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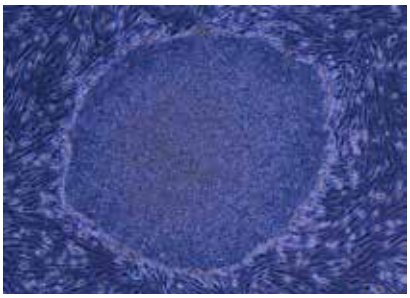


Using patents to ensure access to pioneering cell technology

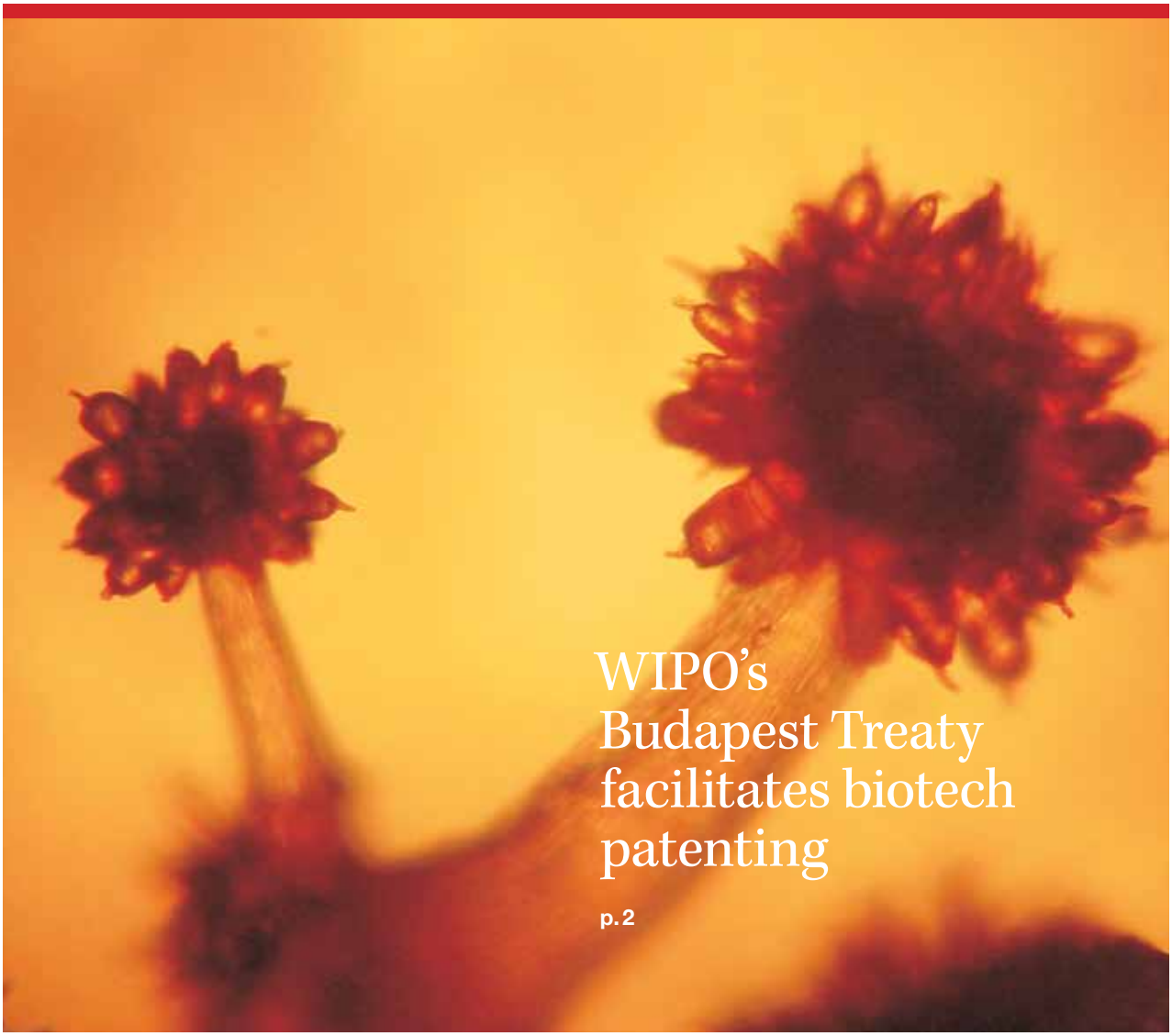
p. 8

Haier: pioneering innovation in the digital world

p. 24

Nation branding: telling New Zealand's story

p. 28



WIPO's Budapest Treaty facilitates biotech patenting

p. 2

Table of Contents

2 WIPO's Budapest Treaty facilitates biotech patenting

8 Using patents to ensure access to pioneering cell technology

12 Who benefits from IP rights in agricultural innovation?

16 The puzzle that is patent quality

20 Tanzanian entrepreneur develops innovative water filter

24 Haier: pioneering innovation in the digital world

30 Nation branding: telling New Zealand's story

34 Generating value from the public domain

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WIPO's Budapest Treaty facilitates biotech patenting

By **Catherine Jewell**,
Communications Division, WIPO

Photo: DSMZ

The Budapest Treaty offers applicants an efficient and cost-effective means of meeting the disclosure requirements associated with patenting microorganisms.

Humans have been using microorganisms for millennia.Tiny, single-cell living organisms like yeast and bacteria are essential to produce food products like wine, beer and cheese. Only in the 20th century, however, did the industrial application of these microscopic powerhouses take off. Greater understanding of biological processes, thanks in large part to Watson and Crick's work on DNA, paved the way for the development of revolutionary techniques such as genetic engineering, enabling scientists to manipulate microorganisms in spectacular new ways, to enormous social benefit.

In the medical field, microorganisms are used to produce a host of life-saving therapies – antibiotics, vaccines, insulin – and diagnostic tools; in agriculture, they are used in developing high-yielding, resistant crop varieties. They are also used in environmental waste management systems and many industrial applications, including the production of green fuels like ethanol. These tiny organisms have huge potential to improve the quality of our lives and the environment in which we live, and to reduce our carbon footprint.

For many, biotechnology holds the key to overcoming some of the daunting challenges facing humanity in the 21st century.

Developing these groundbreaking applications takes a massive investment of time, energy and resources. It is a high-risk research undertaking, and successful innovations can be imitated at little cost. As such, researchers and the biotech companies that employ them rely heavily on the intellectual property system, especially patents, to protect their know-how and maximize the chances of getting a return on their investment.

CRITERIA FOR PATENT PROTECTION

Applicants seeking patent protection in all fields of technology are required to satisfy certain criteria as set out in national patent law. Typically, to qualify for patent protection an invention must be novel, non-obvious to a specialist working in the relevant field and must have some industrial application or utility. Within the patent application process, there is what is known as a *disclosure requirement* whereby applicants must describe how their invention works. The description must be sufficiently detailed for a specialist in the field to be able to put the invention into practice – the *enablement requirement.*

HOW BIOTECH PATENTING IS DIFFERENT

For many technologies, a written description is enough to enable a specialist working in the relevant field to reproduce an invention for which patent protection is sought. When it comes to microorganisms, however, this will not generally suffice. Take, for example, an organism isolated in soil that has been "improved" by mutation and further selection. It would be practically impossible to describe the strain and its selection in a way that would guarantee that another skilled microbiologist would obtain the same strain. In such instances, the microorganism itself is considered a key part of the disclosure (see *http://tinyurl.com/p2az6vl*). For this reason, many countries require that when patenting microorganisms, written disclosure is complemented by deposit of the biological material in question with a specialized culture collection.

However, depositing multiple samples with each patent application is impractical. IP offices are ill-equipped to store and preserve biological materials and such a requirement would be hugely time-consuming and costly.

AN INTERNATIONAL MECHANISM THAT FACILITATES BIOTECH PATENTING

Recognizing the peculiar challenges of patenting microorganisms, and the need for a streamlined and cost-effective international procedure, in the late 1970s policymakers adopted the WIPO-administered Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure.

A key advantage of the Budapest Treaty is that for the purposes of patenting procedures, it eliminates the need to deposit multiple samples of the same biological material with biological resource centers in different countries. As such, it offers applicants an efficient, streamlined and cost-effective means of meeting the disclosure requirements associated with patenting microorganisms and other biological material.

Accession to the Budapest Treaty by countries or competent intergovernmental organizations does not require any substantive change to their national or regional patent legislation because the Treaty itself does not define a microorganism nor does it regulate any patentability requirements.

Photo: DSMZ

Photo: DSMZ

Under WIPO's Budapest Treaty, people seeking patent protection for biological material are required to deposit a sample of it with an international depositary authority where it is tested (for viability) and stored for up to 30 years.

The main users and participants in the Budapest Treaty System are patent offices, depositors of biological material, patent applicants, patent lawyers, scientists and international depositary authorities (IDAs).

A KEY ROLE FOR NATIONAL CULTURE COLLECTIONS

The Treaty recognizes certain biological resources centers or culture collections as IDAs where patent-related samples of biological material can be deposited and stored (thereby also fulfilling the need for disclosure information to be made publicly available). There are currently 45 IDAs in operation around the world, and biological material deposited with any one of them is recognized by all members of the Treaty as "valid for patent purposes by all countries in which protection for the relevant invention is sought." To date, 79 countries have signed up to the Budapest Treaty.

Any biological resource center or culture collection can become an IDA under the Budapest Treaty if it meets certain conditions and is formally nominated by a member country. These institutions specialize in the collection and storage of specific types of biological material which they make available for research purposes. For example, the German Collection of Microorganisms and Cell Cultures (Leibnitz Institut – Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, (DSMZ)) hosts an open collection of over 35,000 cultures of archaea, bacteria, genomic DNAs, bacteriophages, fungi, yeasts, plant cell cultures, plant viruses and animal and human cell cultures which it makes available to scientists around the world.

All IDAs comply with certain requirements; in particular, they agree to accept and store deposited materials for at least 30 years or five years after the most recent request for a sample, whichever is later. They also agree to provide samples of deposited material only to those entitled to receive them (e.g. anyone with the depositor's written authorization or an "interested" patent office). Storing biomaterials and processing samples for patenting procedures still entails costs but these are significantly reduced thanks to the Budapest Treaty.

DSMZ began operating as an IDA under the Budapest Treaty in 1981. As such, it serves as "a center for the safe deposit of biological material for patent purposes," notes Dr. Vera Bussas, DSMZ's IDA Representative responsible for managing its patent deposit collection. With more than 8,000 deposits filed under the Budapest Treaty, and a capacity to accept a broad range of biological materials, DSMZ is one of the largest IDAs in the world.

Upon receipt of a patent-related sample, DSMZ checks the viability and purity of the biological material deposited. This can take several days or weeks, depending on the type of material and species of organism. It then issues a deposit receipt and a statement of viability (Forms BP/4 and BP/9). Such information typically has to be included in the patent application at the time of filing so some forward planning is required.

MAKING BIOLOGICAL MATERIAL AVAILABLE FOR RESEARCH

"We then preserve and store the biological material for at least 30 years as prescribed by the Budapest Treaty," Dr. Bussas explains. "Whenever possible, two methods of preservation, such as freeze-drying or storage in liquid nitrogen, are applied, and the viability of the cultures is inspected periodically," she says.

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"The main reason for depositing patent-related biological material with an IDA is to render it available to entitled parties for trials and examinations," Dr. Bussas explains, noting that industry players deposit significantly more samples than their counterparts in research institutions. Every year some 2,000 samples are furnished by IDAs around the world. "DSMZ releases around 150 samples per year, mostly to industrial customers from abroad."

Since the Budapest Treaty became operational in early 1981, over 90,000 patent-related samples of biological material have been deposited in IDAs around the world. In 2014, China (51 percent) and the United States (21.9 percent) accounted for 72.9 percent of deposits made. "The total number of deposits each year is still increasing, especially among Asian IDAs, which are showing amazing increases in deposition numbers," Dr. Bussas notes.

ENABLING BIOTECH COMPANIES TO CAPTURE VALUE

"Recognizing the huge potential that biotechnology holds in treating human disease, many biopharmaceutical companies have made it a priority to discover and develop microorganisms to treat a wide range of medical conditions, including cancer, allergies and autoimmune and inflammatory diseases," explains Emil Pot, Legal Counsel at ActoGeniX, a small biotech company based in Belgium.

