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Intellectual Property & the Academic Community

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INTELLECTUAL PROPERTY AND THE ACADEMIC COMMUNITY

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FOREWORD

In 1983 in her foreword to *Intellectual Property Rights and Innovation* – the Nicholson report – the Prime Minister Margaret Thatcher stated:

‘individuals generating new ideas, whether in universities, companies, Government research establishments, or even in schools, should take very seriously indeed the protection of those ideas’.

This philosophy has been promoted vigorously since that report and there is now a greater awareness of the value of ideas. However, which ideas should be protected and when? Who should exploit them and how? Who should profit? These questions have become increasingly difficult to answer. There is inevitably a potential conflict between the openness of scientific research and the competitiveness of the commercial world. The fundamental problem is how to operate the patent system in a way that encourages both research and its exploitation.

The National Academies Policy Advisory Group was formed in 1992 and in Spring 1993 it was agreed that the spectrum of issues thrown up by intellectual property required the multifaceted approach that NAPAG could offer. Thus, a working party comprising scientific, technological, medical, ethical, commercial and legal expertise began work in June 1993. The working party consulted widely and I would like to thank all those who contributed to its deliberations.

Intellectual Property and the Academic Community is published as a statement of NAPAG. I hope that all those with an interest in the impact of IP issues on creative work, or the way current IP regimes cope with technological advance, will consider this report. The issues are complex and will take time and effort to resolve, both at the national and the international level. The report suggests some actions that may be required and offers views on what further examination may be necessary.

Sir Michael Atiyah, O.M.
President of the Royal Society
Chairman NAPAG 1992–1994

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PART I INTRODUCTION

INTRODUCTION

1. IPRs AND ACADEMIC SCIENCE

1.1 Prominence of IP Issues

In Great Britain as elsewhere, intellectual property rights (IPRs) are much in the public eye. Persistent attention has been given in recent years, for instance, to patenting within the framework of the Human Genome project, to the propriety of procuring animals for experimentation by manipulation of their genetic structure, to the protection of newly generated computer programs, to rights in databases, multimedia products and the burgeoning information industry in general. The academic community, as a major generator of intellectual property, has special interests in the subject. The issues range widely.

There are fundamental questions: over the general acceptability and scope of IPRs; and over their potentially distortive impact on the processes of scientific research.

There are practical considerations: What personnel and procedures should be in position for acquiring the rights? What conditions should govern a research collaboration with industry or an outside investor? How should the rights be turned to account – by sharing in production risks or by licensing? Who should bear the responsibility of enforcing the rights through legal proceedings?

1.2 Relation to Other Policy Debates

This growing concern over IPRs is one element in larger debates: about the changing objectives, forms and funding of higher education in general; about the place of scientific research in universities; about the increasing interdependence and interpenetration of basic research and technological development in almost every field; about the contribution which this research can and should make to new spheres such as biotechnology and information science; about the ethical and social issues which these developments raise.

It is within the framework of current change that this report seeks to isolate and comment upon the relationship between IPRs and research in the non-industrial sphere.

1.3 Types of IPR

IPRs are an essential part of industrialisation and exist primarily to give developers and producers competing in free markets the exclusive right to make and distribute products embodying particular ideas and symbols.

The various forms of right – patents for inventions, trade secrets and other confidential information, copyright, plant variety rights, rights in semi-con-

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ductor topographies, trade marks and names – vary considerably in detail. A basic description of the differences is to be found in Appendix I.

It is important to understand that these rights are separate and each of limited purpose. Restricting the scope of any right ensures that no person acquires exclusive legal rights which would unduly inhibit competition in the use of ideas.

There is a tendency in the scientific community today to use ‘intellectual property’ as a synonym for ‘discovery’ or ‘research results’. This loose usage may suggest that there is some overarching legal right of unspecified scope in information or ideas which ranks as original: this is not so. Intellectual property law in all countries is much more selective than that and rightly so.

1.4 Purpose of IPRs

The ubiquity of IPRs in developed economies, and their considerable similarity between one country and another, stand testimony to their general usefulness as legal underpinnings of industry and commerce. They are a particular means of fostering creativity and financial investment in ideas which will make economic and social existence more efficient, and will add significantly to consumer choice.

At the same time IPRs express

an instinct for justice that seeks to reward a creative thinker for the results of mental activity, by some measure of legal protection for those results against imitation in the market-place.

IPRs form a complement to the direct subvention of research by government, charitable foundations and industry, acting as an incentive to investment and effort at the stage of commercialisation.

1.5 Government Research Policy and IPRs

The UK government is seeking ways of increasing the ‘productivity’ of academic research, which it funds directly to a very considerable extent. The Office of Science and Technology’s 1993 White Paper, *Realising our Potential*, signals not only some major re-orientations in the administration of research grants but lays particular emphasis on the encouragement of collaboration in academic–industrial partnerships of one kind or another. An important example is the Technology Foresight Programme, a systematic process involving industrialists and academics in the assessment of market opportunities and scientific and technological developments likely to have a major influence on wealth creation. The Government will draw upon the results of the Foresight Programme in setting priorities for its own R&D funding. In the White Paper and the publicity for Foresight, there

is only fleeting reference to IPRs and the commercialisation of research results. However, these questions are vigorously pursued in another, slightly earlier OST Paper, *Intellectual Property in the Public Sector Research Base*. This argues that universities and government research institutes must adopt internal policies which will ensure that, whenever possible, the commercial potential of research will be identified and promoted.

The two Papers clearly involve complementary policies. But the potential for strain between them undoubtedly exists. It is a major concern of this Report.

2. ACADEMIC EXPECTATIONS AND IPRs

2.1 Value of IPRs to Academics

Academics, whatever their discipline, have long benefited from IPRs. There has been copyright in their writings and similar works, including films and audio-visual productions. There have been patents for their inventions where these can be turned to commercial account. The law also protects information which has been supplied in confidence and this can be relevant to academic work.

Traditionally academics have not shown much interest in shaping intellectual property laws. Accordingly their working practices and expectations have fitted

the different rights with varying degrees of comfort. In general, rights which arise informally on the creation or transmission of ideas (as with copyright and trade secret protection) harmonise more readily with academic attitudes than rights which are acquired only by timely application to a government office (as with patents, registered designs and plant variety rights).

Thus copyright law protects not only against commercial piracy but also against the prime academic sin of plagiarism (which adds to infringement the insult of misattribution). At the same time the law contains exceptions which allow for quotation from works in the process of reviewing and criticising them – a crucial academic activity; and within limits there may also be free private copying, notably for private study or research.

2.2 Results of Scientific Research

Patents for inventions seek to induce those who have made inventions to reveal them as rapidly as possible by giving rights to the first-comer. (In the UK and most other systems the first to apply is entitled to the patent grant. The US is the exception, applying a cumbersome first-to-invent rule.)

Thereafter, even those who make the invention independently are obliged to respect the patent.

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One pre-condition, however, is that no one, including even the first applicant, has previously revealed the invention or something similar to the public. This requirement of the law fits ill with academic needs and calls for further exploration (see further below, Sections 2.7 and 5).

2.3 Traditions of Academic Science

Traditionally the institutional separation of universities from government and industry has ensured that academics decide what scientific research they will do. This freedom has always been subject to the task of obtaining resources for the equipment and staff needed to carry it out. Generally speaking, however, academics have set their own agenda, often with generous, unfettered support for well-conceived projects from both the public and private sectors.

Motivated by personal curiosity, institutional norms and the desire for professional advancement, their interests are centred on the unexplored areas and unexplained basic problems of their subjects, where a significant discovery can attract the acclaim of their peers. This acclaim has not in the past been readily accorded for the practical application of scientific knowledge, which has been regarded as a relatively mundane activity, undertaken at some remove from the academic sphere, in indus-

trial laboratories and government research establishments.

2.4 Practical Thrust of Patents

Reflecting essentially the same dichotomy, scientific work in industry has been centred on the production of knowledge of manifest commercial or social value. This is often organised around the patent system, whose scope is limited to practical applications of scientific knowledge.

By law, patents are available for 'inventions' but not for 'discoveries' and 'scientific theories'; a patent specification has to show some measure of practical usefulness, or capacity for industrial application – the language has varied from country to country, and the meaning to be attached to these general expressions may be difficult to settle (see further below, Section 4).

2.5 Academic Rewards in the Science Base

Although the distinction between pure and applied has now become much less sharp, most university scientists are still deeply involved in academic science. This is undertaken in an international arena which has little to do with the extraction of commercial value from research. Individuals and research teams compete even more strenuously than in the past for the tangible and intangible rewards of coming first with a scientific discovery.

Quite apart from the personal qualities and technical skills that this competition requires and engenders, society gains immeasurably from the inspired and critically tested knowledge that emerges from it.

Nobody – least of all governments responsible for the long-term welfare of their nations – should doubt the ultimate benefit of a healthy, vigorous science base, engaged primarily in the search for knowledge without regard to its immediate practical utility.

2.6 Role of Public Presentation

By its very nature, academic science is ‘public knowledge’. This is not just a sentiment in favour of the supposed good of mankind at large, rejecting the notion of turning potentially beneficial knowledge to personal advantage. Basic science depends for its validity and reliability on the speedy, widespread dissemination of novel research results, so as to expose them immediately to critical analysis and hoped-for acceptance. This is the only way of purging them of errors and misconceptions.

For all their personal rivalries, and occasional secretiveness in the race for priority, academic scientists are unanimous on the importance of publishing new data and theories as soon as they can be presented as sound and convincing. Indeed, this openness

is a necessary condition for any system of personal recognition for scientific excellence.

Academic scientists are thus subject to a highly competitive system of quality control, which provides the framework for innumerable well-established procedures, from the peer review of papers and grant applications, and the obligation to cite earlier work, to the award of Nobel Prizes.

2.7 Demands of the Patent System

As already stressed, established academic procedures are by no means totally incompatible with the grant of corresponding IPRs through the patent system. In both cases, public disclosure of valuable knowledge is the major objective. But the patent system’s requirement of initial secrecy often operates in direct conflict with the academic norm of full and prompt publication. For example:

- While restraint on publication is needed only until patent applications have been drafted and filed, delay could critically affect scientific priority;
- Even when the urgency is less acute, the two modes of disclosure may be quite out of synchronism, with the natural phasing of research papers seriously disturbed by the demands of patenting;
- There may be know-how

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surrounding a patented invention which scientists would normally expect to make available to their colleagues – including even potential rivals – but which from a commercial perspective ought to be kept secret even after patents are applied for.

Faced with such conflicts, many academic scientists retain a preference for early publication. In particular, since the process of deriving commercially viable products from basic research is often so long, uncertain and expensive, they may well reckon (out of hard experience or other good reason) that such prospects lie beyond their concern.

2.8 Search for Greater Compatibility

These objections to the widespread intrusion of the patent system into academic science are not ill-founded. They derive from the basic preoccupations of scientific endeavour and from the way that the science base is organised. They cannot be dismissed today as anachronistic; they will continue to recur. Yet universities and research institutes everywhere are now under pressure to become less dependent on traditional forms of public funding. The cost of much scientific research is accelerating rapidly and the competition for grants from all sources is becoming ever more acute.

Some reasonable accommodation has to be reached between the traditions of scientific research and turning results into applications which are both socially useful and a source of revenue. The need for this accommodation is the greater in those fields where the gap between basic and applied research has ceased to be perceptible. This is so, for instance, in computer science and communications technology and, above all, in medical research.

