



**DEPARTMENT OF SCIENCE & TECHNOLOGY**

**INTELLECTUAL PROPERTY RIGHTS (IPR)  
FROM PUBLICLY FINANCED RESEARCH FRAMEWORK**

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## EXECUTIVE SUMMARY

**Introduction**

*Protection of intellectual property by public research organisations is increasing...*

Intellectual property (IP) rights – of which patents, industrial designs, copyrights and trademarks are among the most widespread – reward investment in R&D and innovation by granting inventors and creators market power over competitors. Over the past decade in many OECD countries, universities, national laboratories and other research organisations receiving significant public research funds (hereafter referred to as “public research organisations – PROs”) have become more aware of the value of their intellectual property. In large part, this awareness reflects the recognition by governments that, in some cases, placing the outputs of publicly funded research in the public domain is not sufficient to generate social and economic benefits from research.

*...driven by legislative reforms but also by closer interaction with industry...*

This awareness and demands to generate more economic benefits from public support to R&D have focused policy makers’ attention on the laws and rules governing the ownership and exploitation of IP at PROs. In 1980 the Bayh-Dole Act in the United States gave university contractors of federal research the right to take out patents on inventions and license them to firms. Although patenting at US universities was occurring before 1980, it has since increased sharply. Between 1993 and 2000, US universities were granted some 20 000 patents. Over that period, some of these academic patents had generated millions of dollars in licensing revenue and have spurred the creation of over 3 000 new companies, according to the Association of University Technology Managers. Consequently, in other OECD countries and beyond, the Bayh-Dole Act has been widely viewed as a catalyst for increasing the social and economic benefits from public research funding.

*...against a background of a strengthening of IPRs in the knowledge-based economies.*

PROs have also been encouraged to protect their academic inventions and creative works by a general strengthening and broadening of intellectual property protection to new areas such as databases, genetic inventions, software or new materials that are closer to basic research. The results of publicly financed research have thus become more valuable to the research community and to firms. The rise of universities and new biotechnology firms as sources of commercially valuable know-how for the pharmaceutical and agricultural sectors illustrates this point.

*This is creating opportunities for both governments and PROs.*

For governments, granting PROs rights to IP generated with public funds can lead to better use of research results that might otherwise remain unexploited as well as to the creation of academic spin-offs or start-ups that create employment. For PROs the benefits may include increased licensing and royalty revenues, more contract research and greater cross-fertilisation between entrepreneurial faculty and industry. Equally important, however, are the intangible benefits to an institution’s reputation and to the quality of its research that closer interaction with the private sector can generate.

## EXECUTIVE SUMMARY

Intellectual Property is increasingly important in all sustainable economies as a basis for competitiveness and economic growth. Intellectual property secured from publicly financed research, in particular patents, requires an enabling framework and clear regulations. This will stimulate universities and other institutions, their staff and students to invent and secure their inventions. It is also critical to expand the capacity of universities and other institutions to commercialise their intellectual property.

Governments need to have good policies and legislation to ensure their rights to use intellectual property that arises from publicly financed research in times of national need (walk-in rights). Government also plays a key role in setting up a well regulated and enabling environment to increase the rate and quality of patenting based on publicly financed research that can be commercialised and/or used in public good programmes to improve quality of life. The enabling environment will take into cognisance the need for the R&D activities to remain located in South Africa.

Following an introduction to intellectual property, the policy framework is placed in the context of the roles and responsibilities of government departments in South Africa.

Local and international trends and data are analysed. This analysis leads to the conclusion that South Africa is not a major player in the global intellectual property domain. South Africa's patent system is dominantly used to secure intellectual property for "inward patenting" – securing inventions that originate outside South Africa. In comparison to other countries, South Africa has not substantially improved its performance in local or international patenting over the last decade. Analysis of the patent patterns for South African institutions shows very low levels of patenting by institutions that are publicly financed. The clear implication is that South Africa is falling behind in this important aspect of the knowledge economy and that a better framework and approach is required.

The approach proposed in the National R&D Strategy is summarised and applicable legislation already in place in South Africa is summarised.

A review of current initiatives in place in South Africa to address matters relating to patenting inventions that arise from publicly financed research is outlined.

These include capacity building and training initiatives, provision of additional finances to assist in patenting, institution level initiatives to put in place IP Management Offices and endeavours to provide clearer benefit sharing arrangements with inventors. Overall these initiatives are having some positive impact. However the conclusion reached is that South Africa would benefit from a legislative framework that would bring coherence to the series of fragmentary approaches that are in place at present.

A framework is proposed for the new approach. This begins with a stakeholder analysis, including the roles and expectations of government, publicly financed institutions, inventors, business and civil society. Building on this stakeholder analysis the roles and modalities required for better outcomes are described -. higher levels of patenting, distribution of benefits to inventors, government's ability to ensure access to key inventions, among others.

The approach includes the following elements:

- 1) Proposals in respect of benefit distribution from successful commercialisation of Intellectual Property from publicly funded research.
- 2) The creation of an obligation, by inventors using public finances, to declare potential inventions.
- 3) The granting of a right to institutions to secure income from successful commercialisation of publicly financed research.
- 4) The creation of an institutional obligation to centrally manage such processes through an IP Management Office.
- 5) The establishment of government "walk-in" rights for Intellectual Property secured with public financing.
- 6) Establishment of a requirement for preference for SME's and BEE firms in respect of the licensing of patents derived from publicly financed research.
- 7) Establishment of a requirement for preference for the licensing of firms in South Africa.
- 8) Establishment of the criteria under which business financed research that is partially publicly financed can be managed.
- 9) An associated mechanism for the proper determination of research costs.
- 10) The designation of an agency to record the declaration of inventions and to track the registration of patents and licences derived from publicly financed research.
- 11) An outline of the operational and performance requirements of the Agency.

The Framework concludes with the need to establish legislation to give effect to the requirements for the policy framework.

## 1. CONTEXT OF FRAMEWORK

### 1.1 *The imperative to secure patents arising from publicly funded research.*

There is an urgent need for the creation of a proper framework and enabling legislation for the effective management of Intellectual Property (IP) arising from publicly financed research. At present, there is very little appreciation for the value of IP as an instrument of wealth creation and in that managing of public risks in South Africa.

At present government does not have a policy or legislation regulating this domain other than the outline contained in the National Research and Development Strategy accepted by Cabinet in 2002. There is presently significant leakage of IP that is publicly financed into overseas jurisdictions. Government cannot exercise any walk-in rights in the absence of legislation and the creation of an enabling environment is significantly constrained by the multiplicity of different approaches adopted by different public institutions.

Globally many nations have established legislative and/or regulatory frameworks to ensure better practice and returns from IP. This process started with the United States (US) in the mid 80's, and was adopted and modified by other developed countries during the 90's. Developing countries and emerging economies have taken action from the late 90's to date. Most recently, Brazil, South Korea and Japan, for instance, have modified their policies and approach. These changes are intended to provide a basis for higher levels of patenting to result from publicly financed research with the attendant potential for commercialisation or regulated public use.

Such patents are used as a basis for licensing of the intellectual property, usually to businesses that use the IP to improve products and services, to create new businesses or to secure a basis to reduce costs of IP developed in other jurisdictions in strategic health research programmes for example.

### 1.2 *Intellectual Property*

IP refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce.

Intellectual property can be divided into categories such as:

- ✍ Industrial property, which includes inventions (patents), trademarks and industrial designs;
- ✍ Geographic indications of source (for instance, names such as Champagne and Rooibos); and
- ✍ Copyright, which includes literary and artistic works.

Appendix 1 summarises the types of IP in more detail.

### *1.3 South African Government Intellectual Property Responsibilities*

The Department of Trade and Industry (the **dti**) has the governmental mandate for legislation relating to intellectual property of the types alluded to above and the Department of Science and Technology (DST) works closely with the **dti** in this regard. The prime focus of the **dti** is trade-related intellectual property issues, the World Intellectual Property Organisation (WIPO) and the Commission for Intellectual Property in Health (CIPH). The DTI has initiated an amendment to the Patents Act that incorporates a number of matters relating to the declaration of prior knowledge in respect of indigenous knowledge.

The Department of Environmental Affairs and Tourism is responsible for biodiversity protection and is involved in a number of international forums where intellectual property issues related to this are discussed.

The Department of Agriculture is responsible for IP issues relating to plant breeders rights.

The DST, working with a range of departments, has engaged in establishing a policy framework for indigenous knowledge systems which was accepted by Cabinet in 2005. The DST takes responsibility for intellectual property arising from publicly funded research. The DST has observer status, on behalf of government, in the Committee for Science and Technology Policy (CSTP) of the Organisation for Economic Cooperation and Development (OECD). CSTP has undertaken a number of policy studies in relation to the issue of intellectual property developed in publicly financed research organisations.

### *1.4 Scope of this Policy Framework*

The scope of this policy framework, and the intended legislation, is **focused on and limited to Intellectual Property, i.e. patents and intellectual property**

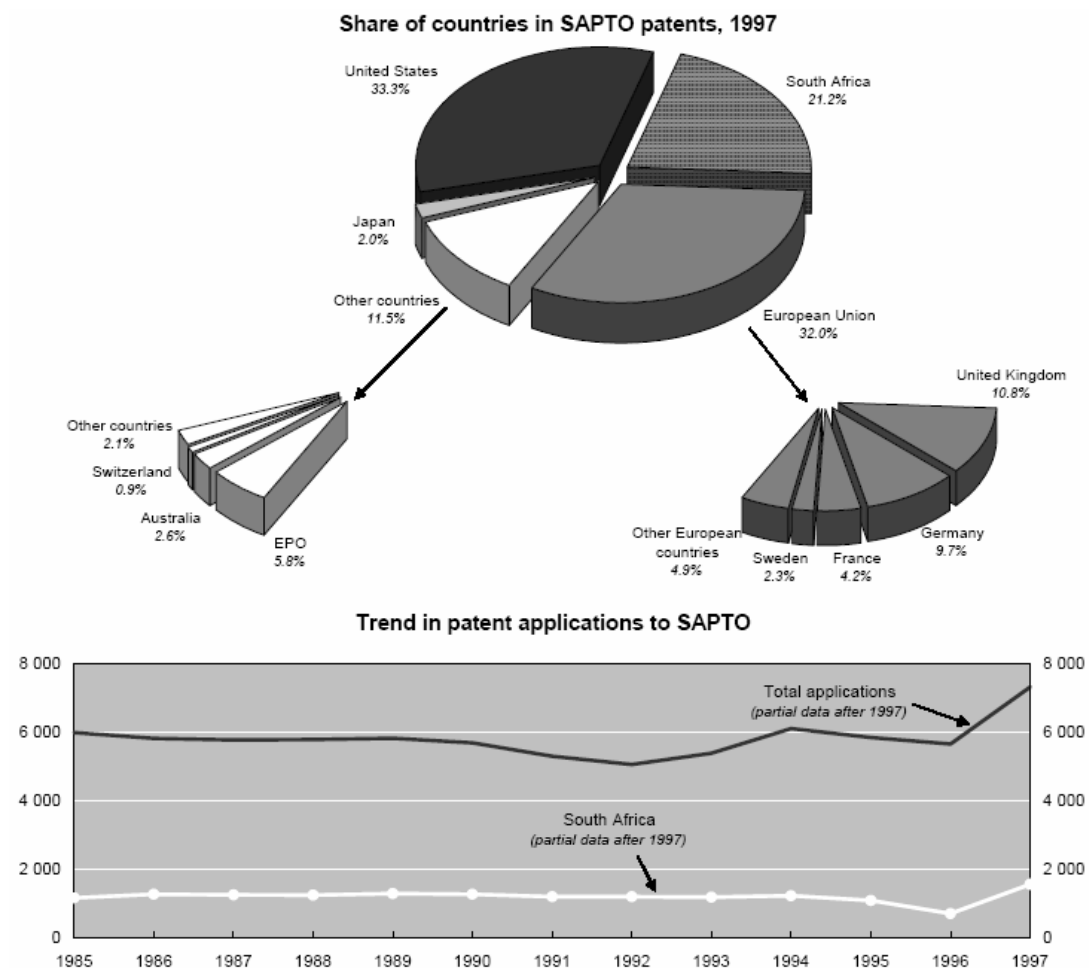
**forms that are integrally linked to the patented invention, protecting inventions made through work financed by public research funding. It deals with issues of ownership, benefit sharing from licensing and use of the patents and intellectual property forms that are integrally linked to the patented invention and accountabilities of different role-players in the system of innovation. The proposed legislations (see applicable legislation) will be compliant with and not in conflict with the provisions of the Biodiversity Act 10 of 2004, the Patents Act 57 of 1978, the Indigenous Knowledge Systems policy and any relevant South African intellectual property laws and policies.**

The reason for protecting inventions is to ensure that the economic and social benefits that arise are captured for South Africa. It is intended that small enterprises (SMEs) and black economic enterprises (BEEs) will enjoy preferred access in licensing the intellectual property that originates from publicly funded research. In addition, the public use of certain technologies (for example water related inventions) can be protected and cost reduced once they are patented, but cannot if they are not.

It is important that inventors benefit from their inventions if they become commercially successful. Indeed, policy analysis reveals that benefit sharing is a major incentive that underpins the successful development of such policies. Benchmarking studies undertaken by the DST show that South African academics secure patents at only 25% of the rate of their developed world counterparts, (relative to the rate at which they publish their results in the open literature). This performance directly and negatively impacts our ability to be effective in key areas of the knowledge economy.

## 2. INTERNATIONAL PRACTICE AND SOUTH AFRICA'S PERFORMANCE

The data from South Africa's patent office for 1997 is shown below (Figure 1). South African originated patents are compared to filings from other countries. The proportion of patents originating from South Africa measures our performance. Current performance shows that only one in five patents filed in South Africa has a South African origin. This data also shows that South Africa remains a small patent country in terms of numbers and is also a small "destination" for foreign patents filed in South Africa. Less than 8 000 patents were filed in SA in 1997 while the European Patent Office had about 80 000 filed in the same year.



1. Provisional data. Due to missing information on inventors, countries refer here to the office where the priority application was filed.

Source: OECD, Patent Database, July 2003.