"In the next decade, we will see even more investment in this important field and many more of these microbiome products will make their way to the market. By depositing these valuable biological materials via the Budapest Treaty, companies are able to pursue patent protection and thereby capture their commercial value, safeguard their rights and generate opportunities to fund further research," Mr. Pot observes.

BIOTECH PATENTS ON THE RISE

With growing demand for biotechnology-related patents – the sector experienced a 4.7 percent growth rate in patents between 2007 and 2011 – the number of IDAs continues to increase. In 1990 there were just 10 IDAs, in 2000 there were 33 of them, and today 45 are in operation. The majority of IDAs – 27 of them – are located in Europe with four in North America, 10 in Asia, two in Australia and two in Latin America. At present, culture collections with IDA status are located in just four developing countries (see box). Dr. Bussas is confident that this will change in the future: "As biotechnology starts budding in Africa and South America we will see the establishment of more IDAs in these areas."

While anticipating the growth of the global IDA network, Dr. Bussas offers a word of caution. "A well-functioning culture collection must first be in place before institutions try to obtain IDA status," she explains. "Countries active in the biotechnology sector need to think about joining the Budapest Treaty – only then can they benefit from its advantages in terms of uniform and cost-effective procedures."

As biotechnological research continues to push the boundaries of possibility, and the number of biotech-related patents rises, the future looks bright for the Budapest Treaty and its expanding network of IDAs, not to mention the many biotech companies that save time and money by using them.

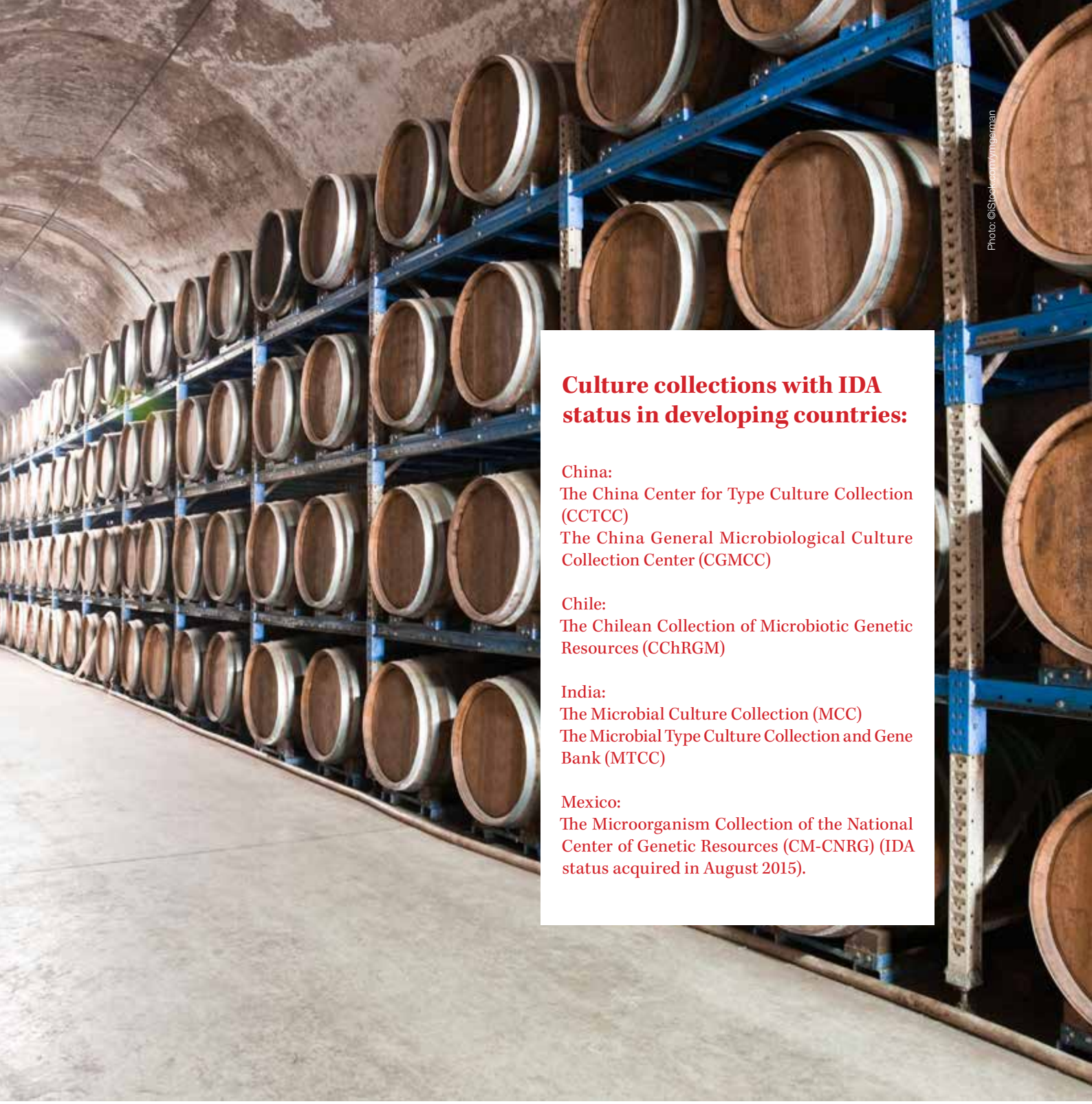

Photo: ©iStock.com/mgerman

Culture collections with IDA status in developing countries:

China:
The China Center for Type Culture Collection (CCTCC)
The China General Microbiological Culture Collection Center (CGMCC)

Chile:
The Chilean Collection of Microbiotic Genetic Resources (CChRGM)

India:
The Microbial Culture Collection (MCC)
The Microbial Type Culture Collection and Gene Bank (MTCC)

Mexico:
The Microorganism Collection of the National Center of Genetic Resources (CM-CNRG) (IDA status acquired in August 2015).

Humans have used microorganisms for millennia to produce food products such as wine, beer and cheese. Greater understanding of biological processes has enabled scientists to manipulate these tiny organisms in spectacular new ways, to enormous social benefit.

Using patents to ensure access to pioneering cell technology

By Professor **Shinya Yamanaka, M.D., Ph.D.,**
Director of the Center for iPS Cell Research and Application, Kyoto University. Japan

Photo: Professor Shinya Yamanaka

CiRA, the laboratory of Professor Yamanaka (above), is an active user of WIPO's Patent Cooperation Treaty (PCT).

Shinya Yamanaka's work has revolutionized our understanding of how cells develop and specialize. His pioneering research won him the Nobel Prize in Physiology or Medicine in 2012, alongside developmental biologist Sir John Gurdon. Here, Professor Yamanaka outlines his research and explains why patents are crucial to its advance.

THE TECHNOLOGY

My research focuses on pluripotent stem cells, which are cells capable of differentiating into any cell type within the adult body – nerve cells, muscle cells, lung cells, and so on.

Essentially, my colleagues and I managed to take mature cells and reprogram them into pluripotent cells called induced pluripotent stem cells (iPS cells). We first reported iPS cells from mouse skin cells in 2006 and from human skin cells in 2007. Since then, we have extended our research to iPS cells for new medical treatments. Almost all our research activities are based at the Center for iPS Cell Research and Application (CiRA) at Kyoto University in Japan.

Our success in generating iPS cells from human somatic cells (i.e. any cell in the body except sperm or egg cells) was a major breakthrough. It overcame the ethical concerns surrounding the use of human embryonic stem cells for medical research, because it made it possible to access pluripotent cells without the destruction of embryos. It also created many opportunities for medical research, particularly in the areas of diagnostics, drug screening and regenerative medicine.

To generate iPS cells, the information contained in somatic cells is reprogrammed through the addition of a small number of genes known as "nuclear reprogramming factors."

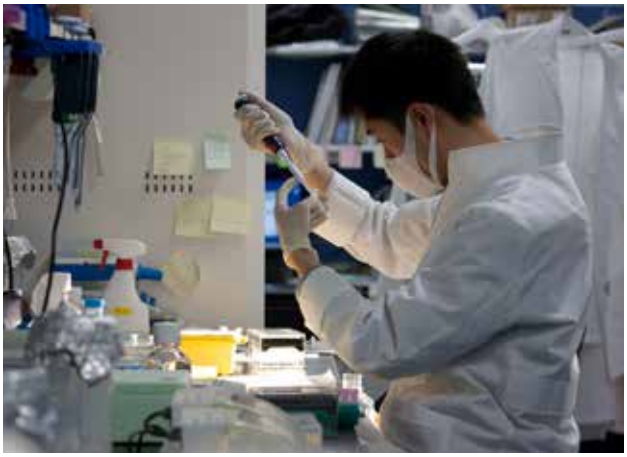

Photo: Center for iPS Cell Research and Application, Kyoto University

A researcher conducting an experiment at the open Lab at the Center for iPS Cell Research and Application, Kyoto University

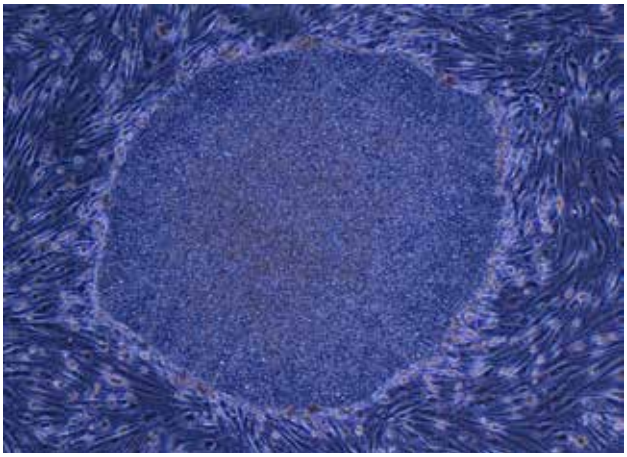

Photo: Shinya Yamanaka, Center for iPS Cell Research and Application, Kyoto University

Human iPS cells derived from adult human dermal fibroblasts, the most common cells of connective tissue. iPS cells are capable of differentiating into all cell types within the adult body and they proliferate without limit.

iPS cells have two great advantages: they are (a) capable of differentiating into all cell types within the adult body and (b) they proliferate without limit. As a consequence, these cells have huge potential to treat a wide range of diseases for which effective therapies are not yet available.

POTENTIAL FOR REGENERATIVE MEDICINE

One exciting application for which iPS cells hold great potential is in the area of regenerative therapy, where they can be used to repair or replace tissues. In 2014, the first clinical research using iPS cell transplantation was performed on a woman suffering from age-related macular degeneration by scientists at the RIKEN Center for Developmental Biology (CBD) and the Institute of Biomedical Research and Innovation Hospital. In this therapy, retinal tissues were created from iPS cells generated from her skin cells and transplanted into her eyes. Preparations are now underway to start similar iPS cell clinical research for Parkinson's disease and other intractable conditions.

POTENTIAL FOR DRUG DISCOVERY

A second major application of iPS cells is in the area of drug discovery. Take, for example, a patient suffering from motor neuron disease. Motor neurons are not easy to access, which is why most drug testing is first done on animals, such as mice.

However, the way in which a drug behaves in animals may be different from the way in which it behaves in humans. The result is many false positives, where a drug found to be effective in animals is ineffective in humans, or false negatives, where a drug is found to be ineffective in animals but effective in humans but is never administered because it does not make it through the animal trial.

iPS cells help get around this problem, because researchers can use a more accessible cell type from the body, such as blood, and reprogram it to create motor neurons via iPS cells. This approach reduces the number of false positives and false negatives, and promises to expedite drug discovery and development.

USING INTELLECTUAL PROPERTY TO ENSURE ACCESS

CiRA's main aim is to realize iPS cell technology's huge potential for medical care by creating new iPS cell-based treatments and making them widely available to patients as soon as possible.

As a university research institute, however, CiRA cannot achieve this goal alone. Private sector support is indispensable when it comes to translating our research results into effective treatments or drugs and delivering them to the broader population.

In light of this, since its establishment in April 2010, CiRA has pursued an intellectual property (IP) strategy that aims to influence how our research results are used. Where appropriate, CiRA seeks to secure patents over key technologies resulting from our research.

