified Bodies
- Has been served with one writ challenging a regulatory decision (the case has yet to reach the Court and issued 1 Suspension Notice.
- Spent 14% of its total activity time on European Regulatory matters, including negotiating the third Directive".

On vigilance, John Worroll of the MDA, reported at the same public forum on the increasing number of vigilance reports received by the MDA between 1995 and 1997. The same

applies to user reports which increased from about little over 4000 to over 5000 for regular reports while reports concerning serious incidences declined from 1995 to 1997.

References

Altenstetter, Christa (1994). "European trade associations: mobilizing for the regulation of medical devices." In: Volker Eichener and Helmut Voelzkow (Hrsg.). Europäische Integration und verbandliche Interessenvermittlung (European integration and associational interest mediation). Marburg: Metropolis Verlag, pp. 349-383.

Altenstetter, Christa (1996). "Regulating healthcare technologies and medical supplies in the European Economic Area." Health Policy. 35, pp.33-52.

Altenstetter, Christa (1998a). "Regulating and Financing Medical Devices in the European Union." In R. Leidl (Ed.). Health Care and its Financing in the Single European Market. Amsterdam: IOS Press, pp. 116-149.

Altenstetter, Christa (1998b). "Collective Action of the Medical Device Industry at the Transnational Level." Current Politics and Economics of Europe. 8(1), pp. 39-60.

American Institute for Contemporary German Studies (1997). The Limits of Liberalization. Regulatory Cooperation and the New Transatlantic Agenda. Baltimore: John Hopkins University.

*Anderson, F. (1994). "The distribution of pharmaceuticals in Europe - Current and future trends in wholesaling." Health Policy. Vol. 27, pp.271-292.

Audry et Poutout (1994). L'Impact de la loi Huriet-Sérusclat sur l'industrie du génie biomédical. Technologie et Santé. Numéro Spécial. Nr. 17, Avril. Rapport au Ministère de l'Industrie, des Postes et Télécommunications et du Commerce Extérieur.

Banta, H.David., Hellen Gelband, Egon Jönsson, and Renaldo N. Battista (1994). "Health care technology and its assessment in eight countries: Australia, Canada, France, Germany, Netherlands, Sweden, United Kingdom, United States." Health Policy. Special Issue. Vol 30 (1-3), pp.1-421.

Begg, Iain. (1996). "Introduction: Regulation in the European Union." Journal of European Public Policy. Vol. 3(4), pp.525-35

Bermann, George A. (1997). Harmonization of Legislation in Federal Systems—Constitutional, Federal and Subsidiarity Aspects—The European Union and the United States of America Compared. Yonkers, N.Y.:Juris.

Bogason, Peter (1991). "Control for whom? Recent advances in research on government guidance and control." European Journal of Political Research, vol. 20, pp.189-208

Brus, Helena (1994). "Pharmaceutical consumption and pricing in OECD countries - 1987-1991." In Health: Quality and Choice. Paris: OECD, pp.111-119.

Burstall, Michael L. (1992). "Europe after 1992: implications for pharmaceuticals." Health Affairs. Fall, pp.157-171.

Butt Philip, Alan and Christina Baron (1988). "United Kingdom." In: Siedentopf and Ziller, 1988, pp.637-745.

Commission of the European Communities (1994). Guide to the Implementation of Community Harmonization Directives Based on the New and Global Approach. First Version. Brussels and Luxembourg.

Dehousse, Renaud (1997). "Regulation by networks in the European Community: the role of European agencies." Journal of European Public Policy. 4:2 (June), pp.246-61.

Dickinson, Michael (1994). "Paying for prescriptions in Europe." In Health: Quality and Choice. Paris:OECD, pp.83-109.

Ecole Nationale d'Administration (1998). Séminaire ENA sur la sécurité sanitaire (novembre 1998). [Http://www.ena.fr/F/sg/semin/presentationac98.htm](http://www.ena.fr/F/sg/semin/presentationac98.htm)

Edwards III, George C. (1980). Implementing Public Policy. Washington, D.C.: Congressional Quarterly Press.

Eichener, Volker (1998). "European health and safety regulation: No 'race to the bottom'." In Unger and Waaden (1998), pp.229-251.

Elmore, Richard F. (1979). "Backward Mapping: Implementation Research and Policy Decisions." Political Science Quarterly, 94 (4), pp.601-616.

European Commission. Directorate General III (1999). All information relevant to medical devices (as of February 1999). <http://europa.eu/int/comm/dg03/directs/d2/meddev.guide/md-aidm/border.htm>.

European Confederation of Medical Devices Associations publishes an annual report entitled EUCOMED 1998/99

Goggin, Malcolm, L, Ann O'M Bowman, James P. Lester, and Laurence J. O'Toole, Jr. (1990).Implementation Theory and Practice: Toward A Third Generation. Glenview, Il. Scott, Foresman & Co.

Gruting, van C.W.D. (Ed.) (1994). Medical Devices: International Perspectives on Health and

Safety. Amsterdam: Elsevier.

Héritier, Adrienne (1995). " 'Leaders' and 'laggards' in European clean air policy." In: Unger and van Waarden, pp. 278-305.