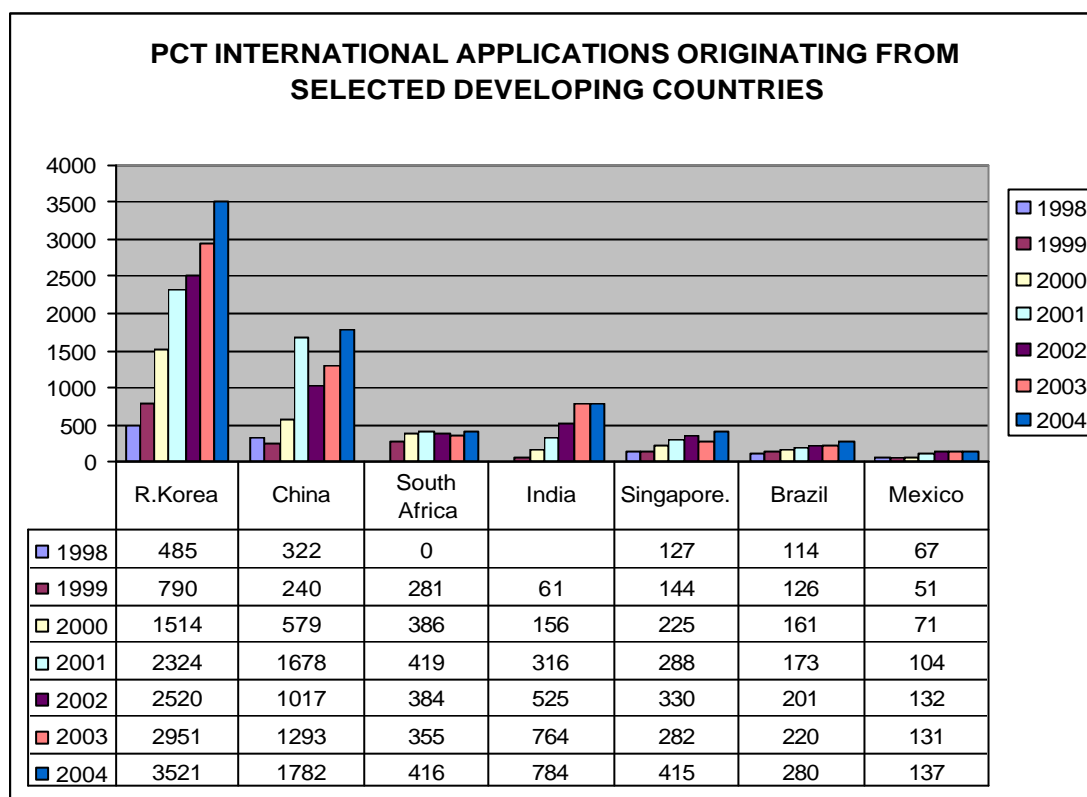
**Figure 1: SAPTO data disaggregated by country of original filing**

South African inventors secure around 100 United States patents per year. These patents are recorded as originating in South Africa, based on an original filing in South Africa. This level of patenting represents 2.5 patents per million of South Africa's population per annum. Inventors in Japan are granted more than 900 patents per million of population per annum.

Globally only a small fraction of all patents are generated by public research institutions – but the numbers are now much larger than previously. Much of the increase in academic patenting has been attributed to the expansion of biotechnology. However, different countries have different strengths. OECD investigations reveal that patents in health and information technology predominate for some countries (Belgium, Germany, Netherlands and Switzerland) in others patenting is significant in manufacturing, food and energy technologies.

Patenting when established reflects a nation's R&D and industrial specialisation. In South Korea for example, where IT is important over 70% of universities declared having filed a patent in IT and electronics. In South Africa mining, mineral technology, chemical and petrochemical inventions and the life sciences predominate.

A comparison between South Africa and other developing countries of Patent Cooperation Treaty (PCT) applications filed internationally is shown in Figure 2. The data indicates that in the past four years South Africa has stagnated while countries such as South Korea, China and India have gone from strength to strength. Korea has increased its patent applications by 7 fold since 1998 and the numbers of India's patent applications have increased almost 12 times since 1999. In this respect, South Africa has barely managed to double its number of PCT patent applications since 1999.



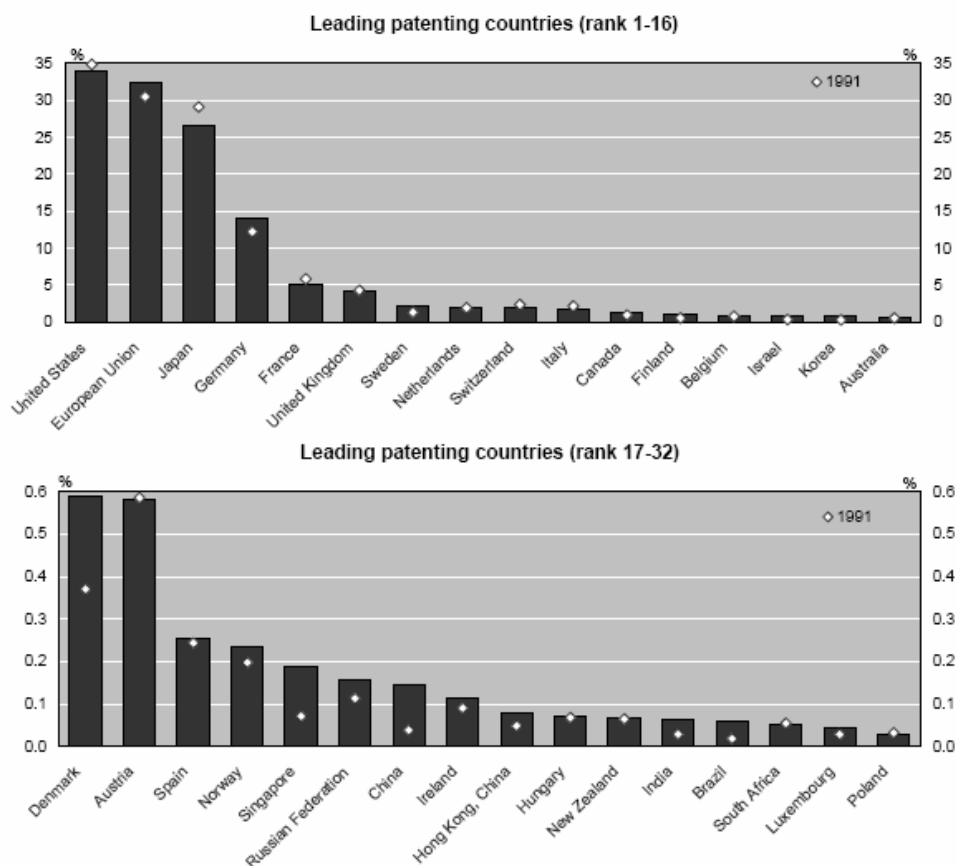
**Figure 2:** *Developing country comparisons of PCT International Applications*

Another measure of performance is the number of patents that originate in a country that are filed (as a “patent family”) in the US, Europe and Japan. These so-called “triadic patents” are generally regarded as the most important from an economic perspective given the large portion of the global economy represented by these offices.

The figure below (Figure 3) shows a comparison of 32 countries in respect of their participation in triadic patents (note the change of scale between the first and the second graph). The “diamond” indicates the position in 1991 and the “bar” the position in 1999. The South African position is essentially static, with a number of countries having overtaken us during that decade.

## 2. Share of countries in triadic patent families<sup>1</sup>

according to the residence of the inventors, for priority year 1999

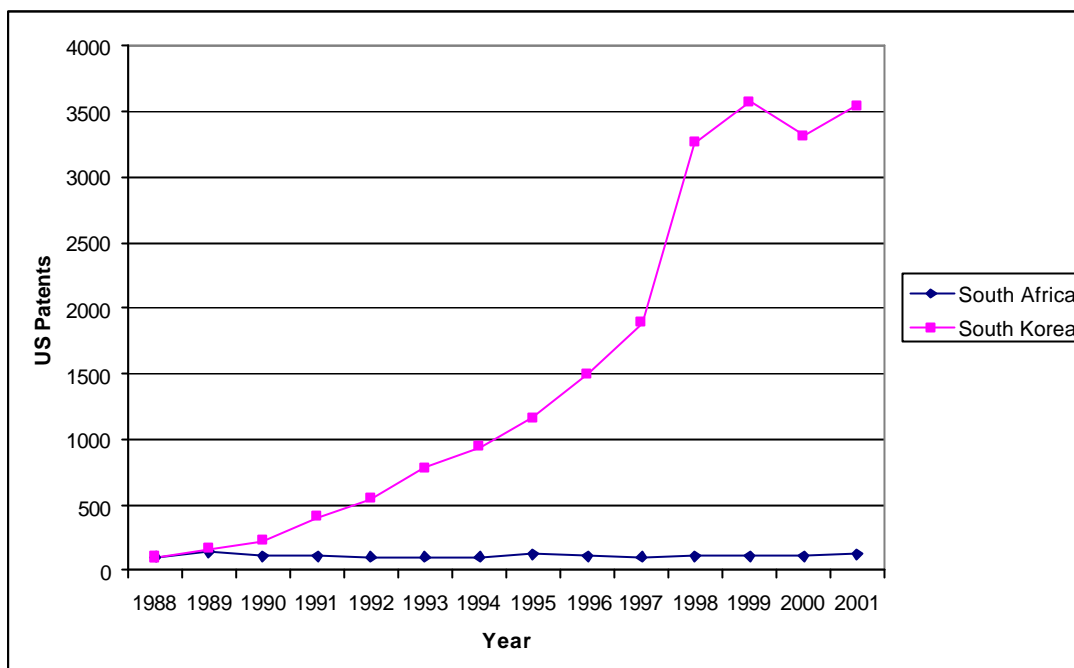


1. Patents all applied for at the EPO, USPTO and JPO. 1999 figures are estimates.

Source: OECD, Patent Database, July 2003.

**Figure 3:** Comparison of countries with triadic (USPTO, EPO and JPO) filings of the same original filing in a patent family. This is an indication of global patent strength.

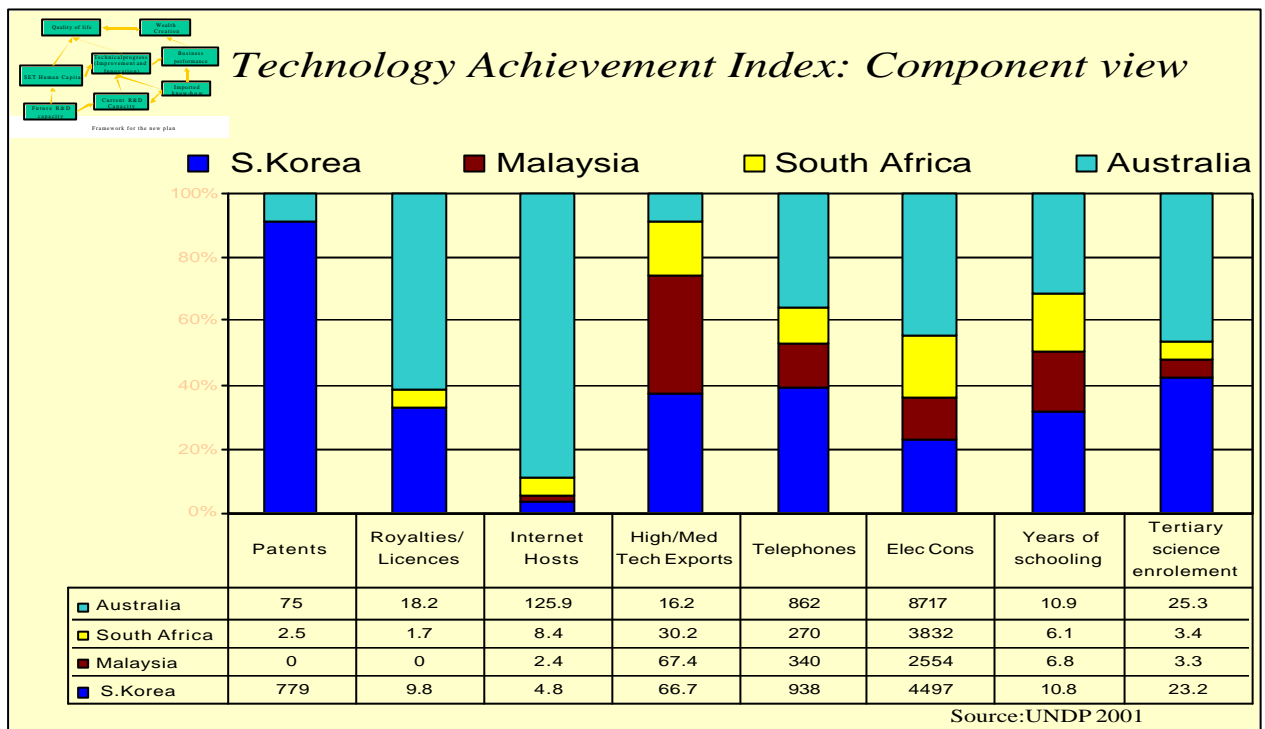
Comparison with countries such as South Korea (Figure 4) indicates a stagnation of South African inventors and institutions securing patents over the last 15 years. South Korea, as an emerging economy, has dramatically improved its production of patents. During this period, countries such as Spain, India and Ireland have also overtaken South Africa in US patents. The US data is widely used because of its reliability and accuracy, but similar analysis undertaken in the European Patent Office and Patent Convention Treaty filings show a similar pattern.



**Figure 4:** Comparison between South Africa and the Republic of Korea (South Korea): Patents secured in the US patent office per year from 1988 to 2001

The differences in patenting rates between the developed and the developing world represents one of the greatest “divides” of the knowledge age. Patents, together with copyright, represent the strongest form of “intangible value” in the knowledge economy. This underperformance is evidence of a major weakness in South Africa’s ability to become a full player in the global knowledge economy. In parallel to focussing on increased patenting activity, there is a need to build capacity in entrepreneurship and technology transfer within publicly funded institutions, to ensure that proper innovation or commercialisation of these inventions/patents, takes place.

The UNDP Technology Achievement Index highlights key weakness of South Africa’s patent scenario, which is strongly reinforced by our poor capacity in securing intellectual property from publicly financed research. (Figure 5)



**Figure 5:** Analysis of the components of the Technology Achievement Index showing the poor performance in the domain of intellectual property and its economic use (columns 1 and 2)

An analysis of the Technology Achievement Index (UNDP 2001 Report) shows South Africa's patent and licensing profile in relation to Malaysia, Australia and South Korea. South Africa rates low in relation to South Korea and Australia (2.5 patents in comparison to 779 and 75 respectively). This is highlighted in the first column of Figure 5. One of the consequences of a low patenting rate is the low royalty and licensing income shown in the second column of the graph. The ability to secure revenue from IP is a key diagnostic of national development. It also influences the economic value derived from high-technology exports, since IP is a key component of many high-tech products. South Africa's performance in respect of high and medium term exports, has been improving, but the relative position shown in column 4 of the graph remains weak. It is however notable

that South Africa's proportion of high and medium term exports has overtaken Australia.

The table (Table 1) below highlights the low patenting rate by South African publicly funded research institutions (shown in bold). This signals the importance of putting in place enabling legislation to encourage stronger IPR protection amongst these institutions. It is notable that a number of our key universities and science councils secured no US patents during this period. The top United States universities (of similar size to our research universities) secure in the order of 30 to 100 patents per annum. Benchmarked against publications, South Africa's institutions that are publicly financed are underperforming by a factor of 50. It is also notable from this table that some institutions assign their IP to groups such as the British Technology Group and other offshore entities.