Let me be clear, our goal is not to monopolize or "ring-fence" iPS cell technology, but rather to ensure that it is widely available for development by other researchers through reasonable non-exclusive patent licensing arrangements.

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KEEPING THE DOOR OPEN

By patenting iPS cell technology, we can control it, which means we can stop others from controlling it. What would happen if a basic technology that leads to innovations in drug development and cell therapy were patented and could only be used upon payment of a high license fee? In such a scenario, the technology would be accessible only to a small number of enterprises who could afford to pay the fee. In the world of medical research, many different researchers are tackling complex problems from a variety of angles. CiRA believes it is essential that all researchers have access to iPS cell technology because of the possible discoveries that their research may lead to. A strictly exclusive approach that narrows the base of research and development would likely translate into many lost opportunities for science.

Additionally, the need to pay high licensing fees would push up the cost of innovative treatments, restricting their access to a limited number of people. In other words, high license fees risk constraining the advancement of iPS cell research and its availability for patient care.

Research into iPS cells has attracted a great deal of attention and generated intense competition within the biotechnology sector. There is no guarantee that others will not seek to create a "patent wall" and lock the door on the technology. But through its non-exclusive patent licensing approach, Kyoto University is making every effort to prevent this wall from being built. Our aim in acquiring patents is to increase the degree of freedom with which the iPS cell technologies we have developed can be used. This effort, we believe, will ensure that iPS cells are widely available for use at reasonable and appropriate licensing fees and that iPS cell research is broadened and accelerated so that new drugs and treatment methods will be available to patients more rapidly.

MAKING IPS CELL TECHNOLOGY GLOBAL

Disease affects us all. It shows no prejudice. CiRA therefore believes that all iPS cell technology should be available to all people, regardless of nationality. For this reason, we are working to obtain patents in as many countries as possible.

In this endeavor, we give much credit to the World Intellectual Property Organization's Patent Cooperation Treaty (PCT). As of May 2015, Kyoto University holds patents relating to iPS cell technologies in 30 different countries. Like other universities and research institutes with limited financial and human resources, Kyoto University has taken advantage of the PCT's simplified and cost-effective procedures. Using the PCT also gives us more time to assess whether we really need to patent a given technology.

Despite its many advantages, however, one point of frustration in using the PCT is the fact that it is not possible to receive identical patent rights in each of the countries in which we seek patent protection. This constraint is related to the significant variations between national patent laws and examination practices.

CATALYZING RESEARCH

The steady progress CiRA has made in iPS cell research is in large part due to the support of the Japanese government and generous donations from individuals and organizations. However, another important aspect of our success has been easy access to new iPS cell technologies, from which we can build new medical therapies. These technologies are available because of our ability to secure patents. Because CiRA believes all scientists should benefit from these innovations, we want these patents to make iPS cell research more widely available, not less so. This strategy, we believe, is the fastest way to bring new iPS cell-based treatments to the clinic.

Despite our achievements, iPS cells are still far from ready for use in treating patients. There are still many hurdles to overcome in establishing reliable and safe treatment methods. These obstacles include peripheral technologies, such as cell quality evaluation and manufacturing methods, to ensure optimal iPS cell development.

CiRA is committed to research that ensures new, effective treatments are available to patients as soon as possible. Our non-exclusive, open-door approach to patent licensing aims to catalyze iPS cell research efforts around the world for the common good.

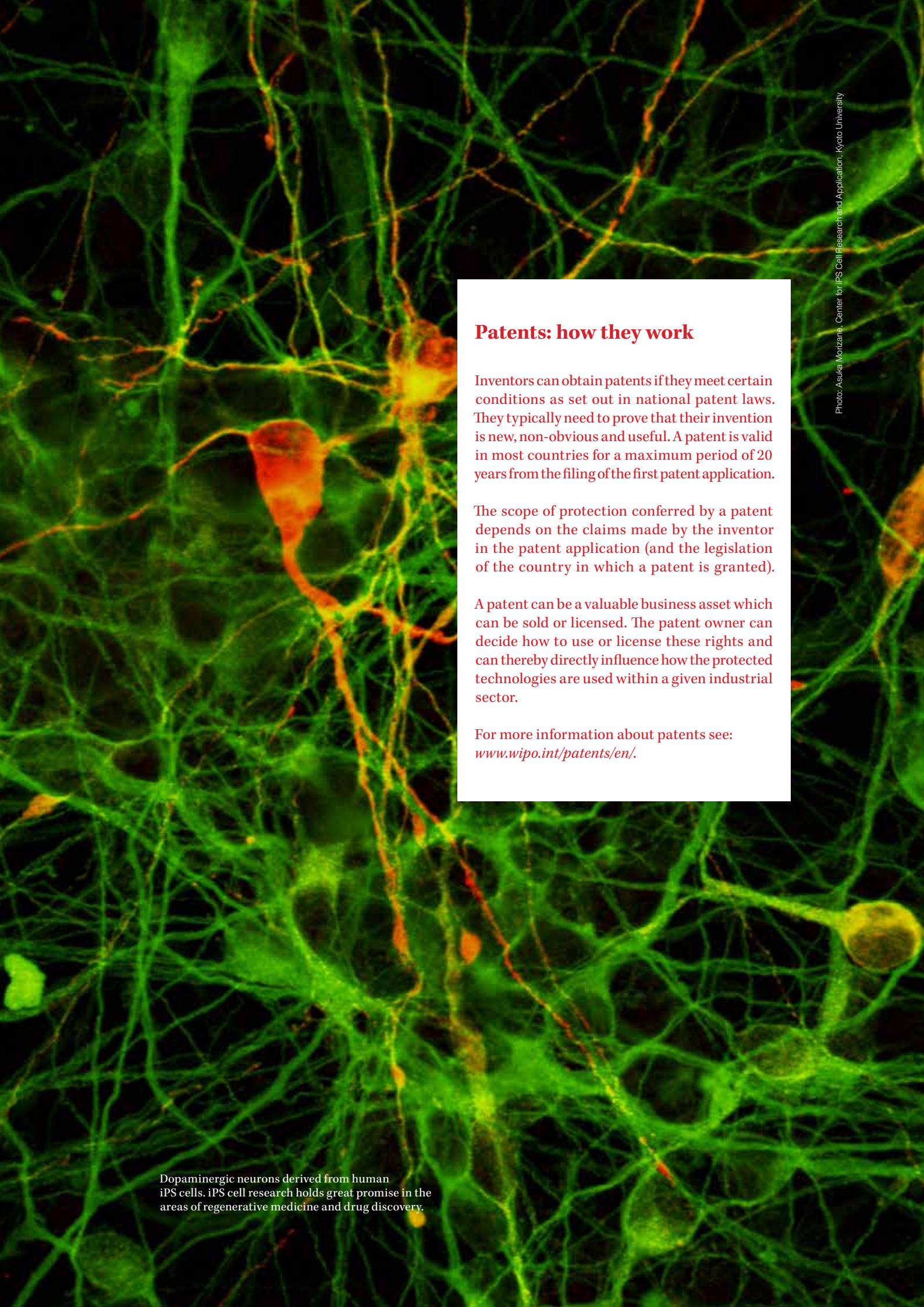

Photo: Asuka Morizane, Center for iPS Cell Research and Application, Kyoto University

Patents: how they work

Inventors can obtain patents if they meet certain conditions as set out in national patent laws. They typically need to prove that their invention is new, non-obvious and useful. A patent is valid in most countries for a maximum period of 20 years from the filing of the first patent application.

The scope of protection conferred by a patent depends on the claims made by the inventor in the patent application (and the legislation of the country in which a patent is granted).

A patent can be a valuable business asset which can be sold or licensed. The patent owner can decide how to use or license these rights and can thereby directly influence how the protected technologies are used within a given industrial sector.

For more information about patents see: *www.wipo.int/patents/en/.*

Dopaminergic neurons derived from human iPS cells. iPS cell research holds great promise in the areas of regenerative medicine and drug discovery.

Who benefits from IP rights in agricultural innovation?

By **Catherine Jewell**,
Communications Division, WIPO

Photo: ©iStock.com/RubyMirriam

Oilseed rape is a versatile and high value crop. Its tiny black seeds are 45 percent oil and 55 percent high protein animal fodder. It is also used to produce biodiesel.

In a finite world with an ever-expanding population, agricultural innovation is vital in order to increase productivity and secure the global food supply. But agricultural research and development (R&D) is a risky and costly business.

In the past, agricultural R&D was largely publicly funded but today, increasingly the private sector is picking up the tab for global crop R&D, especially in the area of agricultural biotechnology. The industry's top ten companies invest some EUR1.69 billion a year – 7.5 percent of sales revenue – on new product development, according to a recent report commissioned by CropLife International and EuropaBio. In this context, intellectual property (IP) rights play a key role in enabling companies to attract investors and generate the returns necessary to recoup development costs and invest in further R&D.

In some quarters, however, there are concerns that IP rights in agricultural technology are pushing up prices and enabling agricultural innovators to generate huge profits at the expense of farmers and the public. How well founded are such concerns? Would the innovations have ever existed without the incentives provided by the IP system?

The study by Steward Redqueen on behalf of CropLife International and EuropaBio explores these questions and takes a closer look at the balancing act that underpins the IP system, in particular the trade-off between the need to offer incentives to invest in new innovation so that new and improved innovations are available down the line (future benefits) and the need to ensure public access to the benefits of existing innovations (present benefits).

The researchers established a framework to evaluate the use of IP rights and tested it using the case of Ogura hybrid oilseed rape technology. The study explores the different socio-economic outcomes flowing from three different IP (patent) licensing scenarios: non-exclusive use of IP rights, exclusive IP use and no IP rights. It examines the different ways in which each scenario would influence incentives for innovation as well as consumer benefits once a product enters the market.

THE CASE OF OGURA

Developed by the French National Institute for Agricultural Research (INRA) in the mid-1990s, Ogura is non-biotech method for producing high-yielding hybrids of oilseed rape. Long used as a valuable "break crop" to improve soil quality for cereals such as wheat and barley, it also a source of high-quality vegetable oil and animal feed – its tiny black seeds are 45 percent oil and 55 percent high protein animal fodder. Oilseed rape is also used for production of biodiesel and industrial lubricants. In sum, it is a versatile and high-value crop.

The study shows that IP rights play a critical role in enabling innovation in the agricultural sector. "IP rights are essential to enable innovation by providing innovators with the ability to recoup investments and fund new R&D," says Willem Ruster, co-author of the report. "Innovative crops have transformed farming and are driving long-term productivity and sustainability in agriculture. Hybrid seeds have made and continue to make a major contribution to agricultural productivity increases, adding an estimated EUR75 billion to global farm incomes."

Crop innovation involves five stages: discovery, proof of concept, early development, advanced development and pre-launch. "It can take between 10 and 15 years to develop commercially viable seeds, so there needs to be some IP protection to provide an incentive for the innovator and to make it possible to keep free-riders at bay," observes Mr. Ruster.

Having done work to prove the concept of Ogura, INRA recognized it was still five to ten years away from producing commercially viable seeds. "INRA knew its capabilities and understood that it was not the right party to develop Ogura commercially so it decided to acquire a bundle of patents over Ogura technology and to license it out to seed companies for further development." Mr. Ruster says.

INRA'S NON-EXCLUSIVE LICENSES PAY OFF

INRA decided to make its Ogura hybrid seed technology available to different seed producers through non-exclusive patent licenses. "Licensing is a key means of generating a return on investment. It also creates a legal framework for making technology available to a wider group of researchers in both public and private laboratories who may contribute to its further development," explains Mr. Ruster. In the case of Ogura, both parties stood to benefit. As the licensor, INRA was able to recoup its development costs, which amounted to over EUR5 million, while staying involved in its further development. As licensees, the seed companies were able to avoid the costs associated with developing the technology from scratch by taking a license from INRA.

Under INRA's patent license agreement, a five percent royalty was payable on revenue generated up to 2011, and one percent up to 2016. INRA favored this approach over a single upfront license fee because it made it possible to encourage the levels of investment needed to advance the seeds' development. The approach paid off. Up to 2011, INRA generated EUR50 million in royalties from its Ogura technology, making it possible to recoup development costs and also reduce its reliance on government subsidies.