2.9 Campus Technology Assistance: The Beginnings

Thirty years ago and more, leading US universities began to establish campus units for the industrial exploitation of research results. These units provided expertise in obtaining IPRs and then in finding industrial and/or financial partners for exploitation of the protected ideas. In a few cases, the results bore remarkable fruit. In more there was a substantial, if not an overwhelming, return. It became accepted practice, by way of encouragement and out of a sense of what was fit, that profits of exploited inventions, after deduction of the development costs, fell to be divided between institution and inventors, often with a share also going to the department concerned.

2.10 The British Experience

The US model has now been taken up in many parts of the world, developing as well as developed. In this country, from the late 70s onwards, it has led to the setting up of Industrial Liaison Offices (or now, more purposefully, Technology Transfer Offices) in universities.

Britain has been notable for another development. Since as long ago as 1947 the National Research Development Corporation had been the body through which exploitable results from government-funded research had to be channelled. After more than 30 years of successful operation, the Corporation was restructured as the British Technology Group, and its monopoly position was removed. It has since been completely privatised.

Universities and similar institutions have been expected to establish their own policy for encouraging and organising the exploitation of research results. They must ensure that the necessary IPRs are acquired, using whatever professional assistance seems appropriate. As part of this process, the rights have been acquired by, or assigned to, institutions, in return for settled

arrangements about sharing in the proceeds of exploitation for individual researchers and their departments. This is leading increasingly to more vigorous examination of commercial prospects arising from the work of universities and research units funded by government and charities. (We return to this subject in Part III below.)

2.11 Content of the Report

Against this background the issues particularly addressed in the ensuing Parts of this Report are the following:

Part II assesses the impact on academic research of present and future regimes of intellectual property. For the most part it concentrates attention on patents for inventions because of the difficulties already mentioned. The copyright system and adjuncts to it will be dealt with only in so far as they extend to new technical applications, notably computer programs and databases.

Part III considers how far academic institutions are dealing with IPRs in an effective manner, given the need to respect the traditions and objectives of those institutions.

PART II: SCOPE AND OPERATION OF INTELLECTUAL PROPERTY SYSTEMS

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3. PATENT SYSTEMS: GENERAL

3.1 The Basic/Applied Dichotomy

In recent years there has been noticeable willingness to roll the frontier of what may be patented back into the area of basic discovery. It is a matter of shifting boundaries, not of wholesale annexation of common land. No one is proposing patents for theoretical perceptions at fundamental levels. Nonetheless the movement is strong enough to deserve careful monitoring, not least from an academic perspective.

3.2 Causes of Expansion of Patentable Subject-Matter

The following factors all contribute to the interstitial expansion of patent systems:

- (i) Some theoreticians of intellectual property have argued that patents should be available at an early stage in the process from initial discovery to the working out of practical consequences, because the financial incentives which follow from the protection will bring readier investment to the development process. Patents have been likened to a mining licence, a right to explore a tract for its hidden resources, free from the debilitating dangers of rival prospecting.

Equally it has been proposed that the strict obligation to publish an invention in the patent specification for it should be alleviated; the specification should act only as notification of the person to whom application may be made for more information and a licence.

These proposals have been made in the belief that the incentive effect of the patent system should be rendered even sharper.

- (ii) Courts have recognised that to allow patents in some cases and refuse them in others must have the effect of canalising research in ways which are not self-evidently desirable. They have accordingly been willing to cut back the scope of the exceptions to what is patentable.

The trend was famously marked by the Supreme Court of the United States in its 1980 decision (Diamond v. Chakrabarty) admitting a patent for a novel microorganism capable of eating up oil-slicks: the Court considered that 'anything under the sun', apart from a human being, was patentable, provided that it satisfied the statutory

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criteria of novelty, non-obviousness, usefulness, etc.

There has been a similar European trend. The European Patent Convention (EPC) of 1973 defines a number of exceptions to patentable subject-matter. (These are mentioned below, Section 4.) In deciding upon applications to it, the European Patent Office (EPO) has adopted a presumption that these exceptions should be read narrowly, so as to allow patents in border areas, rather than refuse them.

- (iii) A separate factor affecting the Western European situation is that there are now competing systems for the granting of patents. In 17 countries, applicants may choose whether to proceed through national Patent Offices as of old, or to secure their grants by a single application to the EPO in Munich. Inevitably the competing offices adopt an attitude of helpfulness towards their primary clients, the applicants. The effects of this cannot easily be measured but that is no reason for ignoring it.

The European granting system has proved a success beyond the expectations of many. One part of this satisfaction undoubtedly

stems from the treatment received from the official examiners and appeal boards of the EPO, as well as from such factors as speed of processing and relative cost.

3.3 Demands for Contraction

In the past there have been tides of expansion within patent systems which have led to counter-currents of contraction. The chief force for the latter has come from those in industry who feel themselves unduly checked or confined by patentees. Their arguments point in particular to cases where there has been no sufficient justification for the grant or where the holder of a strategic patent has blocked off further developments by others. The scope of patent systems is always in flux as the search goes on for optimal effectiveness.

3.4 Particular Issues

From the perspective of academic science, there is reason to examine carefully whether the drive in favour of greater protection now needs to be contained. This involves a number of separate issues, grouped below under five headings:

- (i) Patentable subject-matter and utility
- (ii) Prior publication: 'self pre-emption'

- (iii) Lack of rigour in examination
- (iv) Disclosure in the specification
- (v) Exclusion for research

exploitation of which are contrary to *ordre public* or morality'. However, more by way of objection must be shown than that exploitation is prohibited by law or regulation in some or all of the participant states.

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4. PATENTABLE SUBJECT-MATTER AND UTILITY

4.1 Current Exclusions

The patent systems of Western Europe currently exclude from their scope a number of categories of subject-matter. Among these, some reflect a division between basic and applied research – for instance, the exclusion of ‘discoveries, scientific theories and mathematical methods’. Others express a rather difficult set of distinctions about the manipulation of living matter: methods of treating the human and animal body are excluded, while pharmaceutical compositions and substances are within the net; plant and animal varieties, together with essentially biological processes for the production of plants and animals are excluded; however – exception to the exception – microbiological processes or the products thereof remain patentable. Protection of plant varieties is available, in many countries including the UK, under a special, carefully delineated regime.

In addition there is a ‘long-stop’ provision excluding patents for inventions, ‘the publication or

4.2 Interpreting the Exclusions

US patent law does not exclude bands of subject-matter from the scope of patentability by statutory listing. What is within that patent system and what outside, is left for judicial decision. At present, as we have seen, ‘everything under the sun’ is open for consideration and given a fair wind.

The European exclusions have been subject to constant criticism as the course of mainstream science has shifted so rapidly. It is thought to be difficult to amend the text of the EPC directly, since this would involve convening an Inter-Governmental Conference. The EU is currently seeking to procure changes to the alternative national systems of patent law of its Member states, since these can be enacted by Directive. The hope is that, in the light of such a Directive, the EPC would be read by tribunals and judges in the same sense. However, the draft text of the proposed Directive on Rights in Biotechnological Inventions is the subject of fundamental disagreements about the morality and safety of biotechnological research and it is quite unclear how these tensions will be

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resolved. The Common Position of the European Commission and Council of Ministers, which has yet to be agreed with the European Parliament, was published late in 1993.

The Common Position proposed the following main changes to the present concept of patentable subject-matter in the EPC (as set out in Section 4.1):

The concept of inventions which are contrary to public policy or morality, is to be understood by reference to the following distinctions:

- (Distinction 1) inventions concerning the human body or its parts are not to be patentable; but patents are to be available for inventions relating to genetic, cellular or other material isolated from the body;
- (Distinction 2) processes for modifying genetic identity of the human body will be unpatentable if they are contrary to the dignity of man (a phrase which seeks to distinguish between genetic change which eliminates or relieves a condition such as cystic fibrosis, and a change aimed – to take some recent examples – at skin, hair or eye colour or at sexual orientation in a human embryo);
- (Distinction 3) processes for modifying the genetic identity

of animals will be unpatentable if they are likely to cause them suffering or physical handicaps without any substantial benefit to man or animal; otherwise they will be patentable.

Beyond these exceptions on grounds of public policy or morality, there are also to be provisions which narrowly restrict the exclusion from the patent system of plant and animal varieties, and the exclusion of the essentially biological production of plants or animals. Moreover, methods of medical treatment of both humans and animals will continue to be excluded; but so far as concerns animals, inventions of which a method of medical treatment forms only one part are to become patentable.

These proposed changes, broadly speaking, will increase the relevance of patenting to the results of biotechnological research, thus contributing to a climate in which biotechnology can flourish as a European industry. **We accept the general direction of this policy and, therefore, the tenor of the proposed rules. At the same time we are aware, as anyone addressing the subject must be, of the highly controversial potential of some biotechnological developments and of the need to proceed with all attention to the moral, social and environmental consequences of prac-**

tising some of the techniques and results. In a field where few solutions at present seem self-evident, we offer the following comments on the general desirability of excluding patents on grounds of public policy or morality, and also on some of the specific exceptions proposed in the Common Position version of the draft Directive.

4.3 Morality: The General Exclusion

All scientific progress raises questions of '*ordre public* or morality'. Nonetheless it is argued by some that the EPC is not the right forum for them. One line of argument is that matters of public morality have become so firmly political, as advanced societies grow more plural and secular, that they can no longer be addressed in abstraction from the varying political processes of the states which are party to the Convention. Hence patents should be granted or withheld solely on technical grounds, and decisions whether to forbid experimentation or use left to public bodies with responsibility for health, safety and medical ethics. Another line with the same conclusion might be, that science is in itself morally neutral, and that considerations of freedom and progress combine to favour the separation of the growth of knowledge from moral debate about its proper uses.

However, in our view restriction of patenting on grounds of '*ordre public* or morality' serves a useful purpose. It rules out the prospect of patents for inventions which would be uncontroversially harmful and does so in general terms which recognise that the character and categories of such inventions cannot be specified in advance. It thus gives a signal about the relevance of moral considerations, which is both symbolically and practically helpful for scientists thinking of research in relation to its commercial applications.

4.4 Competence of Patent Office Examiners

Less abstractly, it is frequently objected that patent office examiners have no training by which to make moral, as distinct from technical, judgments. This, however, is not sufficient reason for removing the present provisions from the Convention and the national laws which are based upon it.

It is sometimes forgotten in the debates on the subject that the examiners are only the first stage in decision making. For instance, from the EPO examiners, a disappointed applicant may proceed to an Appeal Board. Once an application is granted, outside objectors may argue the moral objection in opposition pro-

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ceedings before the EPO's Opposition Division (again with a right of appeal). And since, at this stage, the European grant multiplies into a set of national patents in the various states designated in the application, moral objections may be raised before the appropriate tribunals of each state as to the validity of the patent in that country.

It is right that, where possible, the issue should be settled for the EPC territories as a whole. At the same time, scope is properly left for different moral attitudes, reflecting differences in religious teaching or culture, to be expressed by national authorities. If the price is that occasionally inventions prove to be patentable in only some parts of the EPC net, that is a price worth paying.

4.5 Reasons for Judgement on Moral Issues

There needs to be a continuing debate about how those who must judge the morality of an invention should make their assessment of the issue. In the Oncomouse case (mentioned in Section 4.8(3) below), the Examining Division of the EPO made a 'common-sense' assessment of advantages and disadvantages: the invention was to increase the efficiency of experiments into the causes and alleviation of cancer in humans, a highly desirable object in the relief of human suffering; it was also said

that fewer mice would be needed for experimental work than under previous regimes. These factors were held to outweigh the pain which the mice were ordained to suffer, or any possible environmental danger. Other similar patents have been allowed, while by contrast the EPO indicated that it would not accept an application where genetic manipulation of an animal was for research into the restimulation of hair-growth in the bald.