**Table 1:** *Patenting in the USPTO by South African Institutions (Ownership View)*

Organization	Patents issued from 1996-2001
Denel (Pty). Ltd	11
Sasol Technology (Pty). Ltd	10
<b>Water Research Commission</b>	<b>9</b>
Circuit Breaker Industries Limited	9
<b>Atomic Energy Corporation of South Africa (now NECSA)</b>	<b>9</b>
Implico B.V. (offshore)	8
<b>CSIR</b>	<b>8</b>
Eskom	7
British Technology Group Limited (offshore)	7
Farmarc Netherland B.V. (offshore)	5
AECI Limited	5
Ipcor NV (offshore)	4
Microchip Technology Incorporated	4
Windsor Technologies Limited	4
<b>Mintek</b>	<b>4</b>
Billiton SA Limited	4
Scorpio Conveyor Products Limited	4
SLIC Trading Company Limited	4
Electro Chemical Holdings S.A.	4
<b>University of Pretoria</b>	<b>4</b>

H L & H Timber Products (Pty). Ltd	4
European Sports Merchandising B.Vv	3
L'Air Liquide	3
AECI Explosives Limited	3
Press Engineering (Pty). Ltd	3

An analysis of life science patents with South African resident inventors reveals that 40% of these are owned by non-South African offshore entities. One of the reasons for this high level of offshore ownership is the lack of a clear policy with respect to ownership of IP developed with public funds in South Africa.

In summary, there has been no improvement in patenting from our economy as a whole from 1998 to the present. An increasing number of emerging economies and developing countries are overtaking us in this regard. Our public institutions show a low propensity and capacity to secure international patents, reducing our ability to secure economic gains and effective negotiating positions using IP.

### 3. NATIONAL R&D STRATEGY

The National R&D Strategy made specific proposals for a more effective regime for IP derived from publicly financed research. An extract from the NRDS is given below.

*“At present, there is little appreciation for the value of intellectual property as an instrument of wealth creation in South Africa. A number of firms have good intellectual property offices but universities and Science Councils have not created a strong intellectual property framework. The rights of government, financing institutions, performing institutions and their staff are not defined. There is an urgent need for the creation of a proper framework and enabling legislation for the management of intellectual property arising from publicly financed research. This will define the “playing field” for publicly financed research and research that is undertaken in parastatal institutions.*

*This framework should have the following attributes:*

- ✍ It should be legislated.*
- ✍ It should draw on the enabling frameworks of global best practice.*
- ✍ It should not place South African institutions at a disadvantage relative to international practice.*

- ✍ It should create a context for benefit sharing by inventors and innovators.*
- ✍ The obligation of institutions to protect intellectual property developed from publicly financed research should be established.*
- ✍ The right of the state to acquire the right to use such IP in the public interest should be established.*
- ✍ An acceptable framework for the sale of rights should be established, including the conditions under which the rights can be acquired internationally.*
- ✍ Powers should be granted to make regulations in respect of recognition of inventors, designers and authors who develop intellectual property when financed with public funds in respect of benefit sharing by institutions.*
- ✍ Institutional practices in respect of benefit sharing, invention disclosure and minimum standards for institutional intellectual property management should be standardised.*

*A dedicated fund to finance the securing of intellectual property rights resulting from publicly financed research and development, when this is in the national interest, should be established. The management of this fund should be placed with a dedicated agency.*

*Patent expenditures compete directly with human resource budgets. Under these conditions, few institutions have the long-term strategic commitment to securing IP. If patenting is seen as a virtue in its own right rather than as a strategy that leads to economic growth, patenting can increase dramatically but the quality of the patents can be poor and their economic value dubious.*

*Given the poor state of intellectual property protection, there is a need to reduce the financial barriers experienced by institutions when they secure intellectual property from publicly financed research. The policy approach will have to be robust to ensure that institutions remain accountable for the IP, while at the same time proactively seeking to commercialise it.*

*A national database of intellectual property that arises from publicly financed research is an important management tool to measure the current and future performance of the system. It is proposed that the Department of Science and Technology take responsibility for the development of such a database". Information from the Innovation Fund's Patent Support Fund will provide initial data to go into such a database.*

Following the publication of the National R&D Strategy, a series of informal discussions with stakeholders were initiated by the DST following the acceptance of an outline approach in the form of a standard presentation that was accepted by the Minister of the former Arts, Culture, Science and Technology in May 2003.

These informal consultations have been held using institutions such as the South African Research and Innovation Management Association (SARIMA), The Intellectual Capital Forum initiated by the National Advisory Council on Innovation (NACI), the Licensing Executives Society of South Africa (LES), university research management seminars, science council leadership groups and industrial associations.

#### **4. SOUTH AFRICAN IP LEGISLATION RELATED TO THIS POLICY FRAMEWORK**

A successful policy requires an enabling environment and incentives to mobilize inventors, institutions and industry to align their responses. In addition, minimum requirements need to be established to ensure that there is a level playing field and effective regulation of the actors who can benefit from publicly financed intellectual property. With this in view, current interventions and actions have been investigated to determine the extent to which they are achieving the policy objectives set out in the National R&D Strategy.

##### **4.1 Applicable Legislation**

###### **Inventions Development Act 31 of 1962**

To provide for the promotion of the development and exploitation in the public interest of certain discoveries, inventions and improvements and for that purpose; to establish a South African Inventions Development Corporation and to prescribe its powers and functions and the manner in which it shall be managed and controlled; and to provide for other incidental matters. This Act is operated by the CSIR.

###### **Plant Breeders' Rights Act 15 of 1976**

To provide for a system where under plant breeders' rights relating to varieties of certain kinds of plants may be granted and registered; for the requirements which

have to be complied with for the grant of such rights; for the protection of such rights and the grant of licences in respect of the exercise thereof; and to provide for incidental matters. This legislation is operated by the Department of Agriculture.

### **Patents Act 57 of 1978**

The purpose of the act is to provide for the registration and granting of patents for inventions and for matters connected therewith. (The **dti**)

### **Intellectual Property Laws Rationalisation Act 107 of 1996**

The purpose of the act is to provide for the integration of intellectual property rights subsisting in Bophuthatswana, Transkei, Venda and Ciskei into the national system, and to extend the South African intellectual property rights legislation throughout the Republic. It also repeals certain other intellectual property laws, and provides for matters connected therewith. (The **dti**)

### **Intellectual Property Laws Amendment Act 38 of 1997**

To amend, (inter alia), the Merchandise Marks Act, 1941, so as to substitute, to delete or to amend certain definitions; to define certain expressions; to repeal the provisions relating to the unlawful trading in counterfeit goods in so far as these provisions are to be superseded by other envisaged legislation regarding the counterfeiting of goods; to adjust the powers of inspectors to enter and search premises and attach goods; to substitute or delete certain obsolete provisions and references; to delete a provision imposing a burden of proof on an accused; to provide for a presumption with respect to the offence of offering for sale or hire goods to which any false trade description is applied; and to adjust the provisions regarding penalties for offences; to amend the Performers' Protection Act, 1967, so as to delete or to amend certain definitions; to define certain expressions; to protect performances in countries which are members of the World Trade Organization; to lengthen the term of protection for performances to fifty years; to provide for all broadcasters; to adjust the provisions regarding penalties for offences; and to extend the application of the Act to performances which took place before its commencement to correspond with the Agreement on Trade

Related Aspects of Intellectual Property Rights (the TRIPS Agreement); to amend the Patents Act, 1978, so as to define certain expressions; to amend or to substitute certain definitions; to clarify the provisions with respect to the payment of renewal fees, the priority dates of matter as opposed to patent claims, the principle of privilege regarding communications by or to patent agents and the assessment of damages; to bring the Act in line with the Trade Marks Act, 1993, the Designs Act, 1993, and the TRIPS Agreement; to provide for the implementation of the Patent Cooperation Treaty in the event of South Africa's accession thereto (South Africa acceded to the PCT in 1999); to effect a correction in the Afrikaans text; to repeal or amend certain obsolete provisions and references; and to amend the long title; to amend the Copyright Act, 1978, so as to substitute, to amend or to delete certain definitions; to elaborate the requirement that a work must exist in a material form to qualify for copyright; to adjust the term of copyright in a cinematograph film and to extend the scope of copyright in computer programs in view of the TRIPS Agreement; to provide for all broadcasters; to amend the provisions relating to damages and other compensation for the infringement of copyright in order that it corresponds with the Trade Marks Act, 1993, and the Designs Act, 1993; and to substitute a certain word in the Afrikaans text; to amend the Trade Marks Act, 1993, so as to amend the provisions regarding marks that may not be registered as trade marks and those regarding the protection of well-known trade marks to ensure compliance with the TRIPS Agreement and Article 6 of the Paris Convention; to effect a correction in the English text; to further regulate the relief for the infringement of registered trade marks; to provide that the registrar must keep a list of emblems of convention countries and international organisations; and to replace an incorrect reference; to amend the Designs Act, 1993, so as to define an expression; to delete a definition; to adjust the requirements for the registration of a design; to amend the provisions regarding the notification of registration and the certificate of registration; to adjust the provisions regarding compulsory licences in respect of certain registered designs and to further regulate the effect of the registration of a design and the amendment of an application for registration, and of a registration of a design, to ensure compliance with the TRIPS Agreement; and to correct or to clarify certain provisions; and to provide for matters connected therewith. (The dti)

### **Patents Amendment Act 58 of 2002**

To amend the Patents Act, 1978, so as to bring certain provisions in line with the

Agreement on Trade-related Aspects of Intellectual Property Rights; to bring provisions regarding the processing and amendment of applications under the Patent Co-operation Treaty in line with other applications; to effect technical corrections to some provisions and clarify others; to provide for the non infringement of a patent under certain circumstances; and to provide for matters incidental thereto. (The **dti**)

#### **National Environmental Management: Biodiversity Act 10 of 2004.**

To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith. (**DEAT**)

#### **Patents Amendment Act no 20 of 2005**

To amend the Patents Act, 1978, so as to insert certain definitions; and to require an applicant for a patent to furnish information relating to any role played by an indigenous biological or genetic resource or traditional knowledge or use in an invention; and to provide for matters connected therewith. (The **dti**)

### **4.2 Applicable Treaties**

#### **Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement 1994)**

The objective of the treaty is to reduce distortions and impediments to international trade by taking into account the need to promote effective and adequate protection of intellectual property rights. Countries that have acceded to the treaty are expected to ensure that measures and procedures to enforce intellectual property rights do not themselves become barriers to legitimate trade. The protection and enforcement of intellectual property rights should contribute to

the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.

### **Patent Cooperation Treaty (PCT), 1978**

Patent Co-operation Treaty (PCT) is an agreement for international co-operation in the field of patents. More specifically, it is a treaty that provides for rationalisation and co-operation with regard to the filing, searching and examination of patent applications by:

- ? Streamlining the international search and examination process, resulting in cost cutting.
- ? Providing for the formal examination of the international application by way of a single patent office – the Receiving Office.
- ? Providing a centralised international publication of international applications together with related international search reports. It provides the option of an international preliminary examination and provides reports that assist the Patent Offices in the various countries that have acceded to the treaty, with an opinion as to whether the claimed invention meets certain international criteria for patentability.

## **5. CURRENT INTERVENTIONS**

Current interventions are underway at the policy, capacity building, funding and programme level. A number of these respond to the keen awareness that there are ongoing changes in how these issues are handled globally. Notwithstanding the value of these interventions, it is notable that there is not yet a discernible increase in the creation, protection and use of intellectual property arising from publicly financed research. Consultations with stakeholders have led to the conclusion that a lack of a defined set of responsibilities and the creation of an enabling environment is critical to success.

### **5.1 Institutional Interventions**

A number of institutions have established policy frameworks for IP creation, protection and use. In some cases these policies provide clear guidance on benefit sharing with inventors. Tertiary education institutions and science

councils have been prominent in these processes. Unfortunately, the approaches adopted by institutions differ quite widely and this has made it more difficult for their partners to work with them efficiently.

Benefit sharing remains a difficult area. Notwithstanding its importance as an incentive, some institutions have not established clear benefit sharing arrangements, preferring to treat this on a case by case basis. This leads to real and perceived inequities in how benefits are shared. In addition, multi-institutional partnerships have become enormously complex from an IP point of view as, in each case, the widely differing institutional arrangements lead to extended negotiations on a final framework for collaboration.

## **5.2 Policy Interventions**

As indicated above, there have been wide-ranging informal discussions on the policy direction contained herein and these discussions have produced many useful insights into effective means of balancing the enabling and regulatory aspects of this framework. South Africa has also participated in global reviews of good practice, in particular, through its membership of the OECD Committee for Science and Technology Policy. The major policy review that has been produced from these interactions is “Turning Science into Business – Patenting and Licensing at Public Research Organisations” OECD (2003). The Executive Summary of this document can be found at Appendix 2.

## **5.3 Capacity Building**

A number of institutions have undertaken study tours to developed countries to provide a basis for the better development of their policies. More recently, visits have been undertaken to India, China and Brazil in order to gain a deeper understanding of their approaches. A number of seminars, training workshops and other training interventions have been undertaken through the Innovation Fund, SARIMA and at an institutional level.

Plans are underway to create independently funded capacity relating to IP and technology licensing in institutions. The Innovation Fund has secured finances to assist disadvantaged institutions in this regard. South African-based Masters level courses to train and develop human capital for the specialized functions required by this Framework are under development, in consultation with major training institutions internationally.

## **5.4 Funding and Business Services**

Despite the extended international protection available to South African patents (as a country that have acceded to the PCT), and the discounts allowed by WIPO on South Africa's developing country status, it is still an expensive exercise to file a PCT patent. These costs are incurred before income benefits accrue and often without any guarantee of any future income benefits.

The discounts offered by WIPO are in respect to individuals. Therefore, the capacity of the patent filer needs to be ascertained; i.e. whether the filer is an individual (inventor) or the public funded institution. In the case where they do not extend to publicly funded institutions, then from an operational point of view, the institutions will need to file the PCT application in the name of the inventor who qualifies for such discounts. However, at the same time, the inventor needs to obtain an assignment, with the assignment being lodged during the further prosecution of the applications, but prior to entry of national phase (similar arrangement in the USA, where the first applicant is the inventor).

Following the recent review of the Innovation Fund, the Innovation Fund Commercialisation Office (IFCO) was established. This office will provide financial incentives for high quality patents secured from publicly financed research where the title of such patents is still held by the public institution. IFCO also co-finances patent costs arising from publicly financed research in universities and science councils. This financial support is linked to strict performance requirements to prevent abuse.

A range of service-providers are being developed to support SME's and BEE companies in securing IP in an efficient and timeous manner. This range of services is intended to reduce the high costs associated with the operation of IP Management Offices (IPMO's) and to ensure that they effectively support their institutions.

## **6. THE NEED FOR LEGISLATION**

Nearly all developed countries (with the exception of Canada and Ireland) have opted to level the playing field through the introduction of legislation. This approach is also increasingly evident in emerging economies and countries in transition (Republic of Korea, China, Brazil and India, among others).