Héritier, Adrienne, Christoph Knill and Susanne Mingers in collaboration with Rhodes Barrett (1996). Ringling the Changes in Europe. Regulatory Competition and Redefinition of the State. Britain, France, Germany. Berlin-New York: Walter de Gruyter.

Hodges, Michael and Stephen Woolcock (1993). "Atlantic Capitalism versus Rhine Capitalism in the European Community." West European Politics. Vol. 16, No. 3 (July, pp.329-344.

Hollingsworth, J.Rogers., Philippe C. Schmitter and Wolfgang Streeck (eds.) 1994. "Capitalism, sectors, institutions, and performance." In Governing Capitalist Economies. Performance and Control of Economic Sectors. New York and Oxford: Oxford University Press, pp. 3-16.

Hospital Healthcare Europe 1998/99 produced in association with HOPE, Standing Committee of the Hospitals of the European Union. London: Campden Publishing Limited, 1998.

Gormley, W. T. and B. Guy Peters (1992). " National Styles of Regulation: Child Care in Three Countries." Policy Sciences. 25, pp. 381-399.

Kanavos, Panos and Martin McKee (forthcoming). "Cross-border issues in the provision of health services: Are we moving towards a European Health Policy.?"

King, Gary, Robert O. Keohane and Sidney Verba (1994). Designing Social Inquiry. Princeton, NJ: Princeton University Press.

Krasner, Stephan. (1983). International Regimes. Ithaca: Cornell University.

Kreher, Alexander (1997). "Agencies in the European Community—a step towards administrative integration in Europe." Journal of European Public Policy, 4:2 (June), pp. 225-45.

Lane, Christerl (1995). Industry and Society in Europe. Stability and Change in Britain, Germany and France. Aldershot: Edward Elgar.

Lowi, Theodore J. (1964). "American Business and Public Policy, Case Studies and Political Theory." World Politics 16, pp. 677-715.

Majone, Giandomenico (ed.) (1992). Deregulation or Re-Regulation. Regulatory Reform in Europe and the United States.

Majone, Giandomenico (1996). Regulating Europe. London and New York: Routledge.

Majone, Giandomenico (1997). "The new European agencies: regulation by information." Journal of European Public Policy. 4:2 (June), pp.262-75.

McGowan, Francis and Helen Wallace (1996). "Towards a European regulatory state." Journal of European Public Policy. Vol.3 (4), pp.560-76.

Mendrinou, Maria. (1996). Non-compliance and the European Commission's Role in Integration. Journal of European Public Policy. Vol. 3 (1), pp.1-22.

Mény, Ives en collaboration avec Marie Pierre Chérel (1988). "France." In Siedentopf and Ziller, 1988, pp.373.

Milner, Helen V. (1997). Interests, Institutions, and Information. Domestic Politics and International Relations. Princeton, NJ: Princeton University Press.

Najam, Adil (1995). Learning from the Literature on Implementation: A Synthesis Perspective. WP-95-61. Laxenburg: Austria: International Institute for Applied Systems Analysis.

Pag, Sabine and Wolfgang Wessels (1988). "Federal Republic of Germany." In Siedentopf and Ziller, 1988, Vol. II, pp.163-229.

Sabatier, Paul and Daniel Mazmanian (1980). "The Implementation of Public Policy: A Framework for Analysis, Symposium on Successful Implementation Special Issue Policy Studies Journal, Vol. 8, Special Issue # 2, No. 4, 1980: 538-560.

Sandholtz, Wayne and Alec Stone Sweet (1998). "Integration, Supranational Governance, and the Institutionalization of the European Polity." ch. 1 of European Integration and Supranational Governance. Oxford: Oxford University Press, pp.1-26.

Shapiro, Martin (1997). "The problem of independent agencies in the United States and the European Union." Journal of European Public Policy. 4:2 (June), pp. 276-91.

Schendelen, M.P.C.M. van (1998). EU Committees as Influential Policymakers. Aldershot: Ashgate.

Siedentopf, H. and J. Ziller (eds.) (1988). Making European Policies Work. The Implementation of Community Legislation in the Member States. London: Sage. Vol. I Comparative Syntheses.

Siedentopf, H. and J. Ziller (eds.) (1988). Making European Policies Work. The Implementation of Community Legislation in the Member States. London: Sage. Vol. II. National Reports.

Unger, Brigitte and Frans van Waarden (eds.) (1998). Convergence or Divergence? Internationalization and Economic Policy Response. Aldershot, Brookfield: Avebury.

Van Waarden, Frans (1998). "Persistence of policy styles: A study of their institutional foundations." In Unger and Waarden (1998), pp.333-3

Victor, David G., Kal Raustiala and Eugene B. Skolnikoff (eds.) (1998). The Implementation and Effectiveness of International Environmental Commitments: Theory and Practice. Cambridge, Mass.: MIT Press.

Vogel, David (1997). Barriers or Benefits? Regulation in Transatlantic Trade. Published for the European Community Studies Association. Washington, D.C. Brookings Institution Press.

Wilks, Stephen (1996). "Regulatory compliance and capitalist diversity in Europe." Journal of European Public Policy 3:4 (December), pp.536-59.

Yanow, Dvora (1996). How Does a Policy Mean? Interpreting Policy and Organizational Actions. Washington D.C.: George Washington University.