4.6 Fundamental Human Rights

The pragmatic and constructivist approach described above may be criticised for failing to grapple with ideas of fundamental right. We consider that it would be a mistake to expect moral decisions about the granting of patents to be grounded independently of the evolution of a consensual morality among the Member states. Indeed it has been strongly argued that the morality exception in the EPC should operate by reference to the rights guaranteed in the European Convention on Human Rights. This Convention, however, does not expressly confer rights either on inventors or on animals. Further consideration of the issue within this frame of reference, therefore, becomes a matter of implication, and is inherently likely to reflect the opinions and feelings of the decision makers, the very difficulty which a rights-based approach seeks to avoid.

4.7 Effects of Refusing a Patent

Discussion of the merits of an ‘*ordre public* or morality’ test is complicated because refusal of a patent does not mean the withdrawal of the invention. On the contrary, although it may act as a deterrent to expenditure on some related research and development, the publicity may also draw attention to an invention for which no monopoly right is to be granted. In consequence knowledge and use of the idea may actually spread. Hence legislatures still need to consider whether its use should be directly prohibited or strictly regulated. **An outcome where an invention is granted a patent and then regulated will often be entirely appropriate, especially if only some of the possible uses are a matter of moral objection.**

Meanwhile, a different sort of question about the practical effects of a refusal of grant arises where countries not party to the Convention have a different practice. Researchers are most likely to be influenced by the state of patent law in their home territories. Accordingly the greater readiness of American courts to grant genetic patents sets a problem for European science and industry. This may be one reason for applying the ‘*ordre public* or morality’ exception only in a clear case, but it is not in our view a strong enough objection to merit abandoning the exception altogether.

4.8 Common Position: Specific Issues

Turning to the specific propositions in the Common Position version of the draft Directive, we would refer to Distinctions 1, 2 and 3 in Section 4.2 above.

1. *Inventions concerning the human body, and its parts as distinct from material isolated from it.* This distinction appears to be practically tenable and one which differentiates at a point which would be widely accepted in academic and industrial circles but there is considerable concern at suggestions that inventions based on materials isolated from the body should also not be patentable.
2. *Processes for modifying genetic identity of the human body.* This distinction uses the imprecise phrase ‘contrary to the dignity of man’ in order to differentiate between forms of genetic change which are, and are not, to be regarded as proper and, therefore, patentable. The issues addressed are likely to be subject to changing perceptions as the technology advances and its potential for benefit and harm can be more completely assessed. The formulation does no more than indicate that some changes in genetic identity of humans must be accepted as beneficial, and, therefore, if inventive,

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patentable; there is no general exclusion. We accept this, and likewise the proposition that national or european authorities should not grant patents for inventions of this type which are for morally unacceptable purposes. The grant of a patent is after all not a neutral act. It confers a legal privilege which is specifically designed to encourage both the making and the exploitation of the protected invention. Patent systems cannot simply put the question on one side for others concerned with medical and social ethics to decide within a different framework of legal regulation. The language in the Directive adequately expresses the intended purpose.

3. *Processes for modifying the genetic identity of animals.*
This distinction has come into prominence because of the application by Harvard University to patent its 'Oncomouse' – the mouse genetically manipulated to generate cancers readily for research purposes. To this creation, two relatively specific moral objections have been raised: against the suffering imposed upon animals genetically manipulated precisely so that they may develop cancer; and against potential environmental hazards which could arise if the animals were to escape.

In the US, despite these factors, the relevant patent was granted with despatch. In the EPO, the application was initially rejected. But after an appeal which referred the matter back for further consideration on somewhat equivocal grounds, the patent has been allowed to proceed to grant. However, it is subject to opposition proceedings from a considerable number of determined opponents.

The proposed formula would express the factors which the EPO has so far found relevant in judging the moral propriety of the particular invention claimed. We are sympathetic to that approach and, therefore, support the proposal. At the same time we appreciate that future cases are likely to raise quite different moral issues. These will push tribunals back to considerations which are not expressed in the legislation in any form, however, vague. The main danger of developing listed Distinctions is that they draw upon case-law of the time. So long, however, as the list is not taken to be absolute, this objection does not appear an overriding one.

4.9 Genetic Material Patents

When it comes to specific application of the general exclusions from patentability, there is considerable scope for differences of

view. It is then that the current tendency towards expansion of the system may exert itself.

To take one prominent controversy: the question of patenting has injected into the Human Genome Programme a disturbing distraction which was ignored at the time when the original great collaboration was put into operation. Once the possibility was addressed, patents were arguably available (particularly within the US patent system) for the identification of short sub-sequences of DNA. Accordingly a number of applications were filed – from the US for the research undertaken for the National Institutes of Health, and from the UK (by way of protective reaction) for results from Medical Research Council laboratories. In this instance the US Patent Office indicated an initial reluctance to accept the particular claims being proffered; and both the American and the British sets of applications were subsequently withdrawn. But this has only put the issue to one side for the moment.

The scope of patent law on the issue of genetic material has not been definitively settled in any country. We would hope that it can be resolved soon. **The present rule excluding mere discoveries should be read as disallowing patents for DNA sub-sequences which have no known practical applications.** It is an approach not without its

difficulties, since those who uncover sub-sequences or sequences will be under pressure not to contribute them to relevant databanks until they have investigated potential applications. **The caution is nevertheless justified: patents should not be allowed on discoveries because exclusive rights might well be conferred on a range of practical applications, the scale of which has not even begun to be uncovered. That is too large a risk to introduce, even though a patent might induce more extensive work at greater speed on the practical consequences suggested by the discovery.**

4.10 Genetic Material: Alternative Protection

Suggestions are currently being made that some lesser form of protection should be introduced, which would give limited rights over the discovery of genetic information, when that information is subsequently put to commercial use. What is proposed appears to be a non-exclusive right to equitable remuneration for such an application of the information. Various descriptions have been offered: a 'copyright', a right subject to compulsory licence, and so on.

The purpose of the proposal is to secure some return to those who have produced results from expensive experimentation, while

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not putting them in a position to prevent practical deployment of the information. It is hoped thereby, to induce researchers to publish results, when otherwise they would be tempted to keep them secret. **The object is certainly meritorious and deserves further consideration. But before such a right could be introduced, its practicality would have to be the subject of hard-headed examination.**

There are two obvious issues:

First, if the right is to be one for equitable remuneration, it ought not to be necessary to have the level of royalty or other payment settled before the information can be used. Experience in this country with the compulsory licensing of patents (particularly of pharmaceutical patents under the law before 1977) indicates that the need for preliminary permission can induce tactics aimed at long delay and expense. Even if the law requires a payment which may be fixed after the event, there may be complex issues about the rate of royalty, if it is left to be settled case by case. It would be important to arrive at simple formulae.

Secondly, IPRs are only significant to the extent that they are enforced; users then know that they must pay up or face the costs of successful proceedings against them. Is

it reasonably likely that the researchers, or some organisation connected with them, will have the resources and determination to see to enforcement? The law should not introduce rights in response to vague hopes of action. If they are in practice ignored, respect for law in general suffers.

4.11 Utility

A distinct concept for limiting the scope of patents to subject-matter which has a practical application, though one closely related to some of the exclusionary categories just mentioned, is to require that utility be claimed for the invention in issue. The present US patent law applies a test of practical usefulness. The EPC, however, is less specific, since it requires only that an invention be 'susceptible of industrial application'. This may be read as indicating only that any type of industry suffices, and that this includes agriculture (the Convention says so specifically).

In our view a separate requirement of utility should be introduced into the EPC. As with the concept of 'discovery', one consequence of this would be to leave in the sphere of basic discovery the isolation or analysis of the structure of compounds, including the basic structures of genes, so long as no practical application of this

knowledge can be demonstrated. The impact would be to confine the sphere of patents to work which had been carried far enough to show practical results, for instance, by producing substances or establishing processes for their production which have a novel pharmaceutical use, including uses in testing and analysis. This would preserve a reasonably acceptable line of demarcation at a position where recently there has been considerable doubt and serious concern.

5. PRIOR PUBLICATION: 'SELF PRE-EMPTION'

5.1 Novelty in Patent Law

It is a basic rule of patent laws that the invention concerned must be novel. Novelty is measured at the priority date of the patent, which will normally be the date on which an application is made for protection in a Paris Convention country. (To take advantage of the Convention's provisions, it is necessary to follow an initial application in one of the countries, by applications in those other countries where protection is wanted, within a twelve month period.) Novelty is assessed, as is the related requirement of an inventive step, by reference to 'the state of the art'. In many countries, including Western Europe, this means everything that is published or publicly known (e.g. through practical use) anywhere in the world at the priority date.

5.2 Self Pre-emption

It is from the requirement for novelty that the danger of 'self pre-emption' arises. In academic circles in particular, the desire and need to present research results to peer groups may lead to a presentation being made or a paper being published before the priority date of one or all of the patents which might relate to its content. This hazard will not arise if a presentation is made only to those who undertake to treat what they learn in confidence. But it is often complicated to ensure that all participants knew about this condition and should have accepted it. If evidence of this cannot be produced later, the consequent patents will be in jeopardy. And in any case, the dilemma will remain, since presentation to a restricted peer group – especially under conditions of confidentiality – may well not establish priority in discovery from an academic perspective.

5.3 US Approach: Grace Period

In US patent law, the danger of self pre-emption is modified: those who make inventions public and then apply within twelve months to patent them are not treated as having jeopardised their position. It is important to recall a complementary factor in US law: that the patent goes to the first to invent, rather than the first to file an application. One proposal currently being discussed is for the introduction of a grace period in European patent law. In part this

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is a negotiating stance: a grace period would only be adopted if US law were amended so as to introduce the more straightforward first-to-file approach.

5.4 Pitfalls of Grace Period

A grace period has some attraction as a moderating device in the academic sphere. But, it has been strongly argued that it would necessarily add to the uncertainties and costs surrounding the business of patenting. If a person wants to know whether he is free to make an article or use a process, an adviser has to look not only at the actual patents and applications of others but also at research reports from which patents might be generated within the grace period.

Such an exception to the ordinary requirement of novelty is accordingly two edged and we doubt whether it should be introduced as a way of dealing with difficulties over publication in academic life. **If a grace period has to be introduced, then it should be limited in term to a few months at most.**

The best way of tackling the academic problem is undoubtedly to get efficient machinery in position for acquiring patents. This should work through the initial stages so rapidly that applications can be made in the time that it takes to get

publication organised. This would do much to reduce tensions, though it cannot do everything. It should be possible in the interim period to submit material for consideration by journals. If it is made clear that a submission is confidential, editorial policy should be that material is passed to reviewers only under equivalent terms of confidence.

5.5 Need for Information about Legal Rules

A grace period will not necessarily cover those cases where scientists move towards the solution of a problem by meeting to discuss work in progress. It can of course happen that during such discussions a piece of information that later proves crucial is revealed. It is hard for scientists to appreciate how, in the tough commercial disputes which surround successful patents, a chance remark (or whatever evidence is later available of a chance remark) can assume crucial significance before a patent tribunal. But objection to the novelty of a patented invention may hang on a single instance of prior revelation, a rule which is followed in order to avoid any qualitative assessment of 'sufficient' revelation to others.