Although the Bayh-Dole Act in the United States led the development of such legislation, most countries have developed tailored approaches to respond to existing practises and the future needs of each country.

The Table below shows a comparison of the approach embodied in the United States' Bayh-Dole legislation and the more recent legislation formulated by Denmark. The intentions of both countries are clear: they intend to ensure that there is a proper framework for the protection and commercialisation of IP derived from publicly funded research. In both cases the principle of benefit sharing with inventors is established.

However in the US the emphasis is on the source of funds as the basis of the legislation, while in Denmark it is on the relationship of the institution to government and (derivatively) the employment relationship.

These differences arise as a result of the different features present in their respective systems of innovation. Careful analysis of our own circumstances has been undertaken to develop a robust framework before beginning specific drafting of legislation.

**Box 1.3. Key provisions of the Danish and US legislation on patented IP from PROs****The US Bayh-Dole Act**

(Public Law 96-517, The Patent and Trademark Law Amendments Act enacted 1980 and amended in 1984).

**Scope:** The provisions apply to all inventions conceived or first actually reduced to practice in the performance of a federal grant, contract or co-operative agreement. Provisions do not apply to federal grants that are primarily for the training of students and post-doctoral scientists.

**Ownership rights:** The university must decide on taking title to the invention within two years after disclosing the invention to the (federal) agency. If the research results must be published, the time period for claiming title is at least 60 days before the end of the statutory period. Federal agencies may claim title if the university does not. The university must file a patent application within one year, or prior to the end of any statutory period in which valid patent protection can be obtained in the United States. Universities may not assign their ownership of inventions to third parties, except to patent management organisations.

**Disclosure:** The university is obligated to have written agreements with its faculty and technical staff requiring disclosure and assignment of inventions. The university has an obligation to disclose each new invention to the federal funding agency within two months after the inventor discloses it in writing to the university.

**Licensing regulations:** The university must provide the government, through a confirmatory licence, a non-exclusive, non-transferable, irrevocable, paid-up right to practice or have practiced the invention on behalf of the US throughout the world. Under certain circumstances, the government can require the university to grant a licence to a third party, or the government may take title and grant licences itself (these are called "march-in rights"). Universities must give preference to small business firms (fewer than 500 employees), provided such firms have the resources and capability for bringing the invention to practical application. However, if a large company has also provided research support that led to the invention, that company may be awarded the licence.

**Royalties:** Universities must share with the inventor(s) a portion of any revenue received from licensing the invention. Any remaining revenue, after expenses, must be used to support scientific research or education.

**Exploitation requirements:** Manufacturing by a company holding an exclusive licence to an invention must substantially manufacture the product in the United States. Waivers of this rule may be granted by the federal funding agency under certain conditions.

**Reporting requirements:** The university must submit periodic reports regarding the utilisation of the invention as requested by the funding agency, but not more often than annually.

**Source:** OECD based on, "The Bayh-Dole Act: A guide to the law and implementing regulations", Council on Government Relations (1999).

**Danish Act on Inventions at Public Institutions**

Act No. 347 of 2 June 1999 (applicable to inventions made after 1st January 2000)

**Scope:** The law applies to patentable inventions made by an employee as part of his work at the university, the government research institution, the public hospital or the health research institution under the county authorities or the Copenhagen Hospital Corporation.

**Ownership rights:** The right to inventions made by an employee at an institution shall be accorded to the employer. The institution shall, within the limit prescribed by law or agreed upon with the employee, decide on the claim of transfer of the right or on whether the employee maintains the right in exchange for compensation. Institutions may order the employee not to publish or have the disposal of an invention for up to two months from receipt of notification or longer if agreed with the employee. The institution may, for projects completed in co-operation with or are financed, in full or in part, by a party not covered by the Act, on its own and the employee's behalf, upon prior agreement with the party concerned, renounce, in full or in part, the right to the inventions made in the project.

**Disclosure:** The employee must notify the institution in writing without undue delay and provide the institution with all necessary information in accordance with the provision of the institution. Institutions may lay down specific rules concerning how notification may take place. The employee must not publish or have the disposal of an invention before the institution has confirmed receipt of notification in writing. The institution is under an obligation to send confirmation as soon as possible.

**Exploitation requirements:** If the rights attached to an invention have been transferred to the institution with a view to commercial exploitation, the institution is at the same time under an obligation actively to seek exploitation of the rights. Within two months from the date of notification, the institution shall have had carried out an evaluation of the possibility of exploiting the invention and of protecting the rights to the invention and, with the employee, shall have considered how rights to the invention may be exploited commercially.

**Royalties:** The employee who made the invention is entitled to a reasonable payment from the institution. If the right to an invention, as agreed with the institution, is exploited commercially by the employee who made it, the institution is entitled to a reasonable payment. The institution shall lay down the rules for calculation of payment. The rules must be approved by the Minister of Science, Technology and Innovation. Revenues from the transfer of rights to inventions are to be used by the institutions for activities within the mission of the institution.

**Equity:** An institution may receive revenues in the form of profit by transferring its right to a limited company against payment in the form of shares in the company in question. Similarly, the institution may accept to receive payment in the form of shares in a limited company. The institution must not obtain the same connection to the company as that of a parent company to a subsidiary under the Danish Companies Act.

**Source:** OECD based on Chapter 6 in the present volume.

## **7. A FRAMEWORK FOR INTELLECTUAL PROPERTY DERIVED FROM PUBLIC FINANCED RESEARCH**

### **7.1 Stakeholders**

#### **7.1.1 Government**

Government is a key stakeholder in respect of IP derived from its public research funding. This includes the ability to use patents in the national interest (in times of national emergency, for example). Government can create conditions to ensure that the greatest economic benefits are derived from public research spending. In addition, patenting can be used to protect the public interest, for example in the case of health care inventions, where ownership by a public institution can be used to reduce the cost of health care, or leverage the use of other IP. Government can create conditions that ensure that small firms and black enterprises, for example, benefit preferentially from the policy framework. Ultimately government can ensure IP derived from publicly financed research and held by public institutions is a resource for the economic and social objectives it intends to achieve through the creation of a well regulated enabling environment. There is clear evidence that this can be done strategically and coherently in modern knowledge economies.

#### **7.1.2 Inventors**

Inventors' rights have not been sufficiently respected. This has led to many academics not giving proper consideration to the effective protection of their inventions. Benefit sharing arrangements between institutions and inventors are *ad hoc*. It is almost impossible for an inventor to retain a right of benefit sharing in their inventions when employed by an institution that does not have such a policy in place. For example, inventors can be retrenched from institutions which may well still be deriving benefits from the inventions made by them, without any future participation in the financial flows from their work.

#### **7.1.3 Tertiary Education Institutions and Research Councils**

These institutions are, increasingly, intended to operate within the norms of global research practice. In the absence of well-defined policies, many opportunities to secure IP and to derive economic and social benefits are lost. In many cases where IP is secured no concerted effort is made to ensure that

South African firms benefit from the IP. These institutions need to be aligned and encouraged to establish consistent and coherent practices that will benefit South Africa. This will require a combination of minimum acceptable standards for IP management in the institutions and the potential to derive revenues from successful commercialisation.

#### **7.1.4 Public Financing Instruments and Funding Agencies**

There is an increasing number of specialised funds operating in the field of research and innovation that use public funds (or a combination of public funds and business financing). In addition, there is the subsidy financing that tertiary institutions receive for research and development. All of these funding sources have different implicit and explicit arrangements in respect of intellectual property derived from the research that is funded. This lack of coherence leads to inefficiencies and anomalies in the system of innovation, which has the effect of reducing the level of patenting. In addition, the established practices and independent development of institutional policies is increasing the complexity of commercial arrangements (hence reducing their likelihood of success).

#### **7.1.5 Business and Industry**

One of the primary means of creating value from IP financed by public funding is through the licensing of the IP to business and industrial concerns. These institutions then use the IP (under the conditions of the license) to create products and services. In South Africa, within the National System of Innovation, businesses establish long-term partnerships with research councils and tertiary institutions. These positive and proactive relationships need to be incentivised and strengthened. At the same time, industry and business sometimes secure rights to IP, including the assignment of ownership, at a very low cost and with poor contracting arrangements (for example, no performance clauses in the agreements). In these cases, the IP is often “sterilised” as the inventors and their institutions are no longer in a position to influence the use of the IP. Small and medium sized enterprises often lack sophistication in the area of intellectual property and in addition, experience high costs related to patenting. A number of BEEs also fit this category. Better arrangements for their support need to be put in place and the policy framework needs to be made attractive to participation by these types of firms.

### **7.1.6 The South African Public**

The South African public can benefit from inventions that have, for example, public health, environmental or other social good applications. The current low rates of patenting imply that some of this knowledge is simply made available to the whole world in the form of publications, but there is no concerted attempt to derive the quality of life and economic benefits for our citizens. This loss to the country is difficult to quantify. There needs to be an effective reporting mechanism available to the citizens of South Africa so that they can be more aware of the value of science and technology to society and the specific potential and outcomes from the inventive abilities of our scientists and technologists who receive public financing.

Intellectual property and its potential commercial benefits, economic impact and the associated improvements in quality of life, are crucially dependent on a positive set of interactions among stakeholders. This will require a level playing field, clear minimum requirements and a balance of incentives and regulations to ensure that this is achieved. International best practice suggests that simplicity, clarity and transparency greatly enhance the success of policy frameworks. Over-elaboration, overly prescriptive requirements and a dominance of regulation over incentives, will limit our ability to capture value for our nation. The creation of an enabling environment underpins the policy framework elaborated below.

## 8. POLICY FRAMEWORK

### 8.1 The Protection of IP Developed with Public Financing

#### 8.1.1 *Definition of responsibilities*

**Government**, as the source of public research financing, the South African government may use invention for public purpose on such conditions as may be agreed upon with the patentee or determined by the Commissioner of Patents. The legislation will make it clear that government will exercise these rights in cases of national emergency and similar times of great national need. Government will provide incentives for the processes of creation, protection and use of patents arising from publicly financed research.

The recipients of public research financing will always be **institutions**, and not individuals. Even if specific individuals are identified in funding proposals, this policy framework will impose an obligation on institutions to secure patents based on inventions made with public research finance, whether this arises from subsidies, grants, match funding or levies. This should be done by the creation of central IP Management Offices at these institutions. In the absence of such capacity, the Innovation Fund will provide a nationally available service to these institutions.

Research is ultimately undertaken by **individuals**. The intended legislation will place an obligation on individuals to make a declaration to their institution (in a standardized format) if they believe they have made an invention while funded with public funds.

This balance of responsibilities has been found to create the simplest set of arrangements leading to good practice. It has shown increases in the creation, protection and use of inventions from publicly financed research.

#### 8.1.2 *The focus of the policy is on publicly funded research*

This policy does not address institutions and individuals who fully finance their own research, or who undertake such research in the business sector, or who work with IP secured from other jurisdictions. The intention is to deal with inventions that arise from public financing of research in South Africa. It is important to note therefore that public institutions, when fully financed (in a full

cost model) by clients to undertake research, must rely on other policy frameworks and their specific legislation to determine how those matters are handled. An obligation will be placed on the institution to have a clear process, and a centralised function to handle invention declarations. The institution will be obliged to register these declarations with a single national agency for efficiency of management, monitoring and evaluation.

*8.1.3 Scope of benefit sharing is to all employees, students and contractors of public research institutions independent of the source of financing*

It is a specific proposal of this policy that inventors working in public research institutions are, in all circumstances (public or private financing), entitled to benefit sharing arrangements if their IP secured in patents provides economic benefits to their institution or to a client of the institution. It is proposed/recommended that provisions for benefit sharing with inventors be articulated in the act and regulations would provide guidelines such as a minimum of 30% of the economic benefit to inventors. The balance of the economic benefit should be distributed by the institutions as it deems fit, taking into account the need to strengthen the research capacity in the relevant research departments and also the capacity to better manage the IP. The specific formulae most commonly used, based on best international practices is (e.g. 30:30:30:10 in relation to inventor(s): institution: relevant department: technology transfer office /admin). Each institution will, at their discretion, have the right to award higher benefits to the inventors than the minimum of 30%, and distribute the residue to the various institutional players as it deems fit. Where there is more than one inventor, the principle that the inventors share, proportionally according to contributions to the invention, may be considered with the practical and default position being that there is equal sharing of benefits. In consideration for the right to benefit sharing, inventors must be obliged to co-operate with the institution in the technology transfer process.

In the case where the intellectual property is co-owned with a private client, the benefit sharing principles alluded to above, should apply to income accruing to both the institution and the private client; and in the case of fully funded contract research, the institutional policies should determine, with institutions being encouraged to negotiate benefits for inventors, with the funders of such research. Although not mandatory, guidelines should be provided for the institutions to

negotiate with industry before agreements on fully funded contract research are concluded.

Exploitation of inventions with social outcomes as opposed to commercial outcomes must also be recognized, with guidelines being put in place for rewarding inventors where social benefits as opposed to commercial returns are derived through intellectual property exploitation.

In each case, the benefit which accrues to the inventor(s) should be for the lifetime of the patent or the duration of a licence in respect of the associated know-how. Where an inventor(s) dies, his/her estate is then entitled to claim the benefit. Where there is on-going development of an invention, the institution may need to re-evaluate the contributions of the parties from time to time and adjust the benefit sharing ratios accordingly.

In the case where the institution takes up an equity stake in a start-up in lieu of royalties payable for licensing of the intellectual property, the inventor(s) may be rewarded with a share in the equity stake, in lieu of standard benefit sharing arrangements, subject to no-conflict principles.

Where the inventor(s) form part of the start-up to which publicly funded intellectual property is to be licensed, they will not be entitled to benefit sharing under the institutional policies, as this will amount to double dipping.

It was recommended that the Agency together with institutions develop a conflict of interest policy for these cases.

## **8.2 The Use of IP Developed with Public Financing**

Licensing of IP is the most important mechanism to transfer technology from institutions to industry. Licensing is therefore a key mechanism through which IP can be transferred to the market place, because of the well-established nature of the transactions.

When there is no immediate licensee in view, institutions may decide to create a start-up company (possibly with a mix of shareholders) to commercialise the technology that has been patented. This policy framework proposes that the institution retain the rights to the IP in the majority of cases. If it does assign IP to

a start-up, irrevocable rights to the IP will be retained in the event of bankruptcy or failure of the start-up to meet performance obligations.

In addition, institutions can use patents developed in strategic research programmes for specific public purposes, such as reducing the cost of medicines, making technologies available to different interest groups, under different licensing conditions, or securing additional IP at low cost to strengthen a public research agenda.