The first hybrid Ogura seeds were commercialized in 2000. They boosted yields by up to ten percent, and proved popular among farmers. By 2012, Ogura hybrids had captured 83 percent of the oilseed rape seed market in France, the largest oilseed rape producer in Europe, accounting for around nine percent of global oilseed rape production. "The fact that a lot of different seed companies were working on the technology in France, which has a lot of climatic variations, was very helpful in bringing different kinds of seeds to the market. That really helped the technology's diffusion," Mr. Ruster says.

However, despite favorable market conditions – rising crop prices and broad uptake of the technology – it still took INRA at least 15 years of licensing to recover its R&D costs and break even. "While it looks like INRA benefitted handsomely from its Ogura technology, we should remember that this income also has to cover the R&D costs of all the technologies that did not make it through the pipeline as well as future R&D projects. For every success, like Ogura, 12 equally costly projects could fail," Mr. Ruster notes.

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SIZEABLE CONSUMER BENEFITS

The study reveals that over its full patent life, Ogura generated an estimated EUR1.2 billion, of which around 80 percent, some EUR1 billion, went to farmers, downstream processors and consumers. The remaining 20 percent went to those involved in developing the seeds and getting them to market. From 2000 to 2012, the study estimates that the total benefit to farmers relating to Ogura amounted to EUR471 million.

The Ogura case paints a rosy picture of the economic benefits that can flow from the granting of non-exclusive patent licenses, but how might things look if INRA had adopted a different strategy? What might have been the outcome if it had adopted an exclusive licensing approach, or if it had decided to disregard the IPR system all together?

EXCLUSIVE PATENT LICENSING: EXPECTED IMPACTS

The study suggests that an exclusive patent licensing approach – where there is only one party serving the market – would offer producers a stronger incentive and grant them more market power. In the short term, such an approach may result in a lower uptake of the technology by farmers and as a consequence reduce immediate benefits to them and consumers. "We would expect slightly higher prices, so fewer farmers would be likely to be willing to buy the seeds, Mr. Ruster explains.

However, in the longer term, such an approach could encourage innovation because the higher prices charged by licensees could be expected to prompt competitors to develop their own hybrid oilseed rape technology. In such a case, "an exclusive patent licensing approach would act as a stronger magnet for private-sector investment and increase the probability of innovation taking place," notes Mr. Ruster. Farmers and consumers would also be expected to benefit from having a broader range of improved technologies to choose from.

Greater market power, however, does not necessarily mean producers have a free hand in setting prices or influencing adoption rates within the agricultural sector. "If a producer like INRA, seed companies or distributors sets seed prices too high, uptake will be much smaller because farmers will be unwilling to switch to the new hybrids and so revenues will drop. Similarly, if seed prices are set too low, uptake will be high but margins will suffer," Mr. Ruster explains. "Our study reveals that in reality, the market power of patent holders is constrained by the presence of alternatives and the heterogeneity of individual farmer preferences."

NO IP RIGHTS, NO INCENTIVES?

So what would be the impact of not using IP rights at all? The study suggests that while benefits to farmers, consumers and other downstream users would increase, and prices might be lower due to greater competition, the incentive for producers to innovate would be all but eliminated. "In this scenario we see a decision not to use IP rights also has a cost because such an approach diminishes the incentive to innovate. The more chance an innovator has of recouping his investment and of making a profit to reinvest in new innovations, the stronger the incentive to innovate and for future innovations to occur," says Mr. Ruster.

With respect to the Ogura case, then, INRA's non-exclusive patent licensing approach seems to have succeeded in balancing the trade-off between present and future benefits. The study offers concrete evidence of the way in which patents can enable agricultural innovation and the far-reaching socio-economic and environmental benefits (see box) that can flow from it.

While Mr. Ruster notes that in the agricultural context "optimal IPR use depends on the technology itself as well as on market conditions," the Ogura case study offers an interesting framework for evaluating the impact of different IPR regimes, their underlying logic and the balancing act facing policymakers seeking to enhance food security around the world. Ultimately, the choice of IP strategy depends on the intended goal and is a question of short-term versus long-term benefits, market conditions, and the need to manage the risks associated with research and development.

Photo: ©iStock.com/arturbo

Broader benefits of Ogura technology

Beyond the direct economic benefits of Ogura, the CropLife study reveals benefits in terms of resource efficiency and employment resulting from higher farm incomes.

Savings during Ogura oilseed rape production translate into a reduction of around 66 kg of carbon per tonne and around 300,000 tonnes of CO_2 emissions, equivalent to the annual emissions of 150,000 cars.

In 2012 alone, farmers earned an additional EUR123 million from high-yielding oilseed rape, which translated into almost 1,200 new jobs.

Using a non-exclusive licensing strategy, INRA was able to recoup costs associated with developing its high-yielding Ogura oilseed rape technology after 15 years.

The puzzle that is patent quality

By **Bruce Berman**, CEO,
Brody Berman Associates,
New York, United States

Photo: Bruce Berman

What is a good patent? Patent quality is much discussed and frequently complained about, but not easily defined.

The discussion is typically about validity, not the quality of an invention or its market value. When someone speaks of a "good" patent they could be referring to one or more characteristics: the patent's likelihood of being upheld if enforced (litigated), the importance of the invention it excludes others from practicing; or its relative value (in terms of protecting profit margins or generating direct licensing revenue) to a particular holder at a given time.

There are, in fact, no "bad" patents: just valid and invalid ones – or those that have been issued but do not withstand scrutiny. Bad or unreliable patents get issued for a host of reasons including the lack of examination time and examiner experience; and irresponsible applicants who desire IP rights whether or not they meet the appropriate tests. Valid patents that do not read on an infringing product are another matter. They may be good, but are not very useful.

GRANTS ARE NOT A RELIABLE MEASURE OF VALIDITY

A good patent can mean different things to different holders in different contexts.

The legal definition of patent quality – a valid invention right that permits the holder to sue in order to exclude an alleged infringer from practicing the invention – provides limited direction. The United States Patent and Trademark Office (USPTO) today provides an issued patent with an interim status, referred to as a presumption of validity. This is, in effect, a provisional "thumbs up", based on a less than definitive examination. Patents that are disputed frequently require the courts to determine their validity. Today, what looks like an excellent patent upon issuance may be just the first step in an extended application process.

In practice, once a patent is disputed the presumption of validity to which it is entitled may not be easily sustained. That is when scrutiny is brought to bear on the fine points of specific claims and their construction, which patent examiners often do not have the time, experience or resources to address.

Establishing whether an issued patent is valid, or infringed, is an expensive and arduous process. Procedures such as the USPTO's inter partes review [(*www.uspto.gov/patents-application-process/appealing-patent-decisions/trials/inter-partes-review*)] and the European Patent Office's opposition procedure[(*www.epo.org/applying/european/oppositions.html*)] are designed to make disproving a patent's validity less costly, and less onerous. Neither has helped much to improve certainty.

Bruce Berman is CEO of Brody Berman Associates, a management consulting and strategic communications firm for intellectual property holders, professionals and law firms. He has edited and contributed to five books, the most recent of which is *The Intangible Investor* (CloseUp Media). His blog, IP CloseUp, is read in more than 100 countries.

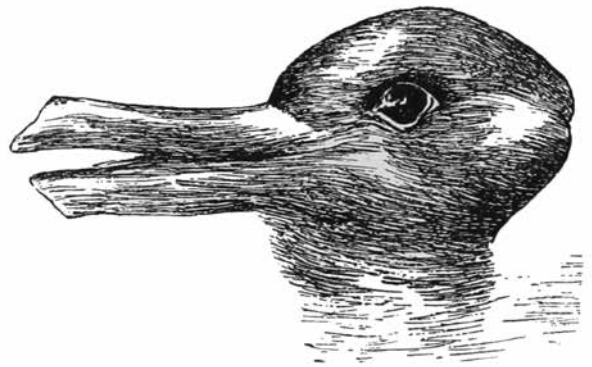

Photo: commons.wikimedia.org

A duck or a rabbit? A good patent can mean different things to different holders in different contexts.

DO UNRELIABLE PATENTS OPEN THE DOOR TO ABUSE BY PATENT TROLLS?

Non-Practicing Entities, (NPEs), are patent licensing businesses that do not practice patents. They do not typically develop or sell products; they only license them. They are interested in monetizing patents through licensing and litigation, and have a reputation for enforcing bad ones to collect the nuisance settlements. In many instances, however, NPEs have little to gain from unreliable patents.

"Trolls" do exist, and they rely on the high cost of defense to secure small, quick settlements. But many NPEs are interested in reliable patents with significant value that will stand up to litigation. Those seeking to win substantial damages awards requiring millions in legal fees typically prefer to start with well-vetted patents. For a patent to achieve success in their world it must do more than "read" on (where its claims match all elements of) an infringed product, it must be valid and remain so through a series of costly tribunals and legal appeals.

NO SHORTAGE OF BAD BEHAVIOR

In contrast, many operating companies, including those with a stellar reputation for innovation, secure and maintain tens of thousands of patents that would be found invalid under scrutiny. Their strategy is one more of quantity than quality. They rarely, if ever, enforce their patents, so if they hold questionable ones, few will ever know. The value of many large patent portfolios lies not in the quality of particular rights or even the inventions they cover, but in their size, and the shadow they cast. These patents are typically used "defensively," that is, for design freedom and not for out-licensing or direct revenue generation.

Truth be told, 90 percent or more of many significant high-tech portfolios are comprised of dubious patents which are used for leverage. In areas like software and business methods the number may be even higher. As most patent holders and IP professionals know, establishing validity is not a simple act of good faith. An issued patent that is enforced is just beginning a long journey.

DOES VALIDITY EQUAL VALUE?

Patent validity is not the same thing as value. In theory, patents that are likely to be found invalid should have no value. But, often, they do. Litigation costs make invalidating and neutralizing even obviously bad patents onerous. As a result, even a hastily issued right can confer financial asset status on its owner because it still enables the right holder to prevent another business from practicing what appears to be a protected invention. The patent holder's right to sue is ultimately part of the patent's relevance and arguably its value.

On the other hand, a perfectly valid patent may be worthless. An excellent, well-prosecuted and objectively valid patent that reads on an invention associated with little or no revenue generation (product sales) may be a legally sound IP right, but is it a valuable one? One hundred percent of nothing is – nothing.

After validity what a patent reads on and who requires it often will play a major role in determining its importance if not its quality. Who owns the patent; the scale of infringement damages; and how difficult it is to prove infringement are factors that are difficult to separate from quality, even if they can be distinguished from validity.

For a patent to be really valuable to a holder it must not only be government-issued but battle-tested, or must provide some defensive leverage, design freedom or financial value. In short, the stars and planets must align. The patent must be held valid; and it must read on a successful product or products sold by one or more financially solvent companies.

Patent holders who enforce their rights today need more than well-prosecuted and examined rights. They need an abundance of patience and capital, and must pray that they can establish a level of certainty. More often they settle disputes not because the patents are questionable, but because it costs too much to prove them valid and infringed, and going to trial is riskier than in the past. If one claim is upended, there goes the case.

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But the quality of all patents matters a great deal. It is central to the DNA of current and future innovation, and to the credibility of inventors and their inventions, patent systems and right holders around the world. It also matters to investors.

Among other things, a lack of patent quality can impede businesses and require them to take expensive licenses or engage in costly lawsuits. Bad patents undermine the integrity of the patent system, and the institutions and professionals that sustain it.

There is a great deal of interest in improving the reliability of patents. The USPTO wants it, as do lawmakers and the courts. Investors and most holders also would not mind it. But what are we really talking about? Is patent quality simply a binary legal definition, where a patent either meets or fails the appropriate tests of patentability? Or does quality really require a more complex analysis, which must incorporate market elements, like risk and demand, and the business goals of a particular holder?

Patent holders must be careful not to confuse the legal and market criteria of patent quality, although it can be difficult to establish one without the other. Greater certainty about the meaning of patent quality would make it easier to determine patent validity and value. Continued uncertainty about the reliability and value of patents benefits some patent holders more than others, and potentially undermines innovation. For many, the best patent is one whose validity cannot be easily established or maintained, and that cannot be proven to read on their products.