The patent law rule is unlikely to change and its consequences have to be faced. It will add to the reasons for less frank and

collaborative attitudes in academic science. The best hope of accommodation lies in informing scientists about the need for confidentiality in disclosures that they make. If they can make it clear that they are discussing their work under conditions of secrecy, and they keep a clear record of what they said, they are likely to be able to preserve their ability to patent later results.

6. LACK OF RIGOUR IN PATENT OFFICE EXAMINATION

6.1 Effect of Inadequate Examination

If patents are too readily available, industries are beset with patentees who assert dubious rights. Either the validity of their patents has to be challenged in legal proceedings or they have to be bought off.

It has been in such periods in the past that business opinion has hardened against patents.

Contraction has then occurred through various measures, of which two stand out:

- (i) there has been added to the requirement of novelty a separate test of inventive step, asking whether the alleged invention represents some unobvious advance over the state of the art;
- (ii) a substantive examination of applications takes place in

the patent office before any grant can be made – a process which is at its toughest if the prior examination deals not only with novelty but also with inventive step.

6.2 Patent Plagues

The US, the EPC and some national systems in Western Europe have a pre-grant examination which extends to inventive step. But, as already noted, complaints are now widespread that nonetheless, on both sides of the Atlantic, patents are granted too readily.

In fields such as electronics, particular technologies now swarm with patents on very minor advances. Industries find it difficult to handle such clouds of prior rights and there is a great temptation to ignore them all and hope that no belligerent emerges who is truly expensive to buy off.

If that is the difficulty in industry, then it poses an even graver threat for the academic sector as it seeks to turn its applied work to commercial account. For it remains a world at some remove from the cut-and-thrust of industrial investment and it may prove relatively easy for aggressive, but not necessarily deserving, patentees to force academics into submission. **The European patent system was designed to provide**

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prompt and adequate screening of applications before grant. Patent offices and appellate tribunals must ensure that this examination process remains scrupulous.

place before the right is granted.

6.3 Second-Tier Protection: Recent Developments

There is an allied matter. Various Western European states have added to their patent systems a separate, 'second-tier' form of protection for technical novelties. The protection, sometimes labelled a petty patent, sometimes a utility model, varies somewhat from country to country. There is some such scheme in all EC states except three. Of these the Netherlands is contemplating a change, while only Great Britain and Luxembourg so far are not.

All the schemes have three common characteristics:

- protection is given for a shorter term than for a normal patent: typically for 6–10 years from application;
- registration is required, a part of which is the submission of a specification of the idea to be protected, which will become public information;
- no examination of the validity of the subject-matter takes

6.4 Lack of Certainty

A second-tier right is thus cheaper and quicker to obtain; but the validity of any grant has not been tested in advance. It is this lack of certainty which has been the principal reason why the British government, strongly supported by much of British industry, has not so far been willing to introduce such a system for this country (even though a registered invention system was suggested in the Cabinet Office paper, *Intellectual Property and Innovation* (Nicholson Report), 1983).

6.5 An EU Second-Tier Right?

There is now a movement to create a second-tier right for the EU as a whole. From the perspective of the academic community, it is far from clear that its interests overall will be fostered by the appearance of a phalanx of short-term, unexamined rights in alleged inventions. The effect can only be to add more claims to the growing range of rights being granted under patent systems. **In our view, on balance, the interests of the academic community would not be well served by the introduction of a second-tier system.**

7. DISCLOSURE IN THE SPECIFICATION

7.1 Patent Law Requirement

Patent systems at present require that the invention for which protection is sought should be described in the patent specification so as to reveal its essential elements. It must tell skilled research workers in the field in question what they need to know in order to be able to make or carry out the invention themselves. They can be assumed to have considerable general knowledge, but it is not only to the leaders of a forefront research team that a specification is taken to be addressed.

7.2 Patents as an Information Source for Academics

Some academic researchers derive considerable benefit from monitoring new patent specifications, as do their counterparts in industry. There is a case for examining whether the need of the academic community for access to this material is adequately met. Various networks now make a great deal of patent information accessible: for instance the British Library's Patent Express, the universities' Janet/Superjanet network and commercial networks such as Dialogue. The question is, therefore, largely one of cost.

It would conflict with this interest to introduce

changes in the requirement of disclosure so as to allow a patentee merely to give notice of the kind of invention which he has available.

The area of difficulty is not in the ultimate requirement of patent publication, but – as has already been discussed – in the initial need to keep even one's own inventions confidential until all patents have been applied for.

8. EXCLUSION FOR RESEARCH

8.1 Patent Law Exception

In UK patent law, and the laws of many Western European countries, it is not infringement of a patent to perform the protected invention for private, non-commercial purposes or for experimental purposes related to the subject matter of the invention. The latter exception means that further research may be undertaken by anyone without any licence from the patentee, provided that it is aimed at extending scientific or technical knowledge in the sphere of the invention and is not, for instance, designed to enhance the experimenter's use of the invention itself once the patent expires.

8.2 Problems of Scope

Conditions in some spheres now raise considerable difficulties about the scope of the above exception. For instance, in med-

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ical research, if a patented substance or composition is being examined for new therapeutic applications, it will have, at some stage, to be tested on patients, perhaps on a substantial scale.

Is this form of testing an ‘experimental purpose?’ If it is not, and, therefore, needs a patent licence to make and administer it, should the full monopoly potential of the patent be qualified by making the situation one for which a compulsory licence is available on officially set terms?

Not surprisingly research-based pharmaceutical companies consider this solution likely to be counter-productive. It is nonetheless a solution which public authorities are likely to contemplate if it can be shown that right-owners are using patent powers substantially to hinder useful research.

Particular instances could even today be tackled by way of a reference to the Monopolies and Mergers Commission and consequent action under The Patents Act 1977, s.51. **If the practice were to become serious and persistent we would support an amendment to the law extending the compulsory licensing powers under The Patents Act, s. 48.**

**9. ELECTRONIC TECHNOLOGY:
COMPUTER SCIENCE,
TELECOMMUNICATIONS**

9.1 Role of Academic Science

In the many spheres of electronics, technologies are advancing at remarkable speed. Academic research is playing a significant role in this expansion. There are myriad opportunities for collaboration between non-industrial researchers and industry at the forefront of development. It is in these fields that much academic technology is being successfully transferred. Some of it – particularly computing applications – can be undertaken with relatively low levels of investment. This typifies the sort of venture which spins off from universities into science park enterprise. Equally, university ILOs find it relatively straightforward to market such technology to industrial licensees.

9.2 IP Problems

The extraordinary speed and range of current developments in electronics are producing their own upsurge in claims to intellectual property. This is noticeable particularly in the growth of patents in those parts of the field where this form of protection is open. It is an area in which many of the questions already addressed in this Part of the Report are especially germane.

Two particular problems will be raised here. The first concerns the recent development which gives prime protection to computer programs through copyright. The second concerns the increasing importance of databanks and the need to protect the considerable investment which goes into their creation.

For the future there may be a third problem, between the two mentioned above – e.g. for the process of navigation through a database that may be protectable by patent (just as are algorithms for encryption of the material within the database). There may, then, be a case for stronger protection of innovative techniques than by copyright alone.

9.3 IP for Computer Programs

The policy of treating computer programs as not sufficiently technological to warrant inclusion within the patent system was fixed in Western European law at an early stage in the development of computing. It continues today for application programs. Inventive operational programs, which determine how a computer or network functions, are now coming to be treated as patentable.

9.4 Copyright in Computer Programs

For all types of program, copyright has been deployed to provide the front line of intellectual

property protection. In most significant countries, copyright laws have now been amended so as to include programs explicitly within the category of 'literary works'. This applies to the initiatory, source-code stage of designing a program, when the work is readable by human perception and resembles mathematical and other logical statements which have long been regarded as 'literary works' for copyright purposes.

It applies equally – and this is all-important for material so eminently copiable – to the final object-code version, readable by the machine itself. The European Community required this legal change and various consequential amendments by a Directive issued to its Member states.

The rights derive from the work of the authors who create the program (they may be many). The protection runs for a term from the death of the last surviving author which soon, throughout the EU, is to become a further seventy years (see the EC Directives on Copyright in Computer Programs (1991) and on the Term of Copyright (1993)). Objections have been raised in principle to such a long period of protection for this subject-matter.

9.5 Computer Program Copyright: Scope

At present, while computing technology is advancing at such speed,

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the question of duration is not of great significance (though it may become so as the technology slows). What is of particular concern within academic computing is the extent to which programs can be examined, criticised and developed by others. To some degree the EC Directive addresses this issue, for it was the subject of high dispute between different sectors of the computer industry during the negotiation of the text.

But the Directive did not address the most central question. This is: when Program II is in some sense derived from Program I, what is to count as sufficient borrowing to constitute infringement of the copyright in Program I? It is an issue on which it is inherently difficult to arrive at any useful general formulation. (The Directive did not attempt to do so.) It is left to courts to reach solutions in particular instances.

9.6 Wide Interpretation

Most of the case-law to date has arisen in the US, and has shown some alarming divergences of attitude among judges. During the 1980s, highly protective judgments appeared to accept:

- (i) that it would be copyright infringement to take the general elements of structure and organisation of a program, even if virtually all the detailed steps of programming were re-written;

- (ii) that there could be infringement of a program which produced screen images if merely its 'look and feel' were annexed (as in a computer game).

9.7 Restricted Interpretation

The 1990s are witnessing more restrictive interpretation. US judges began to call for copying at a level of greater detail (though not necessarily by using the same or 'translated' versions of the actual programming); and excluding from the calculation material already in the public domain and steps which from some functional necessity had to follow a particular procedure.

A balance is thus being reached which leaves a real degree of freedom to develop varied or improved programs which may even act as a substitute for an initial populariser, provided that in all essential steps the detailed working has been done afresh and has not been borrowed under disguise. From the perspective of academic research, this evolving view deserves to be strengthened and supported. The academic sphere is one in which adequate scope must be retained to build in essentially novel ways upon the achievements of others. There will of course be instances where that freedom is abused by work which is essentially plagiaristic. The two English judgements

which so far explore the same territory indicate an awareness of the need for a similar balance, though the justifications used to reach it differ. The gravest danger is that one or two atypical cases will flair up into litigation which settles the case-law into an undesirably restrictive pattern.

9.8 Interfaces

A particular issue, that arises in the further development of programs, is that of electronic interfacing. One program cannot operate with another unless it can adopt the precise procedures of interface specification established in the latter (it is not necessary to copy the coding language, provided that the structure of this specification can be taken). Where the second program copies substantial elements of the first in addition to the interfaces, the copyright in the first will be infringed. But where all that is taken is the interface, in order to secure the inter-operability of the two, this would not of itself constitute infringement. Otherwise the owner of a successful basic systems program will be able to prevent any unlicensed applications programs, from being used with it: that could confer very considerable monopoly power on leading systems manufacturers.

9.9 Decompilation

Concerning decompilation the EC Directive has given an impor-

tant lead. It has introduced a limited exception into the copyright laws of Member states which permits the interface specifications of a first program to be uncovered by the steps of reverse analysis commonly referred to as 'decompilation'. Any making of a copy during this process, to the extent that it is necessary for unearthing interfaces, does not require a copyright licence. The step can be taken with the aim of producing a competing, as well as a complementary program, provided always that the new program does not reproduce elements, which anyway constitute infringement.