### **8.3 Preference for Non-Exclusive Licensing**

Non-exclusive licensing is preferred. This could be achieved by, amongst others, the retention by the institution of the freedom to license the technology to other parties in addition to the primary license agreement. It permits wider access to the actors within the economy and creates, under some circumstances, a performance incentive. However, exclusive licensing can be important in developing early stage technologies which require considerable further development work. Therefore, although there is a preference for non-exclusive licensing, exclusivity can be considered when circumstances require this. Before granting an exclusive licence, institutional IPMOs will be encouraged to consult the Agency, and to also fully explore the reasons why a non-exclusive licence would be prejudicial to the interests of the licensee. The legislation should provide the right to review an exclusive licensing arrangement and probably limit it to specified markets.

To prevent failures in the commercialisation of technology, which other potential developers might be better placed to exploit, performance clauses must be included in licence agreements. Performance clauses will be more rigorous and stringent where exclusivity is required.

The establishment of minimum conditions for licenses by regulation is envisaged. The function of licensing will be undertaken by the IP Management Offices of the public research institution, or in the absence of such, the Innovation Fund. Licenses arising from publicly financed IP and the associated income streams will have to be declared annually in institutional IP reports.

In deciding and granting licences, the following will need to guide the institutions: 1) who will receive a license, 2) whether the license will be exclusive, 3) what types of applications will be covered, and 4) how long the duration of the license will be. In the case of an exclusive license, legally enforceable humanitarian provisions to protect in advance the possibility of sharing the IP with third parties for the benefit of people in need. These humanitarian license provisions may define beneficiaries by the field in which the IP would be applied, by geographic region, by national income level, or by market (e.g., "subsistence farmers"). Specific milestones related to availability or price, may form part of the licensing provisions, so as to ensure the efficacy of these humanitarian provisions. As the South African intellectual property legislation does not preclude research being conducted by a non-patent holder, specific provisions regarding research will have to be considered on a case by case basis, particularly where the IP is for some reason licensed exclusively off-shore or disposed of.

#### **8.4 Preference for Local Licensing**

Reasonable and demonstrable efforts must be made to license the patented technology locally. This has the maximum impact on stimulating national and local economic development and providing the South African business sector with new commercialization opportunities. Local licensing is therefore preferred. Where local licensees cannot be secured, regulations would require that locally beneficial arrangements (future partnership arrangement, manufacturing, preferred pricing, R&D obligations, for example) are secured. In the case where the licensee is domiciled outside South Africa, the licensing provisions should aim to encourage that any product that is the subject matter of the licence, be manufactured in South Africa, and there must be an onus on the parties to show that a product could not be manufactured locally.

#### **8.5 Preference for SME and BEE Licensees**

The patent system should not be cumbersome to SMEs, for example, which typically have limited available capacity. SMEs and BEE enterprises should benefit preferentially from the commercialisation and business opportunities arising from IP developed with public financing. This should be demonstrated by the IP Management Offices of the relevant public research institutions, with monitoring and evaluation undertaken through the provision of annual reports from IP Management Offices and the Innovation Fund Commercialisation Office.

In negotiating licence agreements, publicly funded institutions must seek to extract some benefits to SMEs, particularly in the case where the licence is granted to an established company or off-shore company. These benefits could be in the SMEs being granted right to manufacture or distribute products covered by the licence.

Capacity building and business support should also be rendered to SME and BEE partners, and appropriate benefit-sharing agreements worked out for business growth in these institutions.

## **8.6 International Licensing is permitted**

IP licensing can be utilised to increase foreign direct investment and technology partnerships for South Africa when licensing is not possible in South Africa, whilst considering benefits that can be extracted for local industries, as discussed in 8.3 to 8.5 above. Smaller countries show a higher propensity to international licensing of patents derived from publicly financed research. Therefore the legislation will permit international licensing of IP developed from public financing. However, under some circumstances such practises can be limited by international treaty obligations, national security and the like.

## **8.7 Institutional arrangements**

### *8.7.1 Government*

Government will designate a function of overseeing the protection and use of IP derived from publicly financed research. This function and its location are described in more detail in Section 8.10. It is proposed that the Innovation Fund be capacitated to house this function, a natural extension of its current role.

### *8.7.2 Institutions*

Institutional capacity needs to be established at public research institutions to ensure the approach to publicly funded IP protection is truly consistent. The establishment of intellectual property management capacity at academic institutions will be informed by a number of factors, including the Department of Education (DOE) strategy for each of the institutions, the research capability and

research output of each institution, etc. Thus, establishment of such capacity would not be prioritised in the case where the DOE strategy is for that institution to focus just on high quality undergraduate students as opposed to research outputs. Thus, the setting up of regional capacity may also be an option to be explored. This capacity, usually an IP Management Office, will be tasked with, *inter alia*:

- ✍ Receiving invention disclosures to determine their patentability,
- ✍ Securing patents,
- ✍ Entering into license arrangements,
- ✍ Managing long-term research relationships with business in order to deal with specialized assignment of rights resulting from research partnerships of a strategic nature, and
- ✍ Managing benefit sharing with its employees or previous employees, students and contractors, in respect of returns from the use of IP.
- ✍ Capability to do techno-analysis and capacity building strategies.

The minimum HR requirements for institutional capacity should include at least one professional with commercial and legal (IP) experience/expertise to be able to facilitate technology transfer, and ability to source required expertise, as and when necessary.

Institutions will be required to have written IP policies consistent with legislation. The benefit sharing arrangement should be clearly defined in institutional agreements, serving as an incentive to inventors.

Currently, many institutions have their own benefit-sharing models and often cost-sharing models are designed on a case-by-case approach. The policy and legislation will require that benefit sharing achieve acceptable minimum level of incentive rewards to inventors whose technology is patented and/or licensed by third parties and from which income is derived.

### *8.7.3 Government has Walk-In Rights on IP of National Interest*

A patent is an economic instrument. Government should have specified step-in rights in light of social and security objectives and interests. The legislation will establish government's right to use IP developed with public financing in the national interest in times of emergency or national need, humanitarian and non-commercial purposes, unsatisfactory progress in commercialisation of the IP and

to foster collaboration of institutions that hold complimentary IP. A similar requirement is provided for in sections 4, 56, 78 and 79 of the Patents Act 57 of 1978, the DOHA declaration on TRIPS concerning measures to protect public health.

The Public good in IP, pertaining to health matters, could be ensured by setting conditions such as a requirement that on or before a clinical trial for a new drug, the licensee will have identified a generic manufacturer to produce the licensed technology at a reasonable price for a segment of the market. In addition, minimum pricing of such drugs for the developing countries will have to be negotiated and form part of the provisions of licence agreements.

*8.7.4 Obligations and benefits should accrue to the institution that is publicly financed*

Public research institutions will incur an obligation to manage and secure intellectual property arising from publicly financed research. This will, for instance, require the establishment of institutional policies and capacities to do this. The institution will be in a position to derive income based on the commercialisation of such intellectual property, for example licensing of the patents. The royalties and other payments derived from these activities will be used to:

- 1) Defray the costs of IPMOs and their staff
- 2) Share benefits with inventors
- 3) Used to enhance the research and development initiatives of the institution

The income derived could, for example, be used by university research departments to provide, among other things, new opportunities for graduate students, buy research equipment, or fund new research. The returns can be used to help sustain the technology transfer process by paying for a portion of the legal fees associated with patenting and licensing, as well as technology management staff. A portion of the revenues will be required to be shared with the inventors according to the principles set out in 8.1.3 above.

*8.7.5 Institutions receiving public financing will have the responsibility to disclose potential IP to the designated Agency*

Internationally the most efficient means of determining if an invention has been made with public finances is by placing an obligation on the researchers to make a formal declaration if they think they have made an invention. This is often termed an Invention Disclosure (ID). There would be a requirement that IDs are made to the IP Management Office of the institution, or in the absence of such an office, the Innovation Fund Commercialisation Office (IFCO). Once an ID is accepted by an IPMO, it will be required to be reported to the IFCO, which is proposed as the designated agency for recordal of all IDs based on publicly financed research. The operation of the agency would be subject to the provisions of the PFMA, section 42, if the recordal of IDs would entail the transfer of assets or liabilities of one department to the other.

#### *8.7.6 Institutions will have the right to secure the IP*

Based on the Invention Disclosure, the relevant public research institution will have an established right to the assignment of the IP. Thus if a patent is secured in the course of publicly financed research at a single institution, the assignment of such a patent will be to the public institution engaged in the research. This is fairly straightforward when a single institution is involved.

In the case of research undertaken by a number of public institutions, this right will be given to the one institution designated as the manager of the IP in such research. This institution will be the Designated IP Institution. The Designated IP Institution will be given the obligation of receiving Invention Disclosures, protecting the IP and commercialising it in research where more than one institution is involved. The institutional benchmarking exercises for generated IP will have to take cognisance of this policy arrangement so that institutions that are not designated do not lose out.

The Designated IP Institution will be obliged to enter into benefit sharing and IP use agreements with the other participants in the research. Such agreements will have to meet minimum standards and funding will not be secured until such agreements are in place.

This balance of responsibilities will provide the basis of incentives to commercialise the technology. In order to move the invention into the commercialization and licensing phase, they will be encouraged to set up partnerships so that the economic benefits of the invention are realized.

The intention of these arrangements is to create a single point of management of commercialisation of IP. Commercialisation processes are sufficiently complex and specialised in their own right, that they become impossible when multiple owners, with different and sometimes competing interests, are involved in commercialisation.

Where business institutions, or international groups, participate in research with public funding, it will be a requirement that a South African public research institution, or the Innovation Fund, will be the Designated IP Holder.

In situations where there is co-financing (private and South African public financing, or South African public financing and international public financing), special considerations apply and these are dealt with below.

### **8.8 Determinations on IP ownership with respect to co-financing of research and long-term research partnerships**

Co-financing of research has become a commonplace in large research consortia. This sharing of risk has many advantages. Public financing reduces the risk for businesses to become involved in research. However, it has made IP negotiations more complex. The following principles apply in respect of co-financing:

- 1) Inventors generate the new knowledge and their interests in the invention in respect of benefit sharing need to be ensured. The interests of the communities need to be taken into account, in a case where there is Indigenous Knowledge used, in accordance with the recently promulgated Patents Amendment Act no 20 of 2005.
- 2) New inventions are often based on substantial background intellectual property held by private and public research partners. Proper recording and declaration of such “background” IP needs to be formalised before new research commences
- 3) Sometimes an invidious situation arises where a single research group in a public institution receives financing from two different sources with different contract arrangements and inventions are made that are then difficult to manage. This requires either “non-compete” provisions or full disclosure of contracts arrangements to all parties so that they can determine their obligations and interests

- 4) A clear basis of costing of research. Co-financing and its proportion in respect of research partnerships should be determined on an agreed basis:
- a. Direct costs (with a low percentage for “overheads”) – The Direct Cost Model, or
  - b. Fully absorbed applicable institutional cost, plus contingencies, and margin – The Full Cost Model.

The first model is usually applied in Universities in South Africa. It underestimates the cost of research, to the institution. Direct costs, when properly calculated are usually of the order of 25-35% of the fully absorbed institutional cost. The treatment of human resource costs sometimes mixes these two approaches. The wide use of the direct cost approach in South Africa is a disincentive to the creation of full-time research positions and strong multi-disciplinary groups. The structuring of proper rewards for successful academic researchers focussed on patenting should be considered. However, there are benefits for businesses in that contract research costs are low. One of the positive consequences is the high level of business involvement in funding University research in South Africa.

The Full Cost Model is usually applied in research councils. This model has the advantage that the institutional base is fully funded by clients when research is done. It also allows proper quantification of relative contributions where co-financing is used. It has the disadvantage that the costs are higher to the participating firms.

With respect to long-term research partnerships and co-financed research, the determination of relative contributions with respect to patenting and licensing rights should be based on best endeavours to determine the fully absorbed applicable institutional cost, plus contingencies. The Full Cost Model should therefore be the preferred model for all public research institutions in the long term when IP rights are in view.

It is recognised that moving to such a model will take time and needs to happen incrementally and judiciously to ensure successful and viable public-private research partnerships are developed and maintained.

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- 5) There are particular conditions where long-term research, even when partly publicly financed should be managed by a business enterprise as the Designated IP Holder.
  - 6) Provided that the reversion of rights to a public research institution is predetermined if the IP is not used within a designated period, and a free licence is available for further research and commercialisation in fields not applicable to the Designated IP Holder, this practice can be effective in allowing the business appropriate flexibility in its core business IP domain.
  - 7) For the current policy framework, a business institution can qualify as the Designated IP Holder in respect of IP generated with partial public financing if it meets all of the following criteria:
    - a. It is a South African Registered Company, or is quoted on the JSE.
    - b. The background IP of the business entity in respect of the research is substantial and fully declared
    - c. There is a separate benefit sharing agreement in respect of inventors from public institutions in respect of patents secured during the research.
    - d. The funding by the private institution exceeds the direct costs of the research project or programme (e.g. full direct costs, plus donation of equipment, or full direct costs plus untied bursaries for students, plus overseas travel to conferences).
    - e. The project/programme is longer than two years.
    - f. Invention Disclosures are made to the public institution IPMO in the normal way.
    - g. The patenting costs are paid by the private entity.
    - h. The research is located at a University or University of Technology.
    - i. Restrictions on publishing are predefined, short-term and acceptable to the public institution.

In the case of research undertaken at a Research Council, with funding by a private entity only, the private entity is to be the Designated IP Holder if:

- ? a, b, c, e, f, g and i from above are applied;
- ? the Full Cost Model, plus margin, was applied; and
- ? the public institution agreed to waive any pre-emptive statutory rights (if applicable).

### **8.9 The obligation to declare potential IP developed in the course of publicly financed research will be established (employees, students, contractors)**

An important intention of this policy framework is to make it clear that one of the key objectives of the provision of public financing for research is the creation of intellectual property in the form of patents. In establishing this intention, an obligation must be placed on all potential inventors to declare, pro-active ly, if they believe that they have made an invention. This obligation to make a declaration essentially begins the process of deciding:

- 1) Whether an invention has indeed been made
- 2) The best method of protecting the invention
- 3) The accurate recording of the inventors
- 4) Their future rights in respect of benefit sharing

The institutions charged with the protection of IP will be required to have clear agreements with their employees, contractors and students in respect of publicly financed research and the obligation to declare if inventions have been made and before publication of scientific outputs .

### **8.10 An Agency for Managing the Declaration Process and for Reporting and Supporting the Implementation of the Policy Framework**

An agency function will be established ("the Agency") and located within one of DST's existing institutions or agencies to assist institutions with standard policies, meeting minimum requirements, advising on appropriate benefit-sharing models and providing good practice templates and advice on agreements, and anything else as may be required from time to time by the Minister of Science and technology for the effective implementation of the Policy Framework. Institutions have expressed the need for such a function or Agency, as a few service providers currently provide unique skills set in the IP and innovation spectrum, but there is no dedicated entity serving the integrated needs of IP and Public Funded Research Institutions.