More work is needed on the legal and market implications of patent quality, as is a better system for determining patent quality and value earlier and more efficiently for a broader range of technologies. The uncertainty associated with patents costs companies billions and dissuades innovation and investment.

More transparency about who actually owns a particular patent and how it is being used will help. So will recognition that many companies despite having amassed huge patent portfolios frequently do not have all of the IP rights that they need to sell some of their products. They must in-license, acquire or otherwise buy businesses to secure the rights they need. This should not be seen as a weakness. In fact, pro-active IP management is business strength, and arguably a best practice. Securing reliable patents, internally or through transactions serves to nurture an evolving IP eco-system and improve the certainty and value of patents, and the quality of inventions.

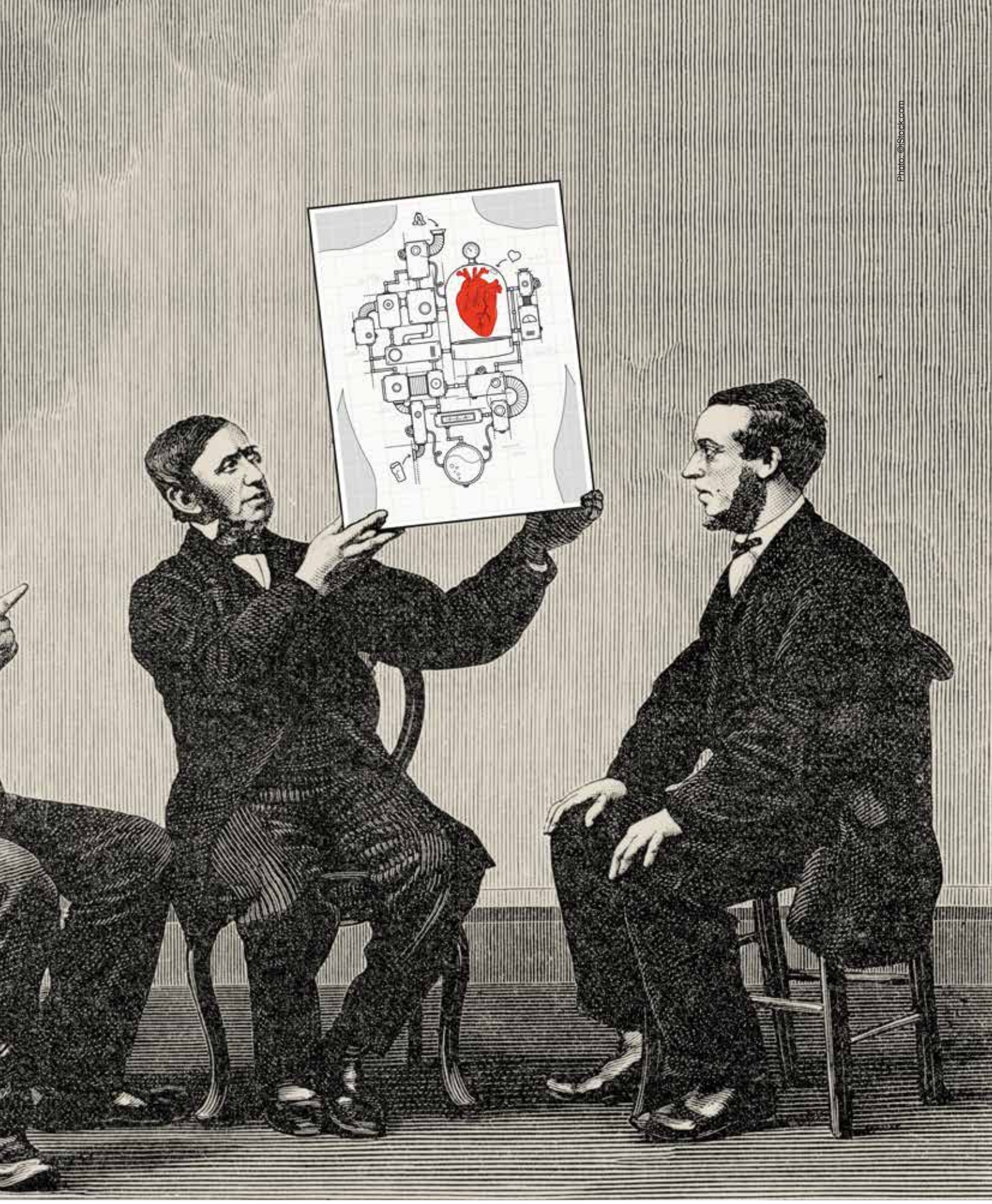

Photo: ©iStock.com

Patents likely to be found invalid should have no value, but the cost of invalidating them can confer financial asset status insofar as those who own them can prevent others from practicing what appears to be a protected patent.

Tanzanian entrepreneur develops innovative water filter

By **Catherine Jewell**,
Communications Division, WIPO

Photo: Dr. Askwar Hilonga

Having obtained his Ph.D., Dr. Hilonga (above) is using his knowledge of nanomaterials to develop the Nanofilter®. His aim: to improve access to safe drinking water and to reduce the number of lives lost to waterborne diseases.

Tanzania is one of the poorest countries in the world, and like many countries in Africa, it faces acute water shortages. Although it borders three of Africa's Great Lakes, many people, especially those living in remote rural areas, lack access to safe drinking water. All too often, both surface water and groundwater sources are contaminated with toxic heavy metals, bacteria, viruses and other pollutants from mining, industrial effluent and poor sewage systems.

But there is hope. A local chemical engineer, Dr. Askwar Hilonga, has developed a low-cost customizable water filtration system that promises to transform the lives of many Africans.

Dr. Hilonga who lectures at the Nelson Mandela African Institution of Science and Technology, recently won the first Africa Prize for Engineering Innovation from the UK's Royal Academy of Engineering. The prize of GBP25,000 (TZS79 million) seeks to encourage talented engineers in sub-Saharan Africa to find solutions to local challenges and develop them into businesses.

Dr. Hilonga explains the significance of his invention and shares his aspirations for the future.

What inspired you to develop your water filter system?

The huge need in my community. I grew up in a very remote village in Tanzania and saw with my own eyes the suffering caused by waterborne diseases. Having obtained my PhD and published widely on nanomaterials, I asked myself what it all meant. At that point, I decided to apply my knowledge of nanomaterials to solve this problem in my community. That is how I come up with my Nanofilter®.

Who is it for?

Anyone can use the filter, but I am targeting rural areas in particular, because of their desperate need. In Tanzania today, out of every ten children who die, nine die from waterborne diseases. This is a huge challenge for the country as a whole, but the greatest need is in rural areas.

How does it work?

Slow sand filters have been used in water purification for over a hundred years. While they are effective in removing bacteria and some microorganisms from water – which is what I use them for – they cannot remove heavy metals, such as copper, fluoride, or other chemical contaminants. My patented filtration system combines a slow sand filter with a combination of nanomaterials made from sodium silicate and silver to eliminate toxic heavy metals. Water first passes through the sand and then through the nanomaterials. Whereas other water filters on the market offer a "one-size-fits–all" solution, the Nanofilter® can be calibrated to target and eliminate contaminants that are specific to a particular geographic region.

Each region has its own challenges when it comes to water. In some areas excessive fluoride in water, which has a devastating effect on teeth and bones, is a problem. In others, for example where mining takes place, the quality of the water is compromised by heavy metals like copper and mercury. The Nanofilter® uses nanomaterials to remove those contaminants that cannot be removed by sand. The water that passes through the Nanofilter® is clean and safe for drinking.

How much does a filter cost?

A filter costs USD130 (around TZS284000). While we do sell them directly to households, there are many who cannot afford to buy them, so we are also working with local entrepreneurs to establish water stations. At present we are renting the filters to around 23 entrepreneurs who filter the water and sell it to their communities at a very affordable price. After 800 liters of water have been filtered, the nanomaterials generally need to replaced, although this varies in accordance with local water quality. For a household, this means the nanomaterials need to be changed every three months or so at a cost of around USD5. It's very cheap. In addition to the filter itself, our company, Gongali Model Company, a university spin-off, which now employs five people, including myself, makes and sells these nanomaterials. But we are not just selling products we are providing a convenient service which includes water quality profiling and water testing.

How long did it take to develop the Nanofilter®?

I began work on the filter in 2010. It has taken me about five years to develop it. Developing and refining the nanomaterials used was the trickiest part. I developed my first prototype just

"If we can solve our problems in Africa, we will create employment opportunities and wealth."

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in time to enter the Africa Prize for Engineering Innovation. In that competition I was one of 12 short-listed entrants who received six months of business training and mentoring. That's where I learned how to develop a business plan to commercialize my innovation. Thanks to the support of the Royal Academy of Engineering, the Nanofilter® is now on the market. In Tanzania alone 70 percent of nine million households do not use any kind of water filtration technology in their homes, but people are very interested in these filters. The whole country is excited about this innovation.

Why is it important to protect your innovation?

During the six-month business training course I learned about the importance of protecting an innovative technology. If you don't protect it, anyone can copy and use your name, come up with a low-quality product, and undermine your business interests. So, as part of my intellectual property (IP) strategy, I decided to register Nanofilter as a trademark. This enables me to protect and maintain the quality of our brand. When I began this venture, my market was Arusha; now there is interest from across sub-Saharan Africa and beyond. Countries like Ethiopia and Uganda share the same challenges with respect to water quality. Fluoride toxicity is a problem all around the Rift Valley. In this context, it is really important to have an effective IP strategy in place.

The Africa Prize winnings will help me to scale up my operation and boost our production capacity, but we will need to bring new investors on board if we are to meet the huge demand for our filters. A number of investors have approached me, but I have to be sure of their motivation. Before I start thinking about making a profit, my first priority is to solve the problem. People need this filter so it needs to be affordable. So ideally, I am looking for investors who share the same goals and who can help to subsidize the price of the filters or reduce distribution costs. That is our goal.

What does winning the Africa Prize mean to you?

It means a lot. First of all it has motivated Africans because they see that someone values our innovation. It means it pays to put your energy into innovation and yes, somebody cares.

What next?

My focus now is to build the Nanofilter® into a sustainable business and to scale-up our operations to reach more and more people. There is a lot of interest in the Nanofilter®, so the challenge now is to build up our customer base and to ensure that our clients are happy with our product and the service we provide. But as I said earlier, my number one goal is to reach as many people as possible and to save lives and limit the number of children who die from waterborne diseases. This is what drives me.

What message do you have for young innovators in Africa?

Don't look for jobs abroad. If we can solve our problems in Africa, we will create employment opportunities and wealth. We will have an impact and we will start building our reputation as a country and a continent that can solve grassroots challenges. Many young Africans dream of going to Europe or America but there is a lot of potential here at home. My experience demonstrates that if you go back home and serve your people, one day your community and the world will appreciate your efforts.

Photo: Dr. Askwar Hilonga

Dr. Hilonga and his company, Gongali Model Company, a university spin-off, also sell filters directly to households.

Photo: Dr. Askwar Hilonga

Dr. Hilonga is working with local entrepreneurs to establish water stations. Filters are currently rented out to 23 entrepreneurs who filter the water and sell it to their communities at an affordable price.

Photo: Dr. Askwar Hilonga

Unlike other water filters, the Nanofilter® can be calibrated to target and eliminate contaminants, such as heavy metals, that are specific to a particular geographic region. Water that passes through the filter is clean and safe to drink.

Haier: Pioneering innovation in the digital world

By **Wang Ye, Teng Donghui, Huang Cheng, Wang Jianguo, Wan Xinming** Research and Development Center, Haier Group Quingdao, People's Republic of China

Many commentators have noted the absence of global Chinese brands. But things are changing. Twice ranked the strongest Chinese corporate brand, by the *Financial Times*, Haier, a world leader in the white goods sector is an impressive calling card for "Made in China".

In just 30 years, the company has gone from being a run-down refrigerator manufacturer facing bankruptcy to a world leading producer of consumer electronics and home appliances and a global brand that is recognized for the reliability of its cutting-edge technologies. "Haier has rewritten the story," says *Newsweek*.