In our view, it is in the interest of the international academic community that this compromise formula should be generally adopted and should be interpreted so as to leave adequate scope for continuing development. Copyright has been introduced as the normal means of protecting computer programs despite their essentially technical character. This copyright applies without having to attain any level of inventiveness such as is called for in the patent system. Yet the patent system has an established exception for experimental use. Scientific bodies have an interest to see that this new application of copyright law contains suitably framed exceptions designed to secure essentially the same freedom.

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9.10 Databases: Modes of Protection

The growth of electronic information sources already affects academic research in many ways, and we face an immense increase in electronic publishing, which will allow readers a range of access and an ability to choose what to take, and indeed what to alter, on an entirely new scale.

The costs of such services, in particular for academic communities, will be considerable. But since access will be by a telecommunications link, records of material consulted and obtained can be electronically compiled and it should, therefore, be possible to relate charges accurately to the information used. If this is so, the essential concept of copyright – that each act of copying and other prescribed use should be authorised by the copyright owner – should be more readily realisable than, for instance, at present, given current methods of private copying.

9.11 Policy for Databases

The databases from which not only literary source material can be retrieved but other information can be consulted generally involve considerable investment. This investment can be directly undermined if there are ways by which others can surreptitiously copy the collection of source material and provide access to it on a competitive basis. There is, accordingly, a need for intellec-

tual property protection for a database as such, so that prejudicial acquisition of its contents can be prevented.

Urgency has been given to the issue by the reluctance of courts in some countries (though not in the UK and other Commonwealth jurisdictions) to accord copyright in the compilations of information, at least where it is an accumulation of mundane facts. Thus, the US Supreme Court has refused to find any sufficient authorial activity for there to be copyright in the compilation of a telephone directory; and the Dutch Supreme Court called for reconsideration of the same factor in respect of the list of words given entries in a leading dictionary.

In consequence the EU is contemplating a harmonisation of copyright law, which will allow copyright in electronic data where there is sufficient personal creativity in the assembly of the data; but where assembly is of straightforward facts, a separate and much more limited right against unfair abstraction of the contents of the database.

9.12 Preferable Approach

The academic community assembles many electronic collections of data and has an interest to see that there is adequate protection of them against piracy. At the same time access should not be unduly limited, as could occur,

for instance, where those compiling the data have been granted some unique opportunity to collect it.

The British and the Irish have copyright laws which allow compilations of information to fall within the scope of the law whenever they are not themselves just copies from elsewhere. In our view, this country should seek to persuade other Community states to adopt a similar approach; it is preferable to the introduction of a separate and more limited type of protection for data collections which do not contain some higher measure of intellectual activity. Attention could then be given to defining appropriate rules about access to databases, deploying, if necessary, the prospect of compulsory licensing.

9.13 Digitisation

There is at present a rapid development in the electronic storage and transmission of information of many kinds in digital, as opposed to analogue, form. Text, image and sound can be stored in the same format. The contents can be extracted in whole, or in part, and can then be manipulated and rearranged in myriad ways. The results can be distributed over new forms of network, using on-line and broadcast channels; and this distribution

process can involve active participation by recipients. The prospects appear revolutionary and there is powerful support for the construction of data highways, such as the National Information Infrastructure in the US and the European Information Society in the EU.

As this technology advances, it will redound on many aspects of academic work. The development of electronic banks of scientific data, already referred to, is one part of the process. To a significant extent – who can tell how completely – the book, the journal and the written record of data will be replaced by information read on screen and held in digital memory. Even today scholars may engage in discussions at a distance which have an immediacy on a wholly new scale, both in terms of speed and in range of contacts. Activities such as the Internet demonstrate these possibilities (and also some of the hazards – for instance the deliberate provision of misinformation). Opportunities for interactive learning will be much enhanced by the new potential, one aspect of which is the ability to combine the use of materials in different media and to manipulate them into new conjunctions.

As the digitisation revolution progresses, there are likely to be very substantial changes in the organisation of information supply; and the economic and social consequences are likely to

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pose a whole range of legal problems, from control over unacceptable contents to the regulation of dominant firms in the emergent industry. Among these problems will be questions concerning the nature, scope and enforcement of IPRs. At present, however, it is very difficult to predict what adaptation of IP laws will be necessary in order to fit a digitised world. Whatever else, one must assume that it will not be a world confined within national boundaries. Accordingly legal discussions will increasingly have to be international in impact.

9.14 IP Protection of Digitised Material

It seems likely that copyright will be the form of IP most involved in the development of digitised information systems. Patents in computer functions may also come to play a strategic role. On current predictions, many legal experts regard copyright (i.e. copyright of both the author's right and neighbouring-right types) as a sufficiently flexible form of legal protection to adapt to the new media without fundamental alteration. At the same time, it is recognised that much will depend on the development of technical means which can track the extraction and restorage of digital material so as to monitor its use in accurate detail. Once this is achieved, and made proof against those intent on piracy, it will be possible to levy charges for use and to dis-

tribute them to a whole complex of right-owners with an efficacy unknown in the distribution systems which for the most part still operate today. In practice, if not in law, rights will have to be asserted through collecting societies and the organisation and control of these societies will become a major issue.

There will be a need to preserve some material as confidential, and this requires further work on encryption. There will be interests (of the kind currently protected by the concept of moral rights) in ensuring that the identification of authorship remains part of a work, even when its form is adapted or altered, and in maintaining (at least in some measure) the integrity of a work held within a network against unfair manipulation of its content. Academic authors will have as strong an interest as any group in these last two factors. At this juncture it is difficult to say more than that, among the groups of experts who meet constantly to review the problems, these difficulties are recognised and a search is under way to find acceptable solutions. Those solutions are most likely to operate in relation to material that is made electronically available on a large, commercial scale. It may be doubted whether collection and monitoring systems will come into effect for informal systems of consultation and additive contribution which are a typical feature of 'bulletin boards' and the like. **Academics are among**

those who must learn, that if they choose to place their ideas in electronic circulation, they may be committing them to a public domain. They will need to be aware that this course of action has its pitfalls as well as its advantages.

10. TRANSFER OF TECHNOLOGY TO DEVELOPING COUNTRIES

10.1 Role of IPRs

Over the past three decades particularly, it has often been asserted that IPRs contribute to the continuing dominance of developing countries by the activities of the trans-national corporations of the developed world – to a degree that is certainly significant, even if it is not positively sinister. This became a strand in the demand for a new international economic order.

An early response, after complex negotiations, was the introduction into the two main international conventions on copyright (Berne Convention, Universal Copyright Convention) of special qualifications on the exclusive rights of authors in favour of developing countries. On the other hand, in 1982 the leading industrial states preferred to abandon attempts to revise the Paris Convention on Industrial Property, rather than concede to developing countries a special right to grant exclusive compul-

sory licences, which would have the effect of keeping even the patentee out of the local market.

10.2 Pressures from Industrialised Countries

In the ensuing years, industrial countries, led by the US, have shown their increasing concern over the piracy of protected products in a range of countries – and in particular those advancing most rapidly towards industrialisation. As well as threats and retaliation through trade control measures, there have been a range of bilateral and regional agreements between states on levels of IP protection, and highly significant negotiations at the international level.

In the Uruguay Round for the revision of the General Agreement on Tariffs and Trade (GATT), a component has been introduced covering Trade Related IPRs (the ‘TRIPS Agreement’). With the eventual success of the negotiations in December 1993, TRIPS provides a new basic accord on IPRs in the international arena. Its implementation (to be spread over several years) must now be a central preoccupation of diplomatic activity and commercial concern.

TRIPS represents some considerable compromise upon the initial starting point of its promoters, which was to insist that any country wishing to have access to

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the opened markets of the GATT network must introduce and enforce IPRs of a standard equal to that found in leading states such as the US. Nonetheless, the levels of protection required are of a much higher order than previously pertained in much of the world community, and they are backed by the sanctioning system which operates within the GATT as a whole. The concessions for many purposes allow developing countries a five-year period in which to bring their laws into compliance with TRIPS standards. For the least developed countries this tolerance is extended to ten years.

**10.3 IPRs under World Trade
Sanctions**

IPRs now have a distinct weight in the balance of world trade advantages and disadvantages. Intellectual property will have to be respected in developing countries and this will often add to the burdens being assumed by those countries as a price of access to international markets. Those which derive most advantage from the new regime

overall, should also begin to draw benefits from the protection of ideas generated in their own countries, or made the source of production as part of industrial organisation on a trans-national scale. Patents and other rights in technical ideas after all provide a means of attracting the newest technologies to countries which are otherwise likely to be passed over as places for industrial investment.

At this juncture, two things at least should be expected: that leading countries, such as the US, should now abandon unilateral trade sanctions which are designed to insist upon even higher standards than those embodied in TRIPS; and that, if in future higher levels of IP protection are negotiated within TRIPS, they will be conceded only in return for improved access to markets for developing countries.

**The impact of TRIPS on
developing countries should
be carefully monitored.**

PART III: EXPLOITATION OF IDEAS FROM ACADEMIC SCIENCE

EXPLOITATION OF IDEAS FROM ACADEMIC SCIENCE

11. THE GROWTH OF INDUSTRIAL LIAISON

11.1 IP in Research Contracts

In this Part of the Report, we turn to questions of means.

Universities and non-industrial research organisations now seek to give much greater account to the commercial potential of research than happened in the past. More and more of them have established Industrial Liaison Offices (ILOs) or similar units, armed with a mission to uncover exploitable ideas and turn them to the commercial advantage of institutions and individuals. There is active encouragement from government for IP exploitation plans, technology audits, training in IPR management techniques, general education on IP matters and similar initiatives. **We believe that this shift in emphasis is inescapable, but one which deserves to be pursued only to an extent that does not compromise the essential value of academic research.**

Pressures on research funding are such that no institution can now adopt an attitude which neglects any potential for commercial development, where that exists. Moreover, IPRs are essential building blocks in that process. They cannot be left out of account in organising the course of research projects, whether the

project is on a grand international scale or is a small-scale pilot study. **In consequence there has to be some significant modification of those freer notions of collaboration-cum-competition, which have pervaded academic science in the past. To avoid disputes over rights there must be awareness of the need for agreement from the outset on an acceptable approach to them, which must be expressed in a properly drawn contract.**

11.2 Experimental Nature of Development

It must be stressed that the development taking place is an experiment; it must not be conflated in advance into a panacea. It is not the central aim of most academic science to produce commercially exploitable results. If they come, it is by way of secondary consequence. Industry is inherently more likely to produce the technology it needs from its own resources.

The usefulness of industrial liaison and technology transfer may prove to lie not so much in IPRs and royalty flows, as in the strengthening of informal contacts between academics and industry, under which exchanges of information may increase and personnel may move more frequently between the two sides. From this

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real benefits may flow, even if they are not easily quantifiable.

11.3 Concerns for the Future

Looking to the future we would draw attention to three associated dangers:

- (i) In the White Paper, *Realising Our Potential*, the Office of Science and Technology has stressed its continuing commitment to the support of basic research, and to the importance of maintaining this country's long-held position in the international development of scientific knowledge. At the same time it is placing quite novel emphasis on the need to extract practical benefits from academic work, and this cannot but have some tendency to squeeze basic science budgets at a host of points. **The financial support from government, through the Research Councils, for basic research must remain a crucial and distinct priority. The increasing government emphasis on practical benefits must not lead to a creeping displacement of basic science, much of which, by its nature, is far removed from commercially successful exploitation.**

The competition for basic

science support will become sharper and increasing attention is likely to be paid to commercial success as a deciding factor. While this may stimulate the marketing of research, it has long-term costs for the system as a whole. Besides the distorting effects on basic science, it is liable to erode the complex structure of mutual support among individuals and institutions which sustains the academic community. Even institutions which win out in this competition may find themselves the poorer when costs are counted in full.