The terms of reference for this Agency function will be based on the envisaged functions in accordance with this Policy Framework and legislation in partnership with the DTI and other stakeholders and will be the responsibility of DST. The Agency function should entail the management of intellectual property from

publicly financed research, fulfilment of an institutional IP governance role, and management of a national database on IPR and public funded research. In order to leverage existing institutional infrastructure, and avoid setting up of new entities, it is recommended to set-up the proposed Agency function within the ambit of the Innovation Fund, which is a cross-cutting instrument of the DST. The operation of the Agency function would be subject to the provisions of the PFMA, section 42, if the recordal of IDs would entail the transfer of assets or liabilities of one department to the other.

The envisaged set of functions to be carried out by the Agency function will give effect to the policy and its associated legislation.

These functions are:

- 1) Information management in respect of IP from publicly funded research
- 2) Governance, coherence and effective regulations
- 3) Monitoring, evaluation and performance assessment
- 4) Provision of incentives to institutions to reward them for proactively securing IP and commercialising it; and also incentives to inventors, to ensure full participation in the innovation cycle.
- 5) Assist with capacity building at institutions
- 6) Provision of some measure of standardisation and uniformity in the approach to dealing with intellectual property, whilst at the same time providing enough flexibility for institutions to provide custom-made solutions for particular circumstances.
- 7) Provision of some form of assistance to exploit publicly funded IP.
- 8) Provision of advice and recommendations for international patenting strategy
- 9) Development of guidelines for off-shore IP transactions and management of implementation of such guidelines

#### *8.10.1 IP Information Management*

The IPR policy approach will have to be robust to ensure that institutions remain accountable for their IP, while at the same time pro-actively seek to commercialise it. An IP intelligence system (a national database of intellectual property arising from publicly financed research) is an important management tool to measure the current and future performance of the system. It is proposed

that DST take responsibility for the development of such a database, in conjunction with the Agency function.

#### *8.10.2 Good Governance*

In the context of good IP governance, the focus of this Agency function should be the drafting of regulations that are clear and administrable, and minimise conflicts of interest in respect of IP derived from publicly funded research. This would include, but not be limited to, the following:

- ✍ Develop guidelines for disclosure, limits to shareholding and external earnings, and transparency;
- ✍ Set standards for benefit sharing ;
- ✍ Develop procedures for identifying, disciplining, reducing and preventing conflicts of interest; and,
- ✍ Develop model contracts for title assignment, confidentiality agreements, first rights title.

#### *8.10.3 Monitoring Evaluation and Performance Assessment*

The South African government participates in a number of international forums related to the use of intellectual property. In particular South Africa's observer status in the Committee for Science and Technology Policy of the OECD has become a forum for significant international discussions on IPR for publicly financed research. Hence comparability of data and international practice in this regard is important. Participation in the setting of international statistical standards and sharing of data permits rapid acquisition of good practise and mitigates against risks of not being in touch with international negotiations and their relationship to issues of trade, for instance.

Effective monitoring, evaluation and performance assessment is important for the following reasons:

- 1) internal management of public research institutions,
- 2) accountability to government and society, and
- 3) understanding the links between public research and innovation/growth.

In terms of outcomes, key indicators that should be assessed are issues like disclosures, new patents filed, licensing revenue, social development through

licensing activities in the context of sectors like health and agriculture, new innovations (products and services), spin-off companies created (SMEs and BEEs included), employment generated, and tax benefits.

*8.10.4 Institutions will be required to provide annual reports in terms of potential IP disclosures, IP secured, licenses granted and revenue derived from IP*

This will enable government to monitor growth in this area of public funded research and allocate necessary funding support annually.

*8.10.5 Provision of incentives*

The protection of inventions through patenting is expensive when undertaken internationally. These costs need to be “ring-fenced” and not compete with other institutional costs so that they can be managed strategically over time. This Agency function should be able to provide part-financing for such costs, to maintain an ability to review institutional patent portfolios without increasing administrative burdens.

In addition, it is proposed that inventors, whether independent or attached to institutions, on qualifying patents protected in South Africa should be provided with personal incentives paid through this Agency function once certain critical quality criteria have been met.

*8.10.6 Capacity Building*

Simply adopting a stronger IPR system cannot be sufficient to ensure a positive outcome. Intellectual Property protection is but a component of broader business regulation, innovation promotion, and consumer protection that must be conjoined in an effective overall system. An important complementary factor is a commitment to education and capacity building.

A key element of the capacity building will be the ongoing improvement in the quality of IP Management Offices at public research institutions. These IPMOs will perform essential functions in respect of the processing of invention disclosures, protecting patents, seeking commercial partners and monitoring the IP portfolios of their institutions and ensuring benefit sharing arrangements are in place and operational. In some institutions IPMOs do not yet exist, in some they are small and poorly capacitated, in others they have some good and effective

capacities but need a more holistic approach. Specific financing and programmes are required to build this capacity. It includes human resource development programmes in a range of disciplines, and the provision of specialised services to institutions which may not need to make the full investment to have a IPMO in the first instance.

### **8.11 Benefit Sharing between Institutions and Inventors**

In this policy framework institutions are accountable for the management of patents protecting inventions made with public finances. In order for the incentives in such a system to be properly aligned, institutions and inventors must derive benefits from the inventions that are commercialised. There are no normative international practices in this regard but there are a number of principles based on international practice that can be articulated:

- 1) Income derived from patents by the institution must be shared with the inventors
- 2) Inventors share equally where there is more than one, not according to their status
- 3) The inventors right to the income stream, independent of their relationship to the institution provided they are resident in the country. Cognisance of the need for South Africa to attract skills, in particular foreign academics for a short duration should be taken.
- 4) The income to the institution is used for specific purposes
  - a. Recovery of costs of the IPMO and its function of protecting IP
  - b. The stimulation and support of research and development in the institution
- 5) Usually the income flow to the institution is partitioned on two or three streams:
  - a. A proportion to the IP Management Office
  - b. A proportion for the discretionary use of the Executive of the institution in stimulating and supporting new research
  - c. A proportion for the Division/Faculty/ School in which the inventors worked to stimulate and support research
- 6) The income streams are treated as additional to the normal research funding of the institution

Within this set of principles, it is proposed that provisions be made in the legislation in respect of the gross royalties, royalty related payments, equity

participation or sale and other payments applicable to a patent so that the Minister of Science and Technology would have powers to enact regulations.

### **8.12 Offshore Licensing and Disposal of IP**

In order to ensure that full benefits of publicly financed IP accrue to South Africans at large, it is proposed that the licensing and disposal of IP to off-shore entities be managed in terms of the Policy Framework.

There should be a disclosure of intention to license off-shore and guidelines should be developed by the Agency function and Agency should have the capacity to carry out the allocated tasks to ensure acceptable turn around times. As a principle, IP to move off-shore only when South Africa does not have capacity to develop and exploit the IP, and subject to Reserve Bank Exchange Control regulations and approvals. Nonetheless, the parties wishing to licence and/or dispose of the IP offshore will bear the onus of showing that there is no capacity to exploit the IP locally and will also have to make provision for benefits to accrue to South Africa as a result of such a transaction.

### **8.13 Approach to Legislation**

The intention in framing the legislation would be to establish the key applicable principles, based on good international practice that is also aligned with the approach adopted with this framework. The legislation would give the Minister of Science and Technology the power to make regulations to give effect to the provisions of the Act.

It is therefore likely that a number of the more detailed proposals outlined herein would find themselves within the regulations that would be drafted to give substance to the legislative intent. For example, the Bill could refer to the Agency for IP from publicly financed research. The regulations could designate the Agency as the Innovation Fund.

Balancing the degree of detail in the final Act with the power to make regulations will enable higher rate of experience to be gained whilst developing the enabling and regulatory aspects of this domain, with an effective and sustainable measurement of progress.

**BIBLIOGRAPHY**

Kretschmer, M. (2001), Proceedings Symposium 'A New Feudalism of Ideas', Centre for IP Policy and Management, Bournemouth University: The Propertization of Ideas, a historical perspective. Pages 4, 5 & 6

'Turning Science into Business', Patenting and Licensing at Public Research Organisations, Organisation for Economic Co-operation and Development: Executive Summary. Pages 9 -19

<http://www.dti.gov.za/offerings/offeringgroup.asp?offeringgroupid=9>

<http://www.gpa.co.za/english/ZA/pbr.htm>

International Intellectual Property Institute, A report prepared for the 'World Intellectual Property Organisation (WIPO)', Patent Protection and Access to HIV/AIDS Pharmaceuticals in Sub Saharan Africa, Massachusetts Avenue, Washington D.C. (2000)

Maredia, M.K., Application of Intellectual Property Rights in Developing Countries: Implications for Public Policy and Agricultural Research Institutes, (2001)

Pary, CE, Courtmanche, A, Govindsamy, R, A Report to WIPO: The Importance of Intellectual Property Rights in the International Spread of Private Sector Agricultural Biotechnology (December 2001)

Pressman, L, Chair, Survey Statistics and Metrics Committee of AUTM, Independent Business Consultant, Workshop on the Management of Intellectual Property Rights from Public Research, OECD Headquarters (December 2000)

James, L, Perspectives on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy, Consumer Project on Technology, Presented 19 March 2002 at the Federal Trade Commission Washington, DC

Owen, D AA, Conflict of Interest: Management with Intellectual Property, A discussion Paper, MRC Technology, London

Huang, WH, Yeh, JJ, Fernandez, D, Patent Prosecution Strategies for Biotechnology Inventions, IP Strategy Today

Huang, WH, Khaleeli, N, Fernandez, D, Patent Prosecution in Pharmacogenomics, IP Strategy Today

ABSA Software Alliance, Principles for Software Innovation

OECD Brief Policy, Science and Innovation Policy: Key Challenges and Opportunities, (January 2004)

Macdonald, S, When Means Become Ends: Considering the Impact of Patent Strategy on Innovation, Paper presented to the Workshop on Competition in Property Rights and Information Markets, Centre for Competition and Consumer Policy, Australian National University, Canberra, August 2002.

OECD, US RDI Report, Steering and Funding of Research Institutions Country Report: United States

OECD, UK RDI Report, Steering and Funding of Research Institutions Country Report: United Kingdom

OECD New Economy and IPR, Working Party of the Trade Committee Intellectual Property Rights in the New Economy: Technology Changes and the Protection of Intellectual Property (2003)

OECD, Compendium of Patent Statistics, (2003)

Brenner, C, Research programme on: Global Interdependence, OECD Development Centre, Working Paper No. 133, Intellectual Property Rights and Technology Transfer in Developing Country Agriculture: Rhetoric and Reality (1998)

Microsoft Corporation, Microsoft's Response to the Lambert Review

Council of the Royal Society, Keeping Science Open: The effects of Intellectual Property Policy on the Conduct of Science, (2003)

Rutchik, G, Esq., JAPANESE RESEARCH PROJECTS AND INTELLECTUAL PROPERTY LAWS for Office of Technology Policy, Technology Administration, U.S. Department of Commerce

OECD, USING PATENT COUNTS FOR CROSS-COUNTRY COMPARISONS OF TECHNOLOGY OUTPUT, (2001)

Ganguli, P, CREATING AND EMBEDDING AN INTELLECTUAL PROPERTY RIGHTS (IPRS), POLICY IN AN EDUCATIONAL OR PUBLICLY FUNDED RESEARCH AND DEVELOPMENT INSTITUTION, Indian Institute of Technology, Bombay, WIPO

Ganguli, P, CREATING AND EMBEDDING AN INTELLECTUAL PROPERTY RIGHTS (IPRS), POLICY IN AN EDUCATIONAL OR PUBLICLY FUNDED RESEARCH AND DEVELOPMENT INSTITUTION (2), Indian Institute of Technology, Bombay, WIPO

The Concept of Intellectual Property, the World Intellectual Property Organization (WIPO)

Dhar, B, Niranjana Rao, C, INTERNATIONAL PATENT SYSTEM: AN EMPIRICAL ANALYSIS, (2002)

Intellectual Property Rights: APO Symposium Intellectual Property Rights Bangkok, Thailand (2003)

The Role of Intellectual Property in Development and WIPO's Development Cooperation Program: Objectives of Developing Countries, Chapter 3

The Bayh-Dole Act: A Guide to the Law and Implementing Regulations, COGR, (1999)

Lesser, W, THE EFFECTS OF TRIPS-MANDATED INTELLECTUAL PROPERTY RIGHTS ON ECONOMIC ACTIVITIES IN DEVELOPING COUNTRIES, Cornell University

National Code of Practice for Managing Intellectual Property from Publicly Funded Research, Irish Council for Science, Technology and Innovation (ICSTI), (2004)

Cervantes, M, BACKGROUND REPORT: AN ANALYSIS OF S&T LABOUR MARKETS IN OECD COUNTRIES, Science and Technology Policy Division, OECD

PATENTS AND INNOVATION: TRENDS AND POLICY CHALLENGES, OECD

Fields of Intellectual Property Protection: Patents, Chapter 2

Intellectual Property Policy Outline, Strategic Council on Intellectual Property, (2002)

Murray, J W, SESSION I: Examples of Best Practices "Institution Building" OECD Workshop - Management of Intellectual Property Generated from Publicly Funded Research, (2000), Canada

NATIONAL PRINCIPLES OF INTELLECTUAL PROPERTY MANAGEMENT FOR PUBLICLY FUNDED RESEARCH, The Australian Research Council, The

Australian Tertiary Institutions Commercial Companies Association, The Australian Vice-Chancellors' Committee, The Department of Education, Training and Youth Affairs, The Department of Industry, Science and Resources, IP Australia, The National Health and Medical Research Council

THE BEST INVENTION: Umberto Eco shows how after 1000 AD the cultivation of beans, peas and lentils had a profound effect on European civilisation  
MANAGEMENT AND COMMERCIALISATION OF INTELLECTUAL PROPERTY  
BY HIGHER EDUCATION INSTITUTES (HEIs): A SAUVCA PERSPECTIVE

IIPi IPR Vision

WIPO ON Patents and Drugs, Striking a Balance: Patents and Access to Drugs and Health Care

THE BAYH-DOLE ACT: A GUIDE TO THE LAW AND IMPLEMENTING REGULATIONS, (1999)

Integrating Intellectual Property Rights and Development Policy, Report of the Commission on Intellectual Property Rights, London

Brenner, J, ICT Software and patenting: Search About Salon Table Talk, Advertise in Salon Investor Relations

Sime, J M, The Commercialisation of Intellectual Property from Public Sector Research Establishments: a Discussion Paper, Based on a report to the AIC at the conclusion of a series of master classes conducted around Australia during 2003.

ANNEX 1C: AGREEMENT ON TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS

## APPENDICES

### Appendix 1: Detailed summaries of the types of IP

Intellectual property right is a broad term used to cover patents, trade marks, plant breeders rights, copyright, trade secrets and other types of rights that the law gives for the protection of investment in creative effort and knowledge creation. Knowledge, unlike a physical object, can be used by others.