Under the transformative leadership of its CEO and Group Board Chairman, Zhang Ruimin, the company has achieved spectacular results. In 2014, revenues increased by 11 percent to RMB 200.7 billion; profits were up 39 percent to RMB 15 billion and on-line trading volume rose to RMB 54.8 billion representing a remarkable 2,391 percent increase. Haier has become a driving force of indigenous innovation in China.

Haier's pioneering approach to innovation is a key factor in the company's transformation.

NEW THINKING

As the digital revolution gained traction in the late 1990s, Mr. Zhang realized that if Haier was to thrive, it would need to break free from traditional corporate structures, strengthen its entrepreneurial culture, embrace models of open innovation and become a service-oriented company.

"There are no successful enterprises, only enterprises that adapt to the pace of time." These words, often expressed by Mr. Zhang, are a guidepost for innovation and entrepreneurship at Haier. The company's one constant is the drive to innovate and to adapt our business and products to the needs of customers in an increasingly connected world.

HAIER'S APPROACH TO OPEN INNOVATION

Open innovation is central to Haier's business strategy. In a rapidly evolving and highly competitive global market place, it is simply not practical to rely exclusively on internal resources for innovation. Recognizing the potential for employees to create value, the company has been working over the past decade to build and strengthen a culture of entrepreneurship and innovation.

Employees are actively encouraged to become inventors or "makers" and entrepreneurs are guided to create new businesses, not by their bosses, but by the ever-evolving demands of customers. The company has developed open innovation platforms, such as Qingdao Haier and Haier Electronics, where employees can bring new ideas and resources for new products, services or logistical solutions. The aim is to create "a free market in talent, so the cream rises," according to Mr. Zhang.

Traditional business units have given way to self-managed micro-enterprises known as *zi zhu jing ying ti*. Their sustainability depends on their innovative performance, their ability to generate profits and to attract external partners and funding (thereby expanding Haier's ecosystem of resources). In sum, the company has become a giant business incubator. By introducing market mechanisms into its research and development (R&D) processes, Haier is able to generate a flow of disruptive new technologies and convert them into commercial products.

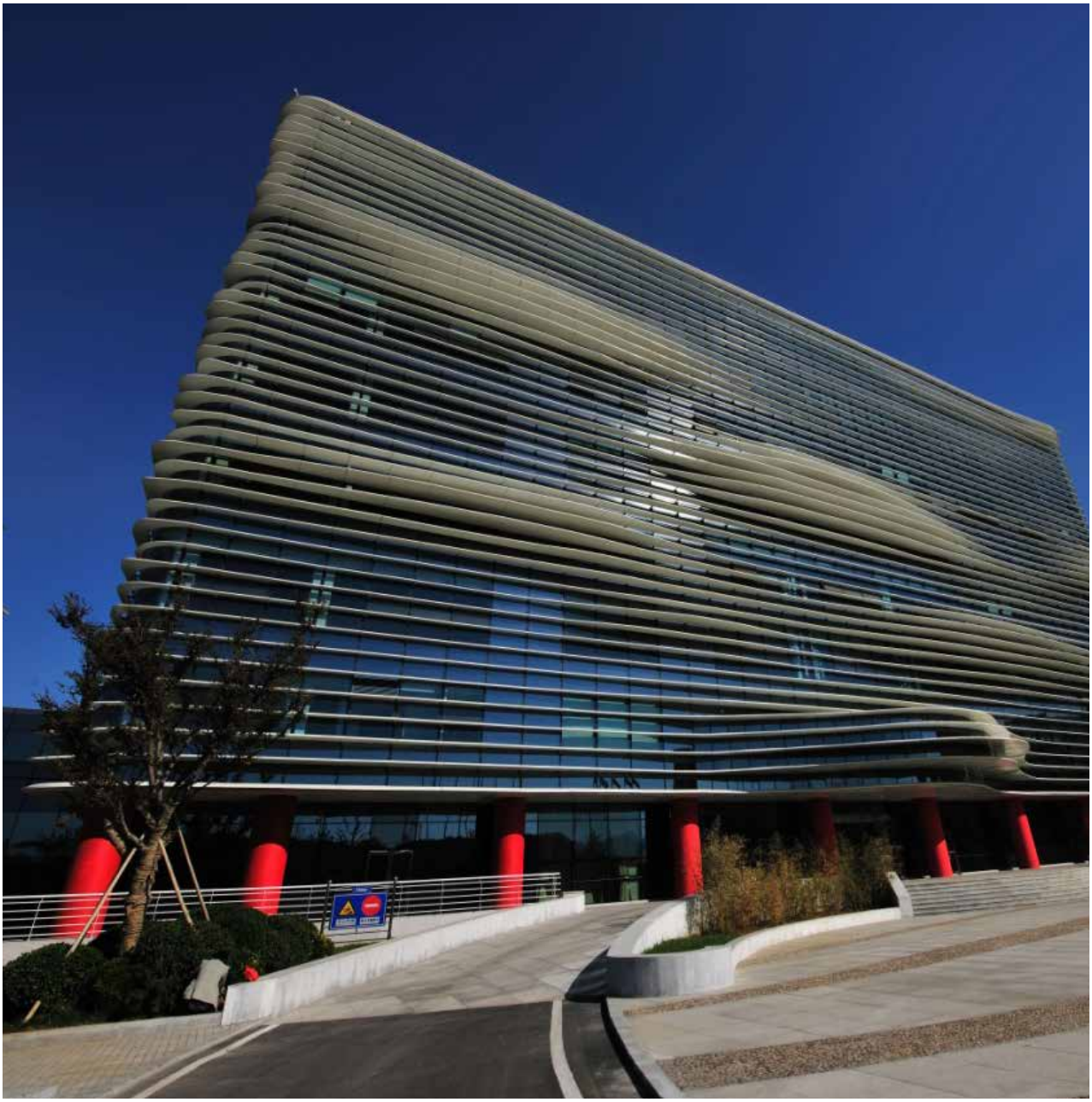

Photo: Haier

Haier's headquarters, Qingdao, People's Republic of China.
The company's pioneering approach to innovation has enabled it to become a driving force of indigenous innovation in China.

THE HAIER OPEN PARTNERSHIP ECOSYSTEM (HOPE) PLATFORM

In parallel, the company has built and developed the Haier Open Partnership Ecosystem (HOPE) platform (hope.haier.com), an online portal to boost technology exchange and innovation. Developed by the Haier Open Innovation Center in Qingdao, the platform brings together an expanding global network of technical partners and resources. By 2014, it had nearly 200,000 registered users. The platform, which is also used by third parties, enables the company to overcome development bottlenecks, find technological solutions rapidly and efficiently, and to get cutting-edge products to the market more quickly.

The platform generates solutions by linking users (or customers), suppliers and research resources. In so doing, it shortens product development cycles and market lead times thereby maximizing the interests of all stakeholders.

Close engagement with customers offers a rich pool of inspiration for design. Every day over a million users engage with the company about its products. On that basis, using big data technologies, around 1,200 ideas are generated every year. Engagement with suppliers allows for the development of customizable modular solutions and logistical improvements and liaison with a global network of research resources enables the rapid conversion of cutting-edge technologies into products. It has given rise to groundbreaking technologies such as the Air Cube (for air conditioning and purification) and a raft of other breakthrough products.

THE AIR CUBE

Haier's Air Cube, released in Beijing in 2014, is the world's first intelligent air quality control device. It has four modules, for humidification, dehumidification, air purification and aromatherapy. These modules can be assembled into eight different combinations, offering customers unprecedented opportunities to control air quality in the home with a single device.

The Air Cube is protected by 40 design patents and 22 invention patents and was the result of a collaboration involving a team of 128 internal and external experts and researchers from eight countries through the HOPE platform. After consulting with more than 9.8 million users from across the globe over a six-month period, the team eliminated 122 product sore points and developed a solution that met consumer needs.

CUSTOMER INPUTS INSPIRE NEW PRODUCTS

Mining customer information using big data technologies has also brought rapid breakthroughs in refrigeration technology. In October 2014, Haier launched an advanced food preservation technology, for which patent protection is being sought, that maintains the freshness of fruits and vegetables.

A comment on a microblog complaining that commercially available refrigerators failed to maintain the freshness of fruit and vegetables landed on the desk of Haier's Refrigerator R&D department in June 2013. Recognizing that solving the problem would be both technically feasible and commercially valuable, the department posted a request for a technology to "keep spinach fresh for seven days" on the HOPE platform. Five providers were identified and after evaluation three were selected and linked-up with the R&D department. By November 2013 two of these had entered into a cooperation agreement with the department, a research institute (to develop high-humidity preservation technology) and a company (to supply high-humidity modules). Less than a year later, in October 2014, the new technology was unveiled.

PROTECTING KEY INTELLECTUAL PROPERTY ASSETS

For Haier, intellectual property (IP) rights are critical in safeguarding the company's assets, maintaining its innovative dynamism and its competitive advantage. As a brand with global recognition, the company faces an increasing number of IP disputes in foreign markets.

IP rights play a particularly important role in the context of the company's approach to open innovation, faciltating its smooth running and ensuring access to first-class innovative resources. The company is committed to deepening its relations with its bilateral partners in the area of IP.

Haier's IP team includes 40 experts, of whom 12 are qualified Chinese patent agents. Each team member is responsible for developing an effective IP strategy and managing the IP for a range of products. The company

also calls a number of external global IP management experts for guidance on IP strategies, process system planning and operating practices.

IP risk management is built into every aspect of the enterprise's operations. In addition to overseeing these systems, the IP team is responsible for developing IP management systems to fully leverage the company's IP assets and IP risk management and control systems to guard against infringement and litigation.

In a highly competitive environment where technology is evolving all the time, companies need to identify and invest in niche IP assets. Company decision-makers need to have a strong grasp of the value and role of IP. They also need to put IP departments on an equal footing with those responsible for production, marketing and finance. Clearly identified strategic IP goals are essential as is the full integration of IP strategies at every stage of the production cycle. The key to successful IP asset management is the implementation of a comprehensive and integrated IP management system that effectively promotes business growth through innovation. Such a management system also needs to encompass external industry chains and business partners.

AN EXPANDING PATENT PORTFOLIO

At the forefront of indigenous innovation in China, Haier sets great store on developing its own technologies and on building and strengthening its portfolio of patents. Up to December 2014, the cumulative number of patent applications filed by the company exceeded 16,000. It has a portfolio of over 9,000 granted patents of which 480 were filed through WIPO's Patent Cooperation Treaty (PCT). The recent acquisition of top global brands Sanyo Home Appliances (Japan) and Fisher & Paykel Appliances Holdings (New Zealand), added a further 4,000 plus core home appliance assets spanning multiple countries to the company's IP portfolio.

BUILDING BRAND RECOGNITION

From the outset, Mr. Zhang recognized the importance of branding to Haier's fortunes. Since 1984, trademark planning and registration has underpinned Haier's enterprise development strategy. There is no business without brands, and without a trademark it is impossible to create a well-known brand.

"There is no business without brands, and without a trademark it is impossible to create a well-known brand."

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The company registered its first graphic marks Qingdao –Liebherr and Haier Brothers in the mid-1980s. Its corporate name, formerly the Qingdao General Refrigerator Factory, was shortened to "Haier Group Company" in May 1993 and the English word "Haier" was used as its main textual identifier. Both the Chinese trademark "海尔" and Haier Brothers gained popularity. The company also began registering product trademarks, including "Prince", "Child Prodigy", "Walrus" and "Conch".

By the early 1990s, recognition of the Haier brand was firmly established in China. In 1991 and again in 1995, the company received the China Trademark Office's National Quality Golden Award.

With an eye on international markets and in a move to strengthen and diversify its trademark strategy, Haier began filing trademark registrations for Haier Brothers and Haier, as well as Haier in combination with other corporate identifiers in both Chinese and English in all classes of goods throughout the 1990s (see box). By 1993, it had registered 145 trademarks both in English and Chinese in all the classes in China. Adopting a multi-tier approach to protecting its marks, the company also defensively registered a number of similar trademarks.

Haier's ambitions to operate in international markets prompted it to preemptively file nearly 600 overseas applications to protect its core trademarks. More than a dozen of these applications were filed through the WIPO-administered Madrid System for the International Registration of Marks. Haier's aims were to minimize the risk of trademark disputes and to safeguard against bad-faith registration of its marks. The company's trademark strategy continues to evolve and its trademark portfolio to expand in line with its pioneering innovation strategy.