- (ii) At present there are optimistic, but essentially untested, estimates of what ILOs may achieve (though it is at least recognised that they cannot be expected to produce the short-term returns that would make it appropriate to designate them independent cost centres: see *Intellectual Property in the Public Sector Research Base*, p. 31). Even the well-established and successful US examples, such as the technology transfer scheme at MIT, produce income that is under 5% of annual research expenditure (\$16 million on \$400 million in the MIT case); UK universities are mostly at an even lower proportion (1–2% at best).

An ILO may indeed be unsatisfactory if it fails to identify and promote opportunities for commercialisation. But how often these chances will occur must depend very much on the range of research which the institution undertakes, and that must be affected by a whole range of factors. **The ‘performance’ of an academic institution’s ILO should not be taken as the measure of that institution’s science. The activities of an institution must reflect a judgment of what is most worthwhile to do; and that should not be tied too closely to successes in commercial promotion.**

- (iii) Significantly, the latest Research Assessment Exercise conducted by the Universities and Polytechnics Funding Councils asked for a tally not only of patents acquired, but even of copyrights. Likewise the OST has called for more emphasis in staff appraisal, performance assessment and promotion reviews to be attached to patents filed, to licences negotiated and royalties earned under them. (*Intellectual Property in the Public Sector Research Base*, p. 32). Of course applications and patents are one way of recording the results of

research, just as financial returns are one measure of its success. So long as these indicators are treated as elements in assessing the quality of the work as a whole, they have some place. But patents are costly to obtain and commercialisation depends on success in finding business partners. If the figures are lifted from their context, they may well be treated as measures of research ability, **The acquisition of IP should not be treated as an independent measure of academic achievement when all it demonstrates is the scale of the research funding or the willingness of an investor to shoulder development risks.**

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11.4 Informing the Academic Community

Since the change in progress must have a significant impact on attitudes of the academic community, that community needs to know more about the commercialisation process, and the role of the various IPRs within it – in particular, the conditions under which they are available, the ways in which they underpin new product development and the limits to their effectiveness. It should be one role of ILOs to increase academics’ awareness of IPRs. Universities

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must also consider actively how far knowledge of intellectual property should become part of undergraduate and graduate courses for scientists, engineers, managers and lawyers.

There is also scope for more extensive training of those whose careers will be in scientific research and its administration. For them, intellectual property and its deployment should form an assessed element in higher education courses. There seems to be considerable willingness amongst professionals involved in intellectual property and its licensing to participate in such teaching, but training of this kind is as yet very much in its infancy.

**12. IPRs WITHIN
INSTITUTIONS**

12.1 Ownership Issues in the Past

If institutions are to act, directly or indirectly, as agents for commercial exploitation of academic science, the basis of their power to do so, vis-a-vis the researchers, has to be established. Certainly the legal question who owns the rights in any IP is part of that issue, though it is by no means the whole story.

In the past academic scientists have often ignored IP and its

consequences and questions of its ownership have tended to be neglected, at least where the issue involves only the researcher and his/her institution. Where, on the other hand, there has been some form of collaboration with industry it used to be common practice for any IP issues to be dealt with by the industrial participant; who not only would make the necessary applications and see to enforcement of the rights, but as a concomitant would acquire ownership and so have the power to exploit itself and/or license others to do so.

12.2 Rights Under The Patents Act

IP ownership as between a university and its staff has not been seriously examined. At least so far as concerns patents, general rules about employed inventors were laid down in The Patents Act 1977. It is in consequence arguable that inventions made by university teachers, as much as those by research fellows and workers in non-industrial research organisations, belong initially to the employing institution. However, students, not being employees, form an opposite case: they are entitled to patents for their inventions unless there is a different agreement with their university.

The important legal issue, however, is not the rule which would apply if there is no agreement about ownership and sharing in

returns, but what agreement there should be. **It seems widely to be accepted in the UK – and it is a view which we support – that public bodies which give grants and otherwise provide research facilities deserve to share in revenue from patented inventions with the researchers (and, in universities, their departments). As a consequence, provided that the body has proper facilities for organising protection and exploitation, it (or its exploitation company) should be the owner of patents and related rights.** There is a case for explicit agreements giving the university the rights in an invention made by a student, subject again to royalty sharing arrangements.

Various royalty sharing schemes now operate in universities: a common pattern is for all or a very high proportion of initial returns to go to the inventor(s); with larger proportions thereafter going to the institution, sometimes with a further tranche for the department concerned. There may be similar arrangements for shares in any spin-off company which may take over a promising venture. The justification for such an arrangement is that it spreads the incentive effect of the patents, so that both institution and individuals may appreciate the stimulus. Indeed if the arrangements as a whole do not strike researchers as efficient, helpful and fair,

inventions may go unrevealed, or be taken off surreptitiously to the private sector.

12.3 Research Councils and Charities

So far as research in universities funded by Research Councils is concerned, the terms of the grant now require acknowledgment that ownership is in the university (or, for reasons to do with its charitable status, its technology exploitation company) and that royalties will be distributed in accordance with an agreed plan, similar to those already mentioned. These arrangements are, however, subject to scrutiny by the joint Exploitation Scrutiny Group set up by all the Councils. So far as research sponsored by charities is concerned, the position is at present complicated by their need not to jeopardise their charitable status (and risk tax liabilities in consequence). **There needs to be careful consideration of the position of donor charities in relation to intellectual property generated by research which they fund. Most charities are in no position to enter upon the complex business of managing rights, whereas academic institutions are building up just this capacity. Charities, therefore, should not be placed under any obligation by the general law to take assignments of IPRs. Ownership of the rights should be left with the organisation, or person funded,**

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where that is the efficient way of ensuring that their commercial potential is actually realised. To what extent the charity should receive any share of returns from the research exploitation is a separate question and one that should be left to the judgment of the charity and the recipient institution. It is an issue which may have complex taxation implications.

13. IPRs IN ACADEMIC-INDUSTRIAL COLLABORATIONS

13.1 New Tensions

Technology transfer from academic institutions to industry can be organised at any stage from the initial conception of the research programme, through to licensing of IPRs already obtained by independent effort. The terms on which ILOs or other agents for universities and government-funded institutions should strike agreements have become the subject of a good deal of disquiet and debate, as the ILOs have begun to make their mark.

Some in industry have found themselves forcefully informed that they can no longer expect to look on university research as a public support programme for their private plans; and that they can, for instance, only expect exclusive rights in resultant IP if they are prepared to meet the full overheads of the project.

On the other side, industrialists point out that, by and large, the cost of research is moderate in proportion to that of subsequent product development and marketing: a ratio of 1:10 is often taken as a minimum. If they cannot have exclusive rights to exploit the inventions which they sponsor, they may have justifiable reason for refusing to go ahead with the collaboration.

From yet another perspective, there is concern that some who staff ILOs at present lack the knowledge and experience to represent their institutions adequately against acute businessmen. Yet they need in many instances to negotiate at arm's length not only with British firms but equally with powerful organisations from overseas.

13.2 Pragmatic Solutions

The importance of these tensions has been reflected in official deliberations. In 1989, the Cooper Committee (Report of the Interdepartmental Intellectual Property Group, *Intellectual Property Rights in Collaborative R&D Ventures with Higher Education Institutions*) was unable to prescribe any one solution for the holding and exploitation of IPRs which resulted from academic-industrial collaboration. The circumstances were considered too various. Terms had to be negotiated case by case.

While the Committee warned against the impracticalities which could flow from joint ownership of IP, it stressed that ownership was not the only, or indeed the vital, issue of itself. A set of interrelated questions needed to be addressed: What degree of confidentiality would be required of the researchers? Which party would take responsibility for enforcing the rights (and would, therefore, appropriately be registered as owner, or at least as exclusive licensee)? What rights of exploitation would be given to the industrial partner and in particular would those rights be exclusive? What background IP would also be licensed? What would happen to IP resulting from modifications and improvements? How far would there be rights to use the current invention for further research and as background for later developments protected by their own IP? The OST's Paper, *Intellectual Property in the Public Sector Research Base*, endorsed these conclusions with only minor additions.

We support the conclusions of the Cooper Committee which reflect the kind of common-sense which any licensing executive acquires. This includes knowledge of how complex and difficult such relations can prove over time. Accordingly what must be sought is an agreement which seems on balance fair to each side – an agreement which it is, therefore, better to honour than to undermine.

13.3 Acquiring Licensing Skills

The first necessity for universities and research bodies is to acquire their own personnel or outside professionals who can bring the practical experience, or at least the business instinct, to drive firm but reasonable bargains. Investment in this, particularly at the early stages, could make the difference between success and failure. It may well be that the kind of expertise needed for the tougher parts of the process can only be provided from outside: through for instance an established player, such as the British Technology Group or a venture capital company. **What may need to be on site is a small staff charged with stimulating interest in commercialisation and its mechanics, in working with researchers on the practical potential in their work and generally in enhancing knowledge of IPRs in the institution. Altogether, to emphasise once more the experimental nature of what is now happening, the development of ILOs needs careful monitoring.**

13.4 Negotiating Positions

In 1991, five leading research institutions in the university sphere (Oxford, Cambridge, Imperial and University Colleges, London and Warwick), established guidelines for collaborative research with industry. These propose a model for negotiations which draws a prime dis-

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inction between a sponsor which is prepared to fund the full costs of the research, including all the university's overheads, and a sponsor which will provide only a lesser level of support.

In the first case, the sponsor should be entitled to exclusive rights in the IPR, subject to the payment of royalties to the university. But even then the university should examine whether the assessment of ownership, or grant of an exclusive licence, would inhibit subsequent research and the exploitation of its results, possibly with a competitor of the initial sponsor. In such a case, the university should seek to preserve its freedom to pursue such research and retain the ability to decide how it will then exploit it. In the second case, the sponsor should expect only a non-exclusive licence, subject to royalty.

The Guidelines also recognise the possibility of granting the sponsor exclusive rights without a royalty obligation. However this solution is appropriate only where the sponsor is prepared to pay full costs plus additional support in lieu of potential royalties. The university would then have funds with which to compensate staff who otherwise would be left without royalty shares under the university's internal arrangements.

We endorse these Guidelines as providing an acceptable

starting point for negotiations. At the same time it has to be recognised that they cannot always be strictly adhered to. The governing concern should be that worthwhile research gets done and results are made publicly available as soon as practicable.

13.5 Enforcement of Rights

It has to be remembered that the actual value of rights depends upon the financial ability and determination of owners and exclusive licensees to enforce them against competitors who are not prepared to take a licence. In the past, when the NRDC/BTG was the channel through which government-sponsored research had to pass, the very fact that a government organ was in charge made some (though not all) would-be infringers wary of becoming involved in litigation. It is one disadvantage of the BTG's privatisation that it no longer presents this appearance, and it will acquire an equivalent reputation only if it builds powerful portfolios of patents and other rights and shows that it is not afraid to assert them.

Government should do all it can to increase the availability and efficiency of court process for the enforcement of IPRs. A beginning has been made with the establishment of the Patents County

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Court, but it still needs time and resources for that court to become an institution of front-rank importance.

On another front, insurance is available privately to IP owners

against the costs of enforcement litigation. **Universities should consider whether, individually or collectively, they should have insurance of this type for their IP.**

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PART IV CONCLUSION

CONCLUSION

14. THE WAY FORWARD

14.1 We would end by re-emphasising the academic values which we stressed in the Introduction. Researchers outside the industrial sector will continue to attach major importance to their contribution to scientific knowledge. This involves both a substantial degree of freedom to present their ideas to their peers and to conduct experiments unfettered by conflicting rights.