**Trade marks** began as indicators of origin, today they are expressed as exclusive brands that can be sold, franchised or merchandised. Trafficking in TM was banned under the UK 1938 Act. Even under the 1994 Act, licensing can mean that a mark has become liable to deceive and thus revocable (Cornish, W. R. (1999), *Intellectual Property: Patents, Copyright, Trademarks and Allied Rights* (4th ed.), London: Sweet & Maxwell: 17-16 and 17-79).

**Copyright** began as a regulation of reprinting for 14 years, today industrial products derive their protection from the life span of an author (plus 50-70 years) during which all conceivable forms of communication, including adaptation, remain the prerogative of the owner (who typically is not the author). In the pre-royalty era, a new piece of music was typically sold in its physical instantiation, i.e. the manuscript. With the sale of the manuscript, all title claims passed to the publisher. It appeared to be a straightforward transfer of property. Similarly, if a musician acquired a printed score, she appeared to suffer no further restrictions of usage (apart from re-printing). The music could be performed in public without further payment; it could be transcribed, arranged or simply copied. (Friedemann Kawohl will have more to say on the paradigm shift in music copyright around 1800).

**Patents** began as a form of local protectionism (first English patents from 1565, for example for attracting Huguenots glass makers whose knowledge already existed), grew into an incentive to disclose, before turning into a strategic tool for manipulating competition (discovering the bargaining and retaliatory power of patent portfolios). Martin Kretschmer, "Intellectual Property in Music: A historical analysis of rhetoric and institutional practices," *Studies in Cultures, Organizations and Societies* Vol. 6 (2000), p. 205. Some composers manipulated this convention to their own advantage by selling the same manuscript to different publishers (e.g. Mozart, Beethoven). The process of propertization culminating in the TRIPs agreement of 1994 took place largely without public debate. IP law mostly evolved as an incremental response to technological change.

## Appendix 2: Executive Summary of the report “Turning Science into Business – Patenting and Licensing at Public Research Organisations”

### EXECUTIVE SUMMARY

#### Introduction

*Protection of intellectual property by public research organisations is increasing...*

Intellectual property (IP) rights – of which patents, industrial designs, copyrights and trademarks are among the most widespread – reward investment in R&D and innovation by granting inventors and creators market power over competitors. Over the past decade in many OECD countries, universities, national laboratories and other research organisations receiving significant public research funds (hereafter referred to as “public research organisations – PROs”) have become more aware of the value of their intellectual property. In large part, this awareness reflects the recognition by governments that, in some cases, placing the outputs of publicly funded research in the public domain is not sufficient to generate social and economic benefits from research.

*...driven by legislative reforms but also by closer interaction with industry...*

This awareness and demands to generate more economic benefits from public support to R&D have focused policy makers’ attention on the laws and rules governing the ownership and exploitation of IP at PROs. In 1980 the Bayh-Dole Act in the United States gave university contractors of federal research the right to take out patents on inventions and license them to firms. Although patenting at US universities was occurring before 1980, it has since increased sharply. Between 1993 and 2000, US universities were granted some 20 000 patents. Over that period, some of these academic patents had generated millions of dollars in licensing revenue and have spurred the creation of over 3 000 new companies, according to the Association of University Technology Managers. Consequently, in other OECD countries and beyond, the Bayh-Dole Act has been widely viewed as a catalyst for increasing the social and economic benefits from public research funding.

*...against a background of a strengthening of IPRs in the knowledge-based economies.*

PROs have also been encouraged to protect their academic inventions and creative works by a general strengthening and broadening of intellectual property protection to new areas such as databases, genetic inventions, software or new materials that are closer to basic research. The results of publicly financed research have thus become more valuable to the research community and to firms. The rise of universities and new biotechnology firms as sources of commercially valuable know-how for the pharmaceutical and agricultural sectors illustrates this point.

*This is creating opportunities for both governments and PROs.*

For governments, granting PROs rights to IP generated with public funds can lead to better use of research results that might otherwise remain unexploited as well as to the creation of academic spin-offs or start-ups that create employment. For PROs the benefits may include increased licensing and royalty revenues, more contract research and greater cross-fertilisation between entrepreneurial faculty and industry. Equally important, however, are the intangible benefits to an institution’s reputation and to the quality of its research that closer interaction with the private sector can generate.

*A more active IP stance by PROs, however, raises a number of policy issues.*

A more active IP stance at PROs, however, raises a number of policy issues about the costs of these activities and their impact on PRO missions. Does a more strategic IP policy: *i)* raise significant funds from licensing; *ii)* limit access to publicly funded research results; *iii)* affect the cost and efficiency of research; *iv)* reorient research towards more lucrative fields; and *v)* lead to conflicts of interests? As such questions are raised, many governments are trying to strike a balance between the research and commercial missions of PROs. In some OECD countries, observers point to a backlash against the commercialisation of public-sector research, fuelled by a perception that PROs have become overly influenced by market objectives and that the public interest requires safeguards against potential excesses.

### **The OECD Survey of Patenting and Licensing and Case Studies in IP Management at PROs**

*The lack of empirical evidence has clouded the policy debate.*

To clarify the debate and to help countries address some of these issues, the OECD's Committee for Scientific and Technological Policy (CSTP) asked its Working Group on Innovation and Technology Policy (TIP) collect empirical evidence on the amount of patenting and licensing activity at PROs in OECD countries as well as information on the legal and regulatory frameworks that govern IP at PROs.

*The OECD survey and case studies provide new information...*

Few OECD countries, however, with the exception of Australia, Canada, the United States and the United Kingdom, regularly collect data on IP activity in the public research sector. Consequently, in 2001 the OECD launched the first international survey of patenting and licensing at PROs. A series of country case studies in IP management at PROs complement the survey by providing the "policy stories" behind the figures. This publication presents the findings of the survey and case studies.

*...but the results should be viewed as an experiment.*

The results of the OECD survey should be viewed as an experiment, albeit a revealing one that should be repeated. The data refer to patents assigned to PROs. In many countries, universities either do not automatically retain title or cede title to the inventors or the firms that sponsor the research. Therefore, the data on institutionally owned patents may understate the total amount of PRO patenting. The data also do not allow for full comparability across countries. Responses to variables such as full-time equivalent staff or research expenditures at PROs were submitted by only a few countries. This limits the ability to normalise responses using a common denominator. The data also cover patenting and licensing activity for the last calendar or fiscal year (2000 or 2001) and thus do not provide time-series information. Not all responding countries surveyed individual universities and non-university PROs; some provided only aggregate data, others provided disaggregated data only for universities or only for non-university PROs. Still, the survey has generated a substantial amount of useful information and raises new questions for further research.

### **Trends in intellectual property policies at public research organisations**

<i>Policies on ownership of IP are changing across OECD countries...</i>	Across OECD countries, laws and policies governing the ownership of IP generated with public research funds are being re-examined with a view to encouraging ownership of inventions by the institution performing the research. In the European Union, there is concern that different national laws regarding the ownership and exploitation of IP from PROs, especially at universities, may create barriers to international collaborative research. Austria, Denmark, Germany and Norway have recently introduced new legislation to grant universities title to IP resulting from publicly funded research. In Finland, proposals are afoot that would, under certain conditions, give universities title to inventions. In Japan and Korea, recent reforms in funding regulations have given universities more control over the IP generated by their researchers. These policy trends echo the landmark US Bayh-Dole Act of 1980.
<i>...to promote institutional ownership of IP.</i>	However, whereas the Bayh-Dole Act modified the IP rules for federally funded research in the United States, most legislative moves in European Union countries have focused on changing employment laws so that university professors are no longer exempted from legislation that gives employers the IP generated by employees. A rationale common to both types of reforms is that ownership by institutions, as opposed to title by individual researchers, provides greater legal certainty for firms interested in exploiting research results, lowers transaction costs for partners and encourages more formal and efficient channels for knowledge and technology transfer.
<i>IP policies are not well disseminated at PROs, including among students.</i>	Despite changes in national legal frameworks, policies at the institutional level do not appear well disseminated among faculty and researchers at PROs. Similarly, rules on ownership of IP by students and other non-faculty at university-based PROs are either lacking or unclear in several countries. In addition, policies on ownership of non-patented IP, including copyrightable works, such as software or databases, are not well established or diffused at PROs in a number of OECD countries.
<i>Most reforms focus on ownership but lack of incentives remains a problem.</i>	Much of the focus of the reforms to legal frameworks has been on the issue of transferring ownership of IP to the performing institution. However, in several countries where PROs have owned the IP, patenting activity by institutions has nevertheless been weak. Part of the reason is that PROs have not had sufficient incentives, beyond legal requirements or institutional policies, to disclose, protect and actively commercialise IP.
<i>Non-IP related rules can be a barrier.</i>	In many OECD countries, non-IP related laws and regulations such as public-sector pay scales that make it difficult for PROs to recruit qualified technology transfer personnel can be a barrier to capacity building in technology transfer offices (TTOs). Fiscal rules that prevent PROs from receiving and retaining royalty income from licences – such as those recently lifted in the United Kingdom and Korea – can also weaken incentives for technology transfer.

<i>Legislation is not the only policy option however. Funding guidelines can help...</i>	The experience of OECD countries suggests that while legislation may sometimes be necessary to create the incentives for PROs to protect and commercialise IP, new laws are not the only action that can be taken. As an alternative, some governments have implemented “codes of practice” or general guidelines on IP ownership and management to foster greater transparency and coherence. Both the Canadian and Irish governments have sought to improve management of IP at PROs by reviewing or clarifying IP policies among the various performers of government research.
<i>...and new legislation has raised awareness of IP at universities and other PROs.</i>	Nevertheless, in countries that have implemented policies by legislative or other means, one of the main impacts has been to raise awareness of and support for technology transfer from universities and other PROs, especially within the administration of the organisations and among scientists/researchers and graduate students.
<i>Greater coherence in national rules might induce cross-border harmonisation.</i>	While greater compatibility – if not harmonisation – of the policies and practices of PROs within particular countries has the potential to improve technology transfer by reducing transaction costs, it can also help induce cross-border harmonisation and thus facilitate international collaborative research.

#### Technology transfer structures

<i>Managing IPR requires institutional, financial and human resources.</i>	A direct consequence of policies to grant PROs title to inventions and requirements for disclosure and exploitation has been the creation of TTOs or similar licensing offices to file patents and to enter into licensing agreements with third parties. Managing IPRs, however, requires institutional, financial and human resources.
<i>Technology transfer offices are recent and generally have fewer than five full-time staff.</i>	The OECD survey revealed a number of trends in the organisation and practice of technology transfer. There are several institutional models. Some TTOs have an arm’s-length relationship to the PRO and may manage technology for several organisations. The majority, however, appear to be dedicated on-site institutions and integrated into the university or research institution. The TTOs are typically young structures; in Japan over 90% were established after 1990. Even in the United States their median age is 12 years. They are relatively small structures; in most cases, they have at most five staff (in full-time equivalent).
<i>Countries are experimenting with regional or sector-based technology transfer offices</i>	Denmark, Germany, Korea and the United Kingdom are experimenting with TTOs that are regional or sector-based according to field of research/technology and manage technology transfer activities for many PROs. Potential economies of scale might be realised by spreading fixed costs over a large number of inventions and perhaps exploiting the benefits of portfolio diversification. A potential drawback of regional approaches and “central broker” technology transfer models more generally is the difficulty of developing close working relationships with faculty/employees of individual PROs, relationships which are often valuable for stimulating invention disclosures, writing patent applications, and finding licensees.

*The most important channel for licensing PRO patents is researcher contacts.* Indeed, the OECD survey shows the channels most often used by TTOs to seek licensees are informal relations and networks of researchers. This testifies to the importance of involving scientists in the further development and licensing of an invention. The networks or contacts of the TTO are also an important channel. Advertising or technology broker networks are used less frequently or not at all.

*There is no "one size fits all" approach to technology transfer.* There are, however, important differences among PROs that shape TTO structures and affect patenting and licensing strategies. Universities, fundamental research organisations, government labs and contract research organisations play different roles in innovation systems, generate different types of knowledge for different clients and therefore require different IP management processes. A contract research organisation such as IMEC in Belgium will differ in its approach to patenting and licensing from a basic research organisation, such as Germany's Max Planck Society. A university with research groups in different technological fields and a different type of staff (including students) may need yet another IP management strategy.

*Governments are providing more support to academic patenting and licensing in many countries.* In line with legislative reforms to create incentives for IP management at PROs, governments in Denmark, Japan, and Germany are providing direct and indirect support, on a time-limited basis, to help universities and other PROs cover the costs associated with patenting and commercialising inventions. Indirect support takes the form of reduced patent application costs for universities as well as informational and awareness creation measures. Without leadership from senior university or research management, however, public support for IP activities at PROs is likely to have a limited impact – increasing the number of patents filed but not necessarily the transfer of technology.

#### International evidence of patenting activity by PROs

*The size of patent portfolios is larger at non-university PROs.* The size of patent portfolios or the stock of currently active patents varies widely across and within OECD countries, depending on whether the PRO is a university or a national laboratory. Total active patents in portfolios ranged from 692 in Japan, 991 in the Netherlands, 1 184 in Switzerland to more than 5 000 in Germany (at non-university PROs only) and over 9 000 in Korea (both universities and non-university PROs). On average, individual TTOs manage between five and 50 patents. Here again, differences by type of PRO are apparent. In Italy only 18% of universities manage up to 50 patents whereas 80% of non-university PROs surveyed reported managing between ten and 50 patents. There are several explanations for differences in patent portfolio by type of PRO. For one, universities in several OECD countries have only recently either obtained the right to patent or established TTOs. Furthermore, non-university institutions, especially in European OECD countries, have had a longer tradition of protecting and commercialising IP.

<i>New patents granted range from the low to high hundreds.</i>	Total number of patents granted in the last year (2000 or 2001) ranged from several hundred in Germany (747) and Korea (832), to the low hundreds in Japan (163), Netherlands (167) and Switzerland (112).
<i>PROs file less than ten new patent applications per institution but applications are likely to increase.</i>	New patent applications per PRO ranged from an average of less than ten in almost half of the countries surveyed to several dozen. However, low patenting may also reflect PRO strategies: some apply for patents after a thorough examination and selection process while others may file for patents automatically each time an invention is disclosed. Public funding requirements that PROs protect and exploit the IP arising from research can also affect patent application rates. As several OECD countries have recently implemented new requirements for PROs, patenting applications are likely to increase in the near future.
<i>Invention disclosures are indicative of potential patenting.</i>	The number of "invention disclosures" – the document submitted by inventing scientists to their TTO – is another indication of the potential for new patents. The countries where PROs reported the greatest number of invention disclosures are the United States (16 286 at both universities and federal labs), Germany (948 at non-university PROs), Japan (489 at universities), Korea (418 at all PROs) and Switzerland (280 at all PROs) followed by Belgium (Flanders only) (230 at all PROs).
<i>PRO patenting is not limited just to biotechnology and health fields...</i>	While much of the increase in academic patenting has been attributed to the expansion of biotechnology, the OECD survey finds that even if patents in health and information technology predominate for some countries (Belgium, Germany, Netherlands and Switzerland), academic patenting is also significant in production, food and energy technologies. Patenting outcomes are likely to be associated with a country's R&D and industrial specialisation. In Korea for example, where IT is important in business value added, over 70% of universities declared having filed a patent in IT and electronics.
<i>...and there is significant protection of IP by PROs in foreign jurisdictions.</i>	TTOs may be small, but their approach to protecting PROs' IP seems to take a geographically broad view. Patents are filed first and foremost at national level, but almost all TTOs reported that they also filed abroad. PROs in Germany, the Netherlands and Switzerland were more likely (over 50% of institutions surveyed) to seek protection at European-wide level, in the United States and Japan than were PROs in Spain, Norway or Russia and Italian universities.
<i>The IP activity of researchers has a greater influence on earnings than on careers.</i>	While PROs are adapting human resources policies to give greater recognition of IP activity in recruitment and career advancement, licensing revenues provide strong incentives for researchers to explore the commercial applications of research. The survey finds that the effects are greater on researcher earnings than on career advancement.