Haier has more than 4,800 registered trademarks in over 190 countries and regions, with domestic registration of them in all 45 classes. It holds 1,200 valid domestic trademarks and over 2,200 registered trademarks abroad. In addition to the registration of its product brands, the company has also sought global trademark protection for other corporate identifiers used in publicity campaigns, such as Eco-life and Inspire-Living.

The Haier Group continues to break new ground in its ambitions to take advantage of the opportunities of the Internet age. Its pioneering approach to innovation characterized by its commitment to building investment-driven entrepreneurial platforms fueled by user demand and a parallel global open innovation ecosystem, is achieving spectacular results. Its commitment to entrepreneurship and open innovation has transformed it into an ultra-modern, innovation-intensive multinational that that is shaping the global white goods landscape. Its experience offers many interesting insights for others seeking to adapt to the reality of business in the digital world. As Haier continues to fine-tune its approach, IP will undoubtedly continue to play a key role in the company's fortunes.

The Haier Open Partnership Ecosystem (HOPE) Platform allows the company to find technological solutions rapidly and efficiently and to get cutting-edge products to the market more quickly.

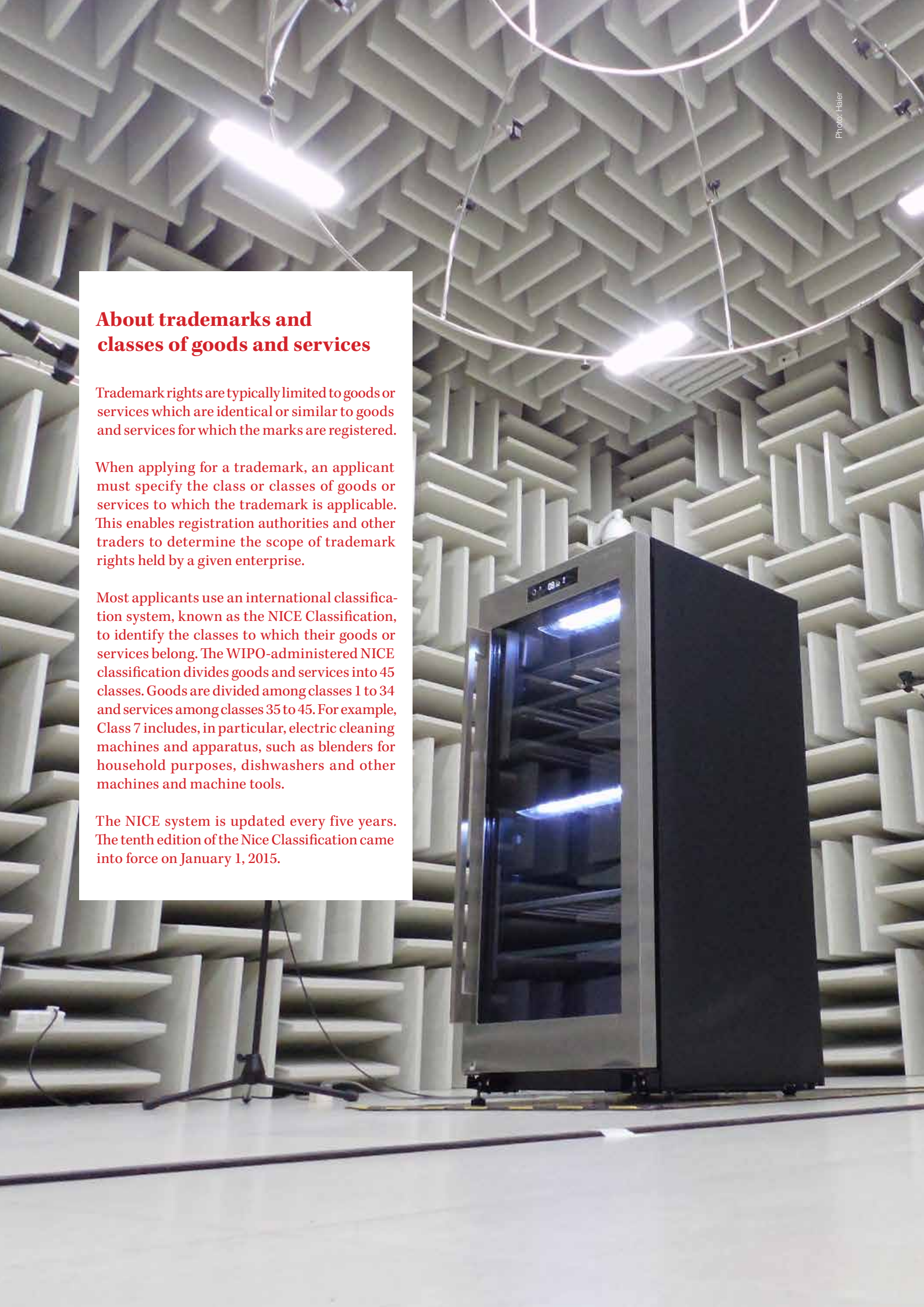

Photo: Haier

About trademarks and classes of goods and services

Trademark rights are typically limited to goods or services which are identical or similar to goods and services for which the marks are registered.

When applying for a trademark, an applicant must specify the class or classes of goods or services to which the trademark is applicable. This enables registration authorities and other traders to determine the scope of trademark rights held by a given enterprise.

Most applicants use an international classification system, known as the NICE Classification, to identify the classes to which their goods or services belong. The WIPO-administered NICE classification divides goods and services into 45 classes. Goods are divided among classes 1 to 34 and services among classes 35 to 45. For example, Class 7 includes, in particular, electric cleaning machines and apparatus, such as blenders for household purposes, dishwashers and other machines and machine tools.

The NICE system is updated every five years. The tenth edition of the Nice Classification came into force on January 1, 2015.

Nation branding: telling New Zealand's story

By **Rebecca Smith**,
Director, New Zealand Story

Photo: New Zealand Story

Amid increasingly fierce global competition for investment, tourism and export markets, the idea of nation branding continues to attract strong interest. "A national brand is national identity made tangible, robust, communicable and useful," says branding expert Simon Anholt. Used effectively, it can help a country gain competitive advantage.

So how can that be done? New Zealand's nation branding experience offers an interesting illustration of what can be achieved with minimal resources to broaden perceptions about a country's values and capabilities and strengthen its brand value.

New Zealand has a strong reputation internationally for its green open spaces and natural, unspoiled landscapes. International nation brand indexes such as Anholt-GfK and FutureBrand, which rank countries according to their image and reputation among foreign consumers and investors, recognize this.

It is a direct result of the hugely successful *100% Pure New Zealand* campaign, which has contributed significantly to the country's multi-million-dollar tourism industry. Launched in 1999, the campaign tells the story of New Zealand's unique combination of landscapes, people and activities and how it offers visitors a "100% Pure New Zealand" experience.

That story has by default become the country's brand. While this was a role it was never intended to fill, it provides a compelling means by which to change perceptions about what New Zealand has to offer.

In the absence of a broader national story, awareness of the value we can add as a country beyond our natural resources is limited. We tend to be seen as a beautiful and friendly country that is particularly good at farming, but not too innovative. This is not the incredibly resourceful and innovative New Zealand that many of us know. And while New Zealand is a world leader in a number of other areas, including ease of doing business and lack of corruption, unfortunately that part of our story is often untold.

As a nation, our economic wellbeing depends heavily on our ability to export. As such, we have to be sure that we stand out among our competitors in international markets. We need to showcase our

strengths and build awareness and confidence in New Zealand as a trusted trading partner and a good place to do business as well as an attractive tourist destination. We need to broaden perceptions of what New Zealand has to offer, expand our export base and help New Zealand businesses move higher up the value chain. We need to start telling a broader, more accurate and consistent story about our country and the value that our businesses can add on the global stage.

This is what New Zealand Story (*www.nzstory.govt.nz*) aims to do.

TELLING THE WHOLE STORY

Launched in November 2013 by Prime Minister John Key, New Zealand Story offers businesses across the economy a framework to tell the rest of the world a consistent story about what they are doing and what New Zealand stands for.

With a very limited budget – just NZD3.3 million (approximately USD2.2 million) – we had to think out of the box. We came up with a formula with which businesses in all sectors can identify; a framework that enables each of them to tell their own individual story. Stories bring together ideas in a way that makes them both memorable and shareable. We believe that this is the best way to yield authentic, long-term results.

New Zealand Story is underpinned by three core values which encapsulate the essence of our attitude and our way of doing things: "Kaitiaki", integrity and resourcefulness.

Kaitiaki is a Maori concept that means minder, custodian or guardian, and in the context of New Zealand Story, it refers to the enormous sense of responsibility New Zealanders have toward its people and protecting the country's natural resources, not just today but for future generations.

Integrity speaks to the value New Zealanders place on honesty, trust, humility and reciprocal respect and to our reputation for being open, safe, accessible, down-to-earth and good to work with. These characteristics are all hallmarks of the Maori concept "Mana" – something that is earned, protected and respected.

Resourcefulness speaks to our fresh, creative thinking and independent thought, something that makes us innovative and often ingenious. As a nation we have a rich history of world-class innovation borne of the resourcefulness of our people and our drive to continually improve. New Zealand Story is told in three chapters – Open Spaces, Open Hearts and Open Minds – each providing a context for businesses and industry groups to craft stories that communicate their dynamism and value.

Open Spaces speaks to our beautiful natural landscape and unspoiled environment.

Open Hearts speaks to the value of the people behind New Zealand companies and our unique way of doing business.

Open Minds speaks to the resourcefulness and innovative capacity inherent in many New Zealand businesses, and represents an opportunity for companies to demonstrate and leverage value that offshore clients do not necessarily expect from our businesses.

New Zealand Story is an opportunity for businesses to think about how to position themselves and how to communicate the unique value of their "New Zealandness" to gain a competitive advantage in international markets.

The promotional materials (videos, photos, infographics, presentations, etc.) that make up the New Zealand Story toolkit are being used extensively around the world in global trade promotions, events and diplomatic engagements.

One of the key lessons we learned in rolling out the New Zealand Story program was the importance of testing our narrative and country value proposition with our target audience early. Initially, we had a very "forward-leaning" version of the Story which emphasized the sort of innovative future that we see for New Zealand. However, we found that our global audiences were not ready for that, so we toned it back to a very realistic "who we are today" perspective. We realized that we had to take our audiences on a journey over time to build credibility in the areas for which we are less well known.

PROTECTING AN ICONIC MARK

New Zealand Story uses the iconic FernMark as a symbol to sum up New Zealand values and beliefs. Its origins can be traced to the use of the native fern in traditional Maori cultures as a trail marker to guide people to safety through the dense native forest of Aotearoa (New Zealand's Maori name). The fern's silvery underside provided a perfect marker under the moonlit sky.

The FernMark gives New Zealand businesses a strong and consistent visual identity and is an extremely valuable device for them to differentiate themselves in the global marketplace.

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The FernMark is widely used to represent New Zealand in sports, politics and business and represents significant brand value. Although a source of great national pride, the FernMark bears no connection with New Zealand's national flag or other State emblems. As such, it does not qualify for protection under Article 6*ter* of the Paris Convention on the Protection of Industrial Property (see box). Therefore a comprehensive trademark strategy has been put in place to protect it from misuse and misrepresentation across the globe. A licensing program has been developed to determine who may use the FernMark in relation to exported goods and services, along with a set of measures to ensure that its bearers put New Zealand in the best possible light.

Trademark protection is vital to maintain the integrity of the Silver Fern, but herein lies the rub. As a trademark, irrespective of the fact that it serves as a symbol of our nation, like other commercial trademarks it runs the risk of being revoked or invalidated for non-use. According to New Zealand trademark law, a mark can be revoked if "at no time during a continuous period of 3 years or more [it has not been] put to genuine use in the course of trade in New Zealand … in relation to the goods or services in respect of which is it registered".

Given the growing interest in nation branding around the world and importance of national symbols, such as the Silver Fern, within nation branding strategies, the time would seem to be ripe to explore a way to safeguard these symbols within national trademark systems.