In universities it should be put beyond question that academics retain ownership of copyright in their writings and other works, so that they may publish them when and where they wish, without control by their institutions.

14.2 As far as the practical application of scientific ideas is concerned, universities are set on a course which encourages the maximisation of commercial value through patents and other IPRs. It is important to recognise that this raises tensions, not just because of the immediate demands of the systems introduced to encourage commercialisation, but more generally from the change of direction itself.

14.3 As to the immediate demands, we have identified the major sources of tension, such as the need to keep inventions confidential until the patenting arrangements are properly in train. **It must be a major concern of research administrations to reduce these strains by efficient management of patenting procedures and by informing researchers of the legal requirements and their objects. There is much else that they can do, particularly in organising the various forms of academic-industry collaboration, to help work out fair solutions which will diffuse potential conflict.**

14.4 Equally it is for government to recognise the contribution which wide-ranging and unhindered dissemination of research results through the academic community, makes to the long-term benefit of society. **Government must play its part in ensuring that these values retain their own status, and are not eroded by the short-term pursuit of commercial return at all costs. For those costs could be immense.**

DESCRIPTIVE CATALOGUE OF INTELLECTUAL PROPERTY

1. PRELIMINARY

Competition and Intellectual Property

Market economies are characterised by a general freedom accorded to all traders to offer products and services in competition.

Intellectual property rights (IPRs) constitute one exception to this general proposition, since they accord their owner an exclusive ability to act in given ways in the course of trade. This takes the form of a right to prevent others from doing the act in question.

IPRs are not a positive entitlement: they do not give the right-owner any licence to act in derogation of the rights of others.

National Basis of IPRs

IPRs are granted when it is considered that legal protection will advance economic performance in particular spheres, or that the right is needed to secure conditions of fair competition for the right-holder.

The policy decisions over IPRs are determined by nation states and so IPRs are essentially national rather than international in character. Not all states grant the same types of IPR, and even when they do legal variations remain between the rights in different states.

International Linkages

International conventions exist which accord equal treatment to the participant states (mainly by reference to the nationality of persons to whom, or through whom, rights are accorded). To a limited extent these conventions also prescribe standards of protection (mostly minima) in the laws of participant states. The most important of these are:

Paris Industrial Property Convention (originally of 1883): covering in particular patents, petty patents, industrial designs, trade marks and unfair competition;

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Berne Convention (originally of 1886) and the Universal Copyright Convention (originally of 1952): both covering authors' rights aspects of copyright;

Rome Convention (1961): covering the neighbouring rights to copyright given to performers, record producers and broadcasting organisations.

European Linkages

To a limited extent, there are also international and regional arrangements for the processing of some types of IPR, the object being to generate national rights in a number of states. Among these is the collaboration of 17 Western European countries in the European Patent Office (which has headquarters in Munich).

The European Community has projects for Community-wide IPRs, equivalent to the IPRs granted in political federations such as the US or Australia. Initially these will become available as alternatives to national rights in Member states. They are mentioned individually below.

Classifications of IPRs

IPRs can conveniently be divided into two main groups: rights which protect certain classes of ideas (patents, copyrights, designs, etc.); and rights which protect elements in the marketing of goods and services (trade marks and names, get-up, etc.) This is the primary division which is followed below.

IPRs may also be divided into those which have as a pre-requisite that a grant or registration is obtained from a public body (e.g. patents, registered designs, registered trade marks); and those which are accorded without any such formality (e.g. copyrights, unregistered design rights, confidential information, unregistered trade marks and names when protected against passing off).

In the first group, the rights are granted against all others, i.e. they may be asserted even against those who independently devise the same idea or symbol. In the second group, the rights can for the most part be enforced against those who take the idea or symbol from the right-holder. These characteristics will be noted in relation to each type of right.

2. IP IN IDEAS

i) Patents for Inventions

Purpose, entitlement, duration

Patents are granted to encourage the making of practical inventions and their subsequent development into commercial products and processes, to increase public knowledge of inventions and also to reward inventors. Patents are granted for new and inventive products, substances and processes.

The protection is an exclusive right to prevent others exploiting the invention in its various forms, which is good even against those who make the invention independently. In most countries priority is given to the first to apply (though the US still adheres to a first-to-invent principle). The right lasts for a relatively short maximum term (under the European Patent Convention, for instance, for 20 years from application for the patent).

Validity

A patent is valid only if the invention claimed is novel (not itself previously known); represents an inventive step (is 'not obvious') over the state of the art; and is capable of industrial application (is useful).

Patents must be applied for at a national patent office (or a regional alternative, such as the European Patent Office). In many countries, the substance of the claim will be examined by that Office before grant. Whether or not this happens, the validity of any patent granted may be challenged throughout its subsequent life by those whom it affects.

Disclosure

In return for the patent, the patentee must define his invention sufficiently in his patent specification for others with normal skills to be able to perform it.

Where a patent relates to microbiological material, and no adequate description can be given of how to acquire this material, a scheme now exists under which samples are deposited in specified culture collections in order that others may procure them. However, while the patent applications are still under consideration, only independent experts may be supplied with this material.

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Infringement

The scope of the right granted, which typically is defined by ‘claims’ set out in the specification, should be related to the degree of invention over the prior art. If a patent is to be of real commercial value, it is crucial to ensure that these claims are of sufficient breadth to prevent at least simple ‘inventing round’ the patent.

Settling the scope of a patent is one of the most perplexing aspects of the system. The drafting of claims calls for professional assistance.

Costs and Procedures

The main routes for British inventors to acquire patents are now the following:

- a) For an invention likely to be used only in the UK: application to the UK Patent Office. Official fees to grant – £285; from 4th year, annual renewal fees £110, rising to £450 for the 20th year; if a patent agent is used, professional fees depend on complexity and volume of work but probably will start at around £1,000.
- b) For an invention likely to be used only in parts of Western Europe: application to the European Patent Office. Official fees to grant – in the region of £3,000–4,000, depending on the number of countries designated; plus professional fees and fees for translations into national languages. The result is a bundle of national patents for the designated countries. It is possible to make a preliminary application for protection to the British Office and within 12 months to proceed with a more complete application to the EPO.
- c) For an invention with international value: application for patents in various countries world-wide is usually commenced by the Patent Cooperation Treaty (PCT) route. A single application through the British Patent Office leads to an international search, and, for many of the participant states (there are now some 70), to a preliminary examination at an international level. So far as Western Europe is concerned, a PCT application can lead on to processing in the EPO. A particular value of the PCT route is that it delays the date at which translations into national languages are needed. This allows the initial application to be made earlier and expenditure to be put off during a period when both technical and commercial assessments of the invention may be under active review. The costs of filing in, say, 50 countries are likely to be around £50,000 depending on the length of the specification.

- d) Litigation costs also are not low. In the US they can easily exceed £1,000,000. In the UK estimated averages are: in the High Court, £100,000; in the Patents County Court, rather less; in the Court of Appeal, some £60,000. In continental Europe litigation costs are generally lower.

ii) Petty Patents; Utility Models

Second-tier protection systems

Some countries (the UK is not yet one of them) have an additional system for protecting technical advances on a simpler basis (in most cases there is no substantive examination before grant) than under the standard patent system; and for a shorter duration (typically 6–10 years). They are obtained by application to a government office and are good even against independent devisers (*cf.* design rights, below).

Differences

In some countries these ‘petty patents’ or ‘utility models’ are available within the whole field of ‘invention’. In others protection is given to the extent to which an invention assumes a particular shape or set of shapes in (say) a machine part or apparatus. Again the various systems differ over the level of achievement which must be shown: some impose the same criteria of novelty and obviousness as for a full patent; others require only a lesser level of practical utility over and above what is already known.

EU Development

There is a movement to introduce such a supplemental system on a EU-wide basis. All Member states, save the UK, Luxembourg and the Netherlands, already have protection of this general character at a national level, though the systems vary along the lines already indicated, and it is unclear what precise form a EU ‘second-tier’ protection would take.

iii) Plant Variety Rights (PVRs); Animal ‘Varieties’

Systems of Protection

In the US from 1930, and Western European and certain other countries after World War II, rights began to be granted for newly developed plant varieties. The form this takes in the UK bears some resemblance to a patent system, with an additional right in the name given to a new variety. Rights are granted once a scheme has been established for a species, and such matters as the duration of the right vary somewhat from scheme to scheme.

APPENDIX I

UK Approach

Before grant, a new variety is subject to official trials to establish that it does have the necessary characteristics of distinctiveness, uniformity and stability. A sample of propagating material has, therefore, to be deposited, though it does not thereby become available to others. The right prevents all others from marketing seed and other propagative material for the variety. There is a 'farmers' exemption' allowing them to produce their own seed and rootstock in certain instances. The variety may also be used in order to produce further varieties.

Relation to Patent System

With the growth of genetic engineering of plants, there has been considerable pressure to by-pass this special, limited system, in favour of extending patent rights so that they may include some inventions relating to plants. In the EPO this is succeeding where the invention lies in altering the genetic structure to some greater or lesser extent than is involved in the production of a new 'variety'.

International and EU

There is an international Convention covering plant variety rights (the UPOV Convention, with 18 member countries), which has now been amended, so as to allow contracting states to protect varieties by patents and by special rights if they choose. It is possible that a EU-wide PVR will be established.

Animal 'varieties'

No special system of intellectual property in new breeds of animal has been introduced, which would provide an equivalent to that for plant varieties. However patents for 'animal varieties' are excluded from the patent system, as are plant varieties. And as with plants, this exclusion is not being interpreted so as to prevent the patenting of inventive changes in the genetic structure of animals, provided at least that those changes affect them to some larger or smaller extent than amounts to the creation of a new animal 'variety' (an inapposite word).

iv) Trade Secrets

Nature and Scope

Most developed countries grant protection to technical and commercial secrets in a manner which comes close to being a property right. Protection does not depend upon any formal act of deposit or registration of the

secret. In most cases, liability stems from the fact that a person has had access to the secret information on a confidential basis (e.g. as an employee or a licensee) and is acting or proposing to act in breach of that confidence.

Much industrial know-how is thus protected informally. But it is rarely simple to use legal rights to stop its leakage away. This helps to explain why many who wish to license rights in successful industrial products and processes prefer to have patents for the main concepts, while relying on trade secret protection for the surrounding know-how.

Differences

Legal systems differ in their treatment of trade secrets over the following:

- a) How far the protection extends to mere 'ideas', e.g. about useful, or sterile, paths for future research;
- b) The extent to which indirect recipients are liable;
- c) Whether the protection applies to spies who obtain the information surreptitiously, without having any relationship to the person holding it;
- d) The degree to which employees must be left free to take information with them when they leave employment.

v) Industrial Designs

a) *Registered Designs*

Registration Systems

Many countries (including the UK) grant rights covering the appearance of mass-produced articles, where a design element is incorporated which appeals to the eye, rather than for purely technical reasons. In the UK these rights are granted upon application to the Designs Registry of the Patent Office and are good against both copyists and independent designers.

Differences

There is considerable variation in the details of registered designs law from one country to another. Typically the rights may run to a maximum of between 15 and 25 years. Countries belonging to the Paris Industrial Property Convention are obliged to protect industrial designs and to afford

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a measure of priority to applicants from other contracting states. The EU is now proposing to introduce a EU-wide design right of this character, supported by a short-term, informal right against the copying of a design.

b) Unregistered Design Right

UK Lead

The UK has already introduced a separate, informal type of protection for industrial design, which operates where the designed product does not qualify as an artistic work within copyright law. Being the subject of no registration procedure, it is available only against those who copy the product.