## Summary results of the OECD survey on patenting and licensing activities

		Patents					Licences			Start-ups and spin-offs
		Total patent stock	Patent grants		Patent applications		Issued in last year	Earning income	Gross income	Total number created in last year
			Number granted in last year	% total stock	Number filed in last year	% total stock				
									EUR (000)	
Australia (2000)	All	-	498	-	834	-	417	491	99 525	47
	Univ	-	219	-	588	-	234	-	79 834	32
	PRO	-	279	-	248	-	183	-	19 691	15
Belgium (Flanders) (2001)	All	508	57	11.3	121	23.9	46	4	240	15
	Univ	-	-	-	-	-	-	-	-	-
	PRO	-	-	-	-	-	-	-	-	-
Germany (2001)	All	-	-	-	-	-	-	-	-	-
	Univ	-	-	-	-	-	-	-	-	-
	PRO	5 404	747	13.8	1 058	19.6	555	1 188	46 488	37
Italy (2000)	All	-	64	-	190*	-	36*	84	-	36
	Univ	-	34	-	102*	-	27*	12	-	27
	PRO	-	30	-	88*	-	9*	72	-	9
Japan (2000)	All	682	163	23.9	567	83.1	89	324	1 397	6
	Univ	-	-	-	-	-	-	-	-	-
	PRO	-	-	-	-	-	-	-	-	-
Korea (2001)	All	9 391	1 018	10.8	1 892	18.0	247	132	3 822	56
	Univ	404	188	46.0	244	60.4	44	22	1 032	19
	PRO	8 987	832	9.3	1 448	16.1	203	110	2 790*	37
Netherlands (2000)	All	991	167	16.9	212	21.4	368	93	11 400	37
	Univ	394	64	16.2	111	28.2	250	-	-	27
	PROs	597	103	17.3	101	16.9	118	-	-	10
Norway (2001)	All	-	-	-	-	-	-	-	-	67
	Univ	-	-	-	-	-	-	-	2 000*	16
	PRO	114	28	24.6	43	37.7	22	39	7 700*	51
Spain (2001)	All	781	64	8.2	133	17.0	125	136	961	11
	Univ	-	-	-	-	-	-	-	-	-
	PRO	-	-	-	-	-	-	-	-	-
Switzerland (2001)	All	1 184	112	9.5	175	14.8	475	77	5 650	68
	Univ	914	59	6.5	132	14.4	200	61	2 800	56
	PRO	270	53	19.6	43	15.9	275	16	2 850	12
United States (2000)	All	-	5 103	-	8 294	-	-	-	-	-
	Univ	-	3 617	-	6 135	-	4 049	8 670	1 297 452	390
	PRO	-	1 486	-	2 159	-	3 007	484	69 600	-
Russia (2001)	All	-	349	-	171	-	206	8	1 375	15
	Univ	-	-	-	-	-	-	-	-	-
	PRO	-	-	-	-	-	-	-	-	-

Australia: Data from the *National Survey of Research Commercialisation*, Australian Research Council 2000. Gross income in USD.

Italy: number of patent applications and number of licences granted are estimates.

Korea: One licence reported is not included in total number of active licences and total gross income. Gross income in USD.

Netherlands: Gross income is an estimate.

United States: Total number of income earning licences for federal labs is probably understated, as data are collected as earning "running royalties" and licences can earn income in other ways. Gross income in USD.

Russia: total number of patent granted and patent applications are estimates.

### Licensing strategies of public research organisations

<i>Two-thirds of PROs negotiate less than ten licences per year...but many licences are for copyright and other non-patented IP.</i>	The majority of PROs negotiate a very small number of licences (often less than ten) a year. One-third negotiate between 15 and 46 licences each year. Surprisingly, a large share of licence agreements in Italy, Japan, the Netherlands and Switzerland were concluded for patent-pending inventions or non-patented inventions (e.g. biological materials or know-how), as well as for copyrighted materials. The importance of non-patent licensing seems to support other evidence that PROs tend to license early-stage technologies requiring further development by firms.
<i>Licensing revenue varies greatly across PROs and countries...</i>	One of the most sought-after pieces of information is the amount of revenue that PROs generate from the licensing of intellectual property. There is enormous variation across OECD countries and even among PROs within a country. In absolute terms, US universities generated the largest amount of income from licences, over USD 1.2 billion followed by Germany at EUR 46.5 million (non-university PROs only). Per institution gross licensing income ranges from the thousands to the low millions: United States (USD 7.7 million); Germany (EUR 1.5 million); Korea (USD 537 000); Switzerland (EUR 269 000); and Japan (EUR 93 000).
<i>...and is highly skewed, as a few licences generate most of the revenue.</i>	Data on licensing revenue per licence reveals the skewed nature of income from technology transfer. While some PROs in the United States generate several million USD from licences, the average value of each licence in 2000 was USD 150 000. A large percentage of licences never generate any income and only a small percentage earn high income. Japan, which has fewer licences and less aggregate revenue, generated EUR 139 000 per licence. In Switzerland, the average revenue per licence is EUR 45 000. This shows that some licences are more valuable than others and that a high number of licences does not necessarily mean high revenue or <i>vice versa</i> .
<i>The number of new spin-off companies created to commercialise inventions is small but the phenomenon is widespread...</i>	In general, PROs prefer to license to existing companies but they may also license IP to a spin-off or start-up company. The number of spin-offs per TTO created in 2000/2001 is low, yet spin-off activity is widespread across OECD countries. In most cases, PROs create less than one spin-off or start-up a year, except in the United States where the average in 2000 was two per university PRO. Licensing and spin-offs are two sides of the same technology transfer coin, however. PROs often license their technology to a spin-off to retain greater control and access to the IP.
<i>...and the numbers are influenced by PROs' licensing strategies.</i>	In many ways, the number of spin-offs is influenced by the licensing strategies of PROs as well by the pool of entrepreneurial managers and access to seed capital. The field of technology also matters, and inventions arising in areas of non-core research may be spun off. Case-study research suggests that so-called "platform" inventions, those that may lead to a wide range of applications, are more likely to be licensed to spin-offs than to existing firms.

<i>Small companies obtain slightly more licences than large ones and licensing overseas is common.</i>	Evidence on licensing by firm size is inconclusive in the aggregate, but in several countries small firms appear to obtain more licences than larger ones. Non-university PROs tend to license to small firms (in Germany, Korea and Switzerland). In Belgium (Flanders) and Japan (universities) most licensees are large firms. Some 80% of Swiss PRO licensees are foreign firms. Similarly, Dutch universities are more likely to license abroad than at home, possibly owing to the international nature of Dutch research as well as the limited national market for IP.
<i>Small firms do not obtain more exclusive licences than large firms</i>	One of the concerns of the scientific community and policy makers is that the exclusive licensing of patents to single firms will limit the diffusion of knowledge generated with public funds. Yet firms, especially small firms and academic start-ups/spin-offs for which IP constitutes a main asset, generally demand exclusive licences in order to offset the risks involved in developing academic inventions further. Contrary to expectations that start-up firms are especially reliant on exclusive licences, data from the OECD survey show that small firms (fewer than 500 employees) do not obtain exclusive licences more frequently than large firms.
<i>Licences negotiated by PROs often contain clauses that protect public interests.</i>	About half of the PROs include clauses in their agreements which require the licensee to make good-faith efforts to exploit the invention. Licences often include some form of limited exclusivity (e.g. by territory or field) so that the technology may be used by more than one firm. Less common but still important are clauses in licensing agreements that grant the PRO reach-through royalties or rights of first refusal on future inventions. There is, however, a good deal of variation among countries as to how common such clauses are.
<i>Fears of crippling legal costs for PROs seem unsubstantiated.</i>	Despite the upswing in PRO IP activities, they have not to date been heavily involved in infringement litigation. In fact, PROs are slightly more likely to sue a third party for infringement than to be sued.

## Conclusions

<i>Legal action can stimulate the "transfer" of publicly funded research.</i>	In most OECD countries some sort of legal action has been necessary to stimulate the "transfer" of publicly funded research, although there is no single template for how such legislation should look like. Differences in national contexts may call for different solutions, even if most OECD countries are moving in the same direction. Harmonisation – or at least compatibility – of national rules regarding IPR at PROs may also facilitate international collaborative research by reducing transaction costs.
<i>But laws are not sufficient; a change in mindset is needed.</i>	Legal instruments are important but not enough: in many countries a change in the culture and mindset of researchers is also needed. TTOs also need to be free to hire high-quality technology transfer specialists with industry experience, and governments may need to modify legal regulations to facilitate this.

<i>Countries are still learning about the costs and benefits of various types of TTOs.</i>	There is no one model for a technology transfer office. Individual countries and organisations are still learning about the costs and benefits of various approaches. Several countries are experimenting with regional or sectoral TTOs, recognising that many individual PROs do not have the scale of research necessary for local TTOs.
<i>Close relationships with inventors and labs are necessary for technology transfer.</i>	However, to the extent that close relationships with inventors and labs are necessary to the technology transfer process, the geographic proximity offered by on-campus TTOs may be important. Since few TTOs are likely to generate positive net revenues, at least in their early years, some sort of cross subsidisation by PROs might be desirable.
<i>Licensing safeguards can help PROs balance research and commercial goals.</i>	PROs are best suited to negotiate the terms of licensing agreements with firms. However, policy safeguards such as those recommended by funding agencies can help balance the research and commercial goals of PROs. Individual PROs can set their own judicious guidelines. Finally, the licensing strategies of PROs can be used to maintain access to IP so that it is not lost should, for example, a “spin-off” company fail.
<i>Regular surveys would benefit PROs and policy makers.</i>	Regular surveys of patenting and licensing activities – undertaken by national governments, multilaterally, or by PROs themselves – are needed to provide input to policy makers but also to help PROs benchmark performance and learn from one another. It is important to remember that for many institutions, reporting of IP activities is new. The US experience shows that the ability of PROs to respond to such surveys improves over time.  Although the OECD project was limited to assessing IP rules at PROs and collecting empirical and anecdotal evidence of patenting and licensing at PROs in OECD countries, it has resulted in substantial insight into the increase in IP activity at PROs, and the challenges facing research administrators and policy makers.

Main Policy Recommendations
<p><b>I. Make national IP policies more coherent</b></p> <p><i>Policies for IP ownership should be coherent across universities, other PROs and funding agencies:</i></p> <p>In many OECD countries, legislative action has been taken to ensure that both universities and non-university PROs have a common basis for allocating ownership of IP to institutions (or contracting parties). This helps reduce transaction costs, increases transparency and facilitates exploitation of IP by third parties.</p> <p>Government funding agencies may also foster coherence through non-legislative means such as "codes of practice" or government policy guidelines which clarify ownership and exploitation requirements for universities and other PROs.</p> <p><b>II. Encourage the development and implementation of IP policies at the institution level</b></p> <p>Policies on the ownership of patented inventions as well as copyrightable works such as software should be better disseminated among faculty, research staff and students</p> <p>Regulations and policies requiring research staff to disclose and report inventions allow for greater oversight by universities and PROs. National funding laws or regulations can promote this by requiring PROs to report IP to funding agencies. But requirements should be backed by control mechanisms and incentives.</p> <p><i>Design and disseminate conflict of interest rules</i></p> <p>Universities and other PROs should develop clear guidelines on conflict of interests. Governmental funding agencies can help set the standard by promoting national guidelines.</p> <p><i>Permit exclusive licensing while protecting public research interests</i></p> <p>Universities and other PROs should be free to negotiate exclusive licences but should design guidelines to ensure that IP that is not commercialised by licensees is not lost. For example, minimum royalty and milestone requirements could be used to create pressures to cancel the exclusive licence if the licensee fails to exploit the IP. Field-of-use restrictions on exclusive licences can also be used to ensure that the IP is made available for future research as well as other firms.</p> <p>Designing licence agreements to share liability and responsibility for protecting against infringement with licensee firms could help reduce the potential costs of litigation to the PROs.</p> <p><b>III. Enhance IP management capacity at PROs</b></p> <p><i>IP management must become an integral part of research management</i></p> <p>Presidents and directors of universities and PROs should make IP management part of their research management plans. One way to accomplish this is by having heads of technology transfer operations report directly to university presidents and/or research directors.</p> <p><i>PROs should have greater freedom and resources for hiring and training technology transfer managers</i></p> <p>The success of PROs in commercialising IP depends strongly on human resources, in particular technology transfer professionals with both a scientific and industrial background. In many countries, rigid public pay regulations limit PROs from hiring professional technology transfer staff. Relaxing such regulations should be encouraged.</p> <p>Universities should also invest in specialised educational programmes to train engineers, scientists and lawyers in technology transfer. This can build awareness of IP among future science graduates as well create a pool of talent from which TTOs can develop their skills base.</p> <p><i>Government support to TTOs should be limited</i></p> <p>Insofar as the goal of TTOs is to facilitate the commercialisation of publicly funded research where social returns might exceed private returns, there is an argument for subsidising the creation of technology transfer structures, at least in the early stages. Support should be limited and focused on building greater incentives for IP management rather than simply reducing operating costs. In some cases, direct government subsidies to TTOs may be incompatible with national and supra-national legislation on government aid as well as with competition laws.</p> <p><i>National patent offices should be mobilised to diffuse information on IP management to universities</i></p> <p>In some OECD countries, national Patent Offices are providing educational and internet-based services to help universities become more aware of IP. Such good practices should be emulated in other countries.</p> <p><b>IV. Improve data collection and share good practices</b></p> <p><i>Governments and PROs should promote better monitoring of IP activity</i></p> <p>Requirements by government funding agencies for invention disclosures and reporting by PROs can create incentives for greater data collection.</p> <p>Associations of universities or research organisations can help PROs to regularly collect and share information on IP activity, including good practices.</p>