Photo: Chris Williams

Photo: Chris Williams

The New Zealand Story is a compelling means to showcase all that New Zealand has to offer, including, for example, its world-class research and testing facilities where ideas are realized to their full potential.

NEW ZEALAND

New Zealand Story uses the iconic FernMark as a powerful unifying symbol that sums up shared New Zealand values and beliefs. Widely used to represent New Zealand in sports, politics and business, it represents significant brand value.

Photo: Rob Suisted

Article 6*ter* of the Paris Convention

The purpose of Article 6*ter* is to prohibit the unauthorized registration and use of trademarks which are identical or similar to armorial bearings, flags and official signs and hallmarks indicating control and warranty adopted by States party to the Paris Convention.

Such registration or use would violate the right of the State to control the use of the symbols of its sovereignty and could mislead the public with respect to the origin of goods to which the marks are applied.

Any such emblems, official signs and hallmarks are communicated to the parties of the Paris Convention, of which there are 176, by WIPO.

For further information see:
www.wipo.int/article6ter/en

New Zealand has strong reputation internationally for its green open spaces and natural unspoiled landscapes, but that is only part of its story, it is also a very resourceful and innovative country

Generating value from the public domain

By **Kristofer Erickson,** Lord Kelvin Adam Smith Research Fellow, CREATe, School of Law, University of Glasgow, UK

The public domain consists of a vast reservoir of creative works and ideas that are available for uptake and consumption by all. It includes works for which the copyright term has expired as well as stories and myths pre-dating modern copyright law. It also includes materials freely placed in the public domain by their creators, such as via certain types of Creative Commons licenses. But what role does it play in fostering new innovation and creativity?

A study entitled *Copyright and the Value of the Public Domain* recently published by the UK Intellectual Property Office and cofunded by the Economic and Social Research Council (ESRC) highlights the huge value of the public domain for both consumers and innovators

Puzzlingly, there has been little scrutiny of the role of the public domain in fostering innovation. This new research is one of the first empirical attempts to map the process of value creation from public domain inputs for the creative industries, although much work remains to be done.

My co-authors (Paul Heald, Fabian Homberg, Martin Kretschmer and Dinusha Mendis) and I argue that rather than focusing only on the economic benefits generated by the traditionally understood "copyright industries", we ought to consider the innovative potential and value generated by inputs which originate not only from copyright-protected material, but from material residing in the public domain. Doing so reveals a rich and dynamic interchange between privately held intellectual property (IP) rights and the public culture within which creative goods are produced.

MAPPING THE VALUE OF THE PUBLIC DOMAIN

To generate empirical evidence about the size and value of the public domain, we turned to the online encyclopedia resource Wikipedia. With lead author Professor Paul Heald of the University of Illinois, USA, we examined the biographical pages of some 1,700 musical composers and literary authors from the 19th and 20th centuries. We were interested to know whether the availability of public-domain images of historical figures meant that pages about them were more likely to feature photographs of them.

We found that, counterintuitively, the earlier an author or musician was born, the more likely their page was to be accompanied by an image. Although camera technology became widespread during the twentieth

century, authors and musicians born in the last 80 years are far less likely to be accompanied by a photograph. This is due to the effect of the public domain – pictures taken of famous people from the twentieth century are likely to be still in copyright and most cannot be used on a website like Wikipedia without permission.

This is more than a mere annoyance to Wikipedia editors and visitors. The missing images represent a loss of value to society. To illustrate this, we calculated the advertising revenue that a commercial website would expect to earn from individual pages where the presence of an image attracted a higher number of visitors. Increased traffic to websites with images is expected for two reasons. Firstly, illustrated materials increase the overall utility of the page to visitors, prompting them to link to the resource and share it with their social networks. Secondly, it is widely accepted in web development practice that search engines such as Google reward pages that contain more information and media such as photographs. Indeed, Google image search enables visitors to find web pages precisely on the basis of the images they contain.

We found that the presence of images in our sample of authors and musicians did, in fact, increase the number of visitors to Wikipedia entries. By using a technique to match creators of similar status and popularity, we found that those with an image on their Wikipedia page benefitted from an increase of between 17 and 19 percent in traffic compared to those with no image, depending on whether they were an author, a lyricist or a composer.

This increase in traffic not only represents added utility for society gained from access to information, but also gives a sense of the economic contribution of public domain images elsewhere on the Internet. Based on the commercial estimate that a single visitor to a website is expected to generate USD0.0053 in advertising revenue, and estimating the density of pages across the entire English-language Wikipedia, we calculated that public domain imagery represents a total commercial value of USD33,896,638 per year.

Wikipedia was a useful field site to investigate questions about the public domain because it is a major user of public domain materials – the Wikimedia Commons hosts millions of Creative Commons and other public domain works. But Wikipedia is also a source of inputs into the public domain.

Insofar as editors' contributions are offered on a free and open basis, and supplementary materials, such as images, are determined to be freely available in the public domain, downstream users are free to make further commercial and non-commercial use of Wikipedia content. Although our research does not consider the downstream value of derivative use of Wikipedia pages enabled by their public domain status, we believe this represents an additional and far-reaching source of value for creators and innovators.

GENERATING AND CAPTURING VALUE FROM THE PUBLIC DOMAIN

To address the question of how such public domain inputs are used to generate value by commercial users, we interviewed 24 creative firms in the UK that have previously used public domain materials in a commercial product. These included companies like Inkle, developers of a mobile app based on the work of Jules Verne, and Onilo, a technology company that offers animated children's story books to schools, some of which are adapted from the public domain. Interviewees were asked about their decision to invest in public domain-inspired products and the strategies they employed to maintain competitive advantage when using non-excludable creative inputs (i.e. those not covered by IP rights).

When analyzing the results of our survey, we drew on management theory about creative firms which suggests that companies face a "make or buy" decision when deciding whether to embark on work-for-hire or whether to develop their own original content. Firms that undertake work-for-hire for third party copyright owners report lower levels of creative satisfaction and greater uncertainty in the market because they are unable to retain a sustainable long-term stake in the content they produce. Designing original content may be more satisfying, but can be risky. It may take years of trial and error before generating a hit product. The public domain offers firms a third option; that of adapting or building upon a well-known work with a pre-existing audience, while also gaining the ability to commercially exploit the resultant IP in a variety of ways unencumbered by third-party rights holders.

Uptake and use of material from the public domain is similar to the phenomenon of user-led innovation, in which end consumers adapt and modify products, later sharing them with each other and with producing

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firms. In as much as enterprises are able to successfully capture value from the user innovation process, these activities are similar to using inspiration and material from the public domain to create new products. Limited empirical evidence from the software industry suggests that some companies that normally enjoy exclusive copyright in their products are beginning to promote user innovation as part of their business strategy, finding benefits in the practice (Haefliger et al., 2010 – *www.sciencedirect.com/science/article/pii/S0048733310001563*). Such benefits might include community reputation as well as added utility from new users of a product due to network effects.

The presence of private benefits combined with the low cost of widely disseminating details of an innovation has led to a reassessment of the "free riding" problem in user communities. If the cost of freely revealing is lower than the expected private benefit of doing so, researchers Eric von Hippel and Georg von Krogh (see: *http://pubsonline.informs.org/doi/abs/10.1287/orsc.14.2.209.14992*) suggest that participants are likely to engage in a "private-collective" model of innovation.

Firms in our study exploited public domain inputs for many of the same reasons that user-innovators engage in private-collective innovation. In particular, they often bundled their public domain products with other complementary goods in order to appropriate the value associated with their own innovation practice. Managers also reported lower costs associated with using public domain materials as an incentive. Incorporating free and open-source inputs early in a new product helped some developers to "fulfill the credible promise" of a prototype, stimulating further contributions and investment. Some respondents actively engaged with communities of users, for example, fans of Sherlock Holmes or H.P. Lovecraft, to develop new adaptations of those public domain works. The openness of such works to collective remixing led to more innovative and more radically collaborative products.

Not all respondents reported positive experiences in working with public domain materials. Several firms reported significant costs in locating and incorporating appropriate sources of public domain materials. Some of these search costs relate to technical issues such as metadata and availability of digital reproductions. Other costs involved the time and effort needed to ascertain the legal status of a work. Beyond specific initiatives such as Wikimedia Commons and the British Library's Mechanical Curator project, there are no central national databases of works available in the public domain. This means that managers with pre-existing knowledge of IP and rights clearance are better placed to locate and exploit such materials.

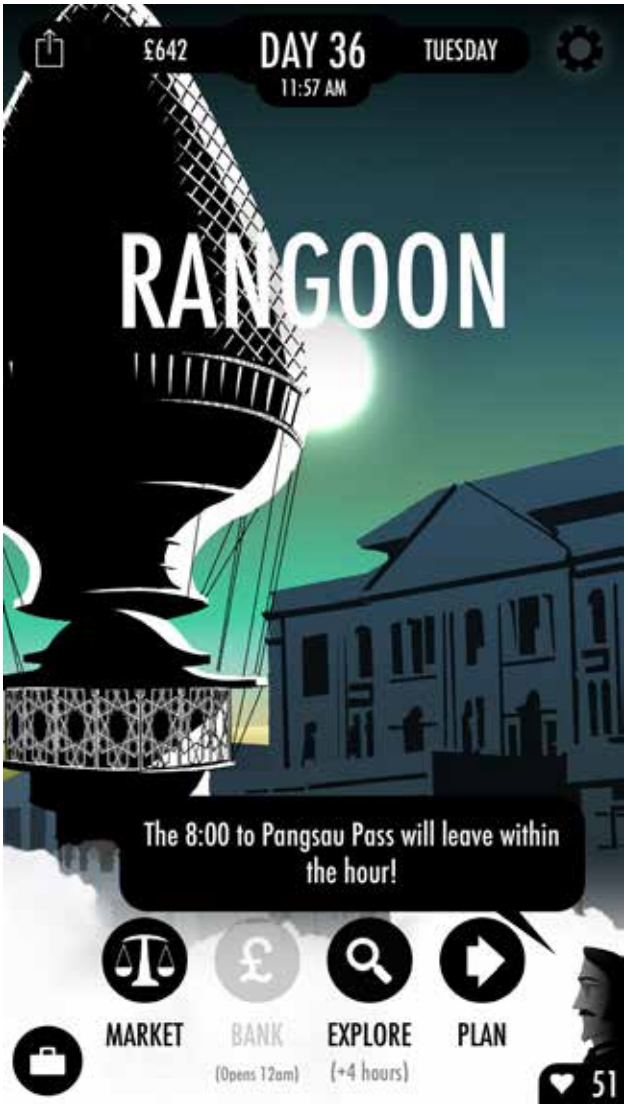
BROADER RELEVANCE AND POLICY IMPLICATIONS

Some of the dynamics we observed among businesses working in the public domain are likely to be felt across other sectors where digitization is leading to a reduction of excludability. Traditionally, the value of an innovation could be packaged in a physical product, allowing firms selling the good to capture profits, even when the underlying innovation was not excludable, such as in the case of a broad scientific discovery.

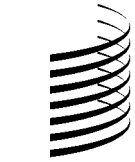
Digitization has impacted some product-based business models because innovations freed from physical goods, such as software code, can circulate rapidly and freely. The disintegration of traditional value chains has also enabled new business models to emerge which challenge incumbents. Access to lower-cost distribution and marketing channels lowers the barriers to entry for newer firms and enables them to reach new consumers.

Overall, digitization has focused attention on new business models such as those identified in our study, and has amplified the effect of the free and open circulation of information (both about business models and product offerings), changing the dynamics of competition in many markets. In this context, IP becomes an increasingly important consideration for managers and researchers as firms seek ways to generate and capture value from their innovations.

The policy implications arising from our research point to the need to improve access to high-quality digital public domain materials for commercial and non-commercial users alike. Clarifying the legal status of works, such as legislative attempts to facilitate the digitization and circulation of orphan works (material where the original rights holder is unknown or cannot be located) is a welcome development. The demand for access to public domain works is high, and the innovative potential is vast.



Inkle, one of 24 creative firms that took part in recent research on the value of the public domain, uses public domain materials to create a mobile app based on the work of Jules Verne (*www.inkle.co/*).



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