Scope

Unregistered design right applies not to surface decoration but to the shape of industrial products and is available irrespective of whether the purpose and effect of the design is to appeal to the eye or to perform a technical function. It accordingly provides some informal equivalent both to a registered design (for the 'eye appeal' of a product) and to a petty patent where that is granted for the shape of an article.

Duration and Limitations

This unregistered design right usually lasts for 10 years from first legitimate marketing of products embodying it, there being a power to impose compulsory licences in favour of competitors, mainly in the last 5 of those years.

There are in any case exceptions (notably the so-called 'must fit' and 'must match' exceptions) which aim to allow competitors to make spare parts for cars and other durables without seeking any design licence (virtually the same exceptions also apply to registered designs).

vi) Copyright and Neighbouring Rights

Authors' Rights

Traditionally copyright has been accorded to 'authors' (i.e. creators) of literary, dramatic, musical and artistic works. The right gives protection against copying in various forms, notably making reproductions and using the material in public performances, broadcasts and the like.

Infringement may occur when less than the whole work has been copied: the reproduction of a substantial part of the work as it is expressed will be actionable.

Duration

Authors' copyright lasts for long periods – in most countries for the author's life and 50 years post mortem, if not longer. Under a EC Directive, the period throughout the EU is soon to be the author's life plus 70 years. In some form there will also be protection of such moral rights as the right to be named as author and to have the work protected from derogatory treatment.

Neighbouring Rights

A modern tendency has been to create similar rights against copying in favour of other persons, mainly in the spheres of culture, education and entertainment. These 'neighbouring rights' to authors' rights differ from country to country. In the UK, they at present include copyrights given to the producers of films, videos and sound recordings (i.e. the investors who fund their making), to broadcasting organisations and to publishers against photocopying. In addition, protection is now given separately, to performers and those with exclusive rights in their performance. The rights endure for somewhat shorter periods than authors' copyright.

Computer Programs

Computer programs, whether in source or object code, have recently been protected by copyright, by deeming them to be works of literary authors. (To some extent, programs are also beginning to acquire patent protection, though this differs between countries.)

In most industrial and many industrialising countries copyright protection of programs has been introduced by special legislation. In some countries literary copyright has been adapted by special provisions, relating, for instance to the term of protection and the degree to which programs may be decompiled by others wishing to make their own developments. It is still far from clear what activities, other than exact reproduction, will constitute infringement of this copyright.

vii) Semiconductor Chip Design

Separate Protection Against Copying

Computer 'firmware', consisting in the layout of chip circuitry, has also been specially treated. Following a US model, the EC and other advanced countries have created a separate right in semiconductor chip design, which operates against copying of the design, and lasts for a 10 year period. It is subject to exceptions which allow reverse analysis and adaptation.

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viii) **Unfair Extraction Right**

Database Protection

The rapidly increasing value of computerised databases is leading to demands for greater IP protection than is available in some countries. A particular difficulty arises in European countries which confine the scope of copyright law to cases where there is a real element of personal creativity in a work. This may make it hard to show copyright in a compilation of facts or other material from a variety of sources. To fill this lacuna, the European Commission has proposed the creation throughout the EU of an unfair extraction right, lasting for a short period, and subject to compulsory licensing in certain cases. At present there is considerable argument over whether this is a desirable development.

ix) **Slavish Imitation of Products**

Misappropriation of Ideas

Many countries (though not the UK or countries which derive their law from it) have a general right of action against unfair competition. There has been a noticeable tendency to extend such unfair competition laws to all circumstances where products are simulated to a degree which can be labelled 'slavish imitation'. It may not be easy to predict what will substantiate such an allegation.

The right forms a drag-net for cases where no specific form of IPR is available. The absence of this drag-net in British law has led to a tendency to increase the scope of specific rights, notably copyright and its attendant neighbouring rights.

3. IP IN MARKETING GOODWILL

i) **Registered Trade and Service Marks**

Registration Schemes

Words, phrases, devices, logos, etc. are used as symbols to indicate the source from which goods and services come. They are crucial elements in differentiated, competitive markets and are prominently featured in advertising. Where practicable today, marks are protected against adoption by competitors (deliberately or innocently) through a system of official registration. In the UK this is at the Trade Marks Registry of the Patent Office.

The EU is poised to introduce the alternative of registering a Community Trade Mark enforceable by a single process throughout the Member states.

Infringement

Once a mark is registered, in most systems it can be protected against the use of the same or a similar mark, on the same or similar goods, and for the same or similar services. Provided that renewal fees are paid, these rights can be extended as long as the mark remains in use.

Ease of Registration

Countries vary in the details of their system for the registration of marks. Some encourage the registration of everything, so that there will be a complete listing of symbols in which rights are being claimed. Others allow registration only after an official investigation into inherent objections to registrability, and even (as in the case of the UK) into whether there are conflicting marks already on the register.

The coming EU system will confine official examination to inherent objections (that, e.g. the mark is descriptive of the product or is misleading); but competitors will be able to oppose registration in advance where they have a conflicting mark with a prior claim to protection.

ii) Misleading Use of Marks, Get-up, etc.

Passing Off and Similar Conduct

Misrepresentations in the course of actual trade may also give rise to legal protection. If one trader uses the mark or other symbol by which another is known to consumers, this conduct will be actionable in law. Some countries classify the right under a general law against unfair competition. Others, such as the UK, use somewhat more limited categories, such as the torts of passing off and injurious falsehood.

Usefulness

These are rights which do not depend upon any formal act of registration and so are particularly important in countries where it may be difficult to acquire a trade-mark registration or where the administration is slow. They are also useful for protecting aspects of marketing which do not (in a particular country) fall within the scope of a registration system, such as the appearance of packaging or even product, disparagement in advertising, merchandising of characters and endorsement by celebrities.

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iii) **Collective and Certification Marks**

Shared Interests

Significant goodwill may be shared by undertakings in a word or symbol which characterises some aspect of the goods or services which each of them separately produces.

This phenomenon includes those cases where products acquire some of their quality from the growing of materials and production methods in a particular place or region ('champagne', 'sherry', 'stilton'). Other cases relate simply to the common description of a product ('advocaat'; the 'wool-mark').

Registration Schemes

Many industrial countries have an official registration system under which they afford protection to such 'appellations of origin' and 'denominations of source'.

In some countries, special forms of joint trade mark exist for this purpose, in the form of a 'collective' or 'certification' mark or through some other specific type of registration. In addition, there is likely to be protection without any need to register, in cases where consumers are likely to be confused by use of the term. This liability will arise under a general law against unfair competition, or, in common law jurisdictions, because of passing-off.

OWNERSHIP AND EXPLOITATION OF INTELLECTUAL PROPERTY GENERATED IN ACADEMIC INSTITUTIONS

Where the employment terms of academic and research staff lay down who is to own intellectual property generated by the employee, for the most part these express arrangements determine the issue. This is the main point made in Section 12.2 of this Report.

It does not matter whether these express terms are found in the original terms of employment or in any subsequent variation of the employment, provided that they are legally binding. What follows here is a statement of the rules which apply if no express agreement has been reached on the subject.

The purpose of this Appendix is:

- i) to demonstrate that these (largely) presumptive rules do not apply with complete clarity to academic situations; and
- ii) to suggest this reinforces the need for both sides, employers and employees, to give fair recognition to each other's interests, when settling the express terms on the subject in employment contracts.

1. Initial Ownership of a Patent and the Right to Apply for it

By UK law, where an invention is made by an employee in the course of employment, ownership lies initially in that person's employer. This is defined as covering cases where the employee's duties (i.e. his normal duties or duties specifically assigned) are such 'that an invention might reasonably be expected to result from the carrying out of those duties.' (Patents Act 1977, s. 39(1)).

Since the enactment of the 1977 Act, many universities have taken the position, also supported by the CVCP, that they are entitled to inventions made not only by purely research staff but equally by teaching staff in the course of academic research.

2. Compensation to the Employed Inventor for Outstanding Benefits

Elaborate rules in The Patents Act 1977, ss. 40–43, seek to secure some measure of fair return to employee inventors from patents to which their

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employers are entitled either initially or by assignment. When the employer is initially entitled to the patent and obtains an outstanding benefit from it, the inventor becomes entitled to compensation representing a fair share in the light of all the circumstances (a list of factors is given in s. 41(4)). While this statutory scheme can be displaced by a collective bargain, it cannot be altered by an individual agreement entered into before the invention was made.

These provisions have a compulsory effect; but the circumstances where they apply are not always easy to identify. Much may hinge on facts of which there is no adequate record. It is, therefore, highly desirable that an express arrangement is embodied in individual contracts and in relevant instances should be negotiated with an appropriate 'trade union' (the expression is widely defined).

The rules under Heads 1 and 2 together underpin the contractual practice which is today frequently an express provision in academic science employment. This provides:

- i) that the employer should have initial ownership of patents, rights to apply for them, and similar rights in technology (e.g. petty patents (in other countries), plant variety rights, semi-conductor chip rights, etc.) Equally it makes broad sense to treat IPRs in computer programs on a similar basis, even though those rights take the form of copyright more frequently than of patents;
- ii) that the employee should be entitled to a substantial share in royalty earnings from inventions, generally in accordance with a stepped or sliding scale which enhances the institution's proportion as the returns increase.

3. Copyright in writings

The underlying legal position relating to the copyright in writings is not the same as that affecting patents and related rights. For a start there is no statutory scheme requiring the payment of compensation for outstanding benefits to an employer.

The Copyright, Patents and Designs Act 1988, s. 11(2) lays down that 'where a literary, dramatic, musical or artistic work is made by an employee in the course of his employment, his employer is the first owner of any copyright in the work subject to any agreement to the contrary'.

Where the employer thus becomes entitled, the author's moral right to be identified as such (s. 77) does not apply in relation to anything done with

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the copyright owner's authority. Equally in such cases, the author's moral right to object to derogatory treatment (s. 80) is reduced to a right, where named, to insist upon a disclaimer.

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Under these conditions, the question arises whether and, if so, when the writings of academic research employees belong initially to their employing institutions; and that is primarily a question of what is done 'in the course of the employment'.

In this context there has been little interpretation by the courts of the phrase. But on one occasion, the Master of the Rolls, Lord Evershed, speaking of the cognate subject of the delivery of lectures by an academic, took the view that copyright in their text would nonetheless belong to the individual lecturer:

'Lectures delivered, for example, by Professor Maitland to students have since become classical in the law. It is inconceivable that because Professor Maitland was in the service at the time of the University of Cambridge that anybody but himself, one would have thought, could have claimed the copyright in those lectures.' (see (1952) *69 Reports of Patent Cases*, p.18)

At least so far as regards academic staff in universities, it has not been the practice for their institutions to claim copyright in their writings. In the language of the statute, the production of copyright material has not been regarded as falling within 'the course of the employment'. If the contrary were to apply, the institution would have the right to decide when the work should and should not be published, and (as noted above) the author would have no moral right of identification; and only a right to have his or her name dissociated where the work was improperly altered, e.g. by making cuts or insertions.

It would be wrong for institutions to claim such a right as a matter of general law, or indeed to take it by express contract, in a way which would deprive academic authors of essential powers to control how, when and where their work should or should not appear.

APPENDIX III

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