

CHAPTER 1

INTELLECTUAL PROPERTY: BASIC PREMISES AND HISTORICAL CONTEXT

“Imagination is more important than knowledge”
Albert Einstein, Scientist (1879-1955)

Albert Einstein's preference for imagination over knowledge is a starting point for this book because intellectual property is based on the power of imagination. Although not belittling knowledge, Einstein understood that it is the ability to stand on an existing foundation of accepted knowledge, and yet see beyond to the next frontier of discovery that is the source of personal, cultural and economic advancement. Had Einstein been content to simply learn the rules of physics as they were passed down to him as knowledge, he might have been a more successful student, but he might never have developed the theory of relativity, which became the foundation for modern physics as it exists and continues to evolve today.

The history of the human race is a history of the application of imagination, or innovation and creativity, to an existing base of knowledge in order to solve problems. From early writing in Mesopotamia, the Chinese abacus, the Syrian astrolabe, the ancient observatories of India, the Gutenberg printing press, the internal combustion engine, penicillin, plant medicines and cures in Southern Africa, the transistor, semiconductor nanotechnology, recombinant DNA drugs, and countless other discoveries and innovations, it has been the imagination of the world's creators that has enabled humanity to advance to today's levels of technological progress.

Imagination feeds progress in the arts as well as science. Music, painting, sculpture, architecture, novels and other works of art, are created by individuals who are not content with the old, and instead see and express ideas and emotions in new ways.

Intellectual property (IP) is the term that describes the ideas, inventions, technologies, artworks, music and literature, that are intangible when first created, but become valuable in tangible form as products. The end of this Chapter provides short definitions and an explanation of the classic forms of IP – patents, copyright, trademarks, and other evolving forms. However, for purposes of this introduction, suffice it to say that IP is the commercial application of imaginative thought to

solving a technical or artistic challenge. It is not the product itself, but the special idea behind it, the way the idea is expressed, and the distinctive way it is named and described.

The word “property” is used to describe this value, because the term applies only to inventions, works and names for which a person or group of persons claims ownership. Ownership is important because experience has shown that potential economic gain provides a powerful incentive to innovate.

It is also important to note that IP results from innovation based on existing knowledge. It is the result of creative improvements on what has worked well in the past, or of creative new expressions of old ideas and concepts.

The term “intellectual property” has recently become topical and, at times, controversial. It is easy to find articles describing recent events related to IP. Some critics attack it as a negative force or as irrelevant to developing countries; some others in developing countries maintain that it stymies creativity. These beliefs have become popular myths and have acquired a cultural momentum. This book addresses why these myths are false and why IP is particularly important today to both developing and developed nations.

We must acknowledge at the outset that, for most people, IP is either an unknown, misunderstood, or mysterious term. Technology and creative arts pervade modern society, yet few actually realize that their daily lives are surrounded by IP creations¹ from which legal rights of all sorts, including their own, arise. Building public awareness of the role of IP is key to fostering a broad understanding of, and respect for, it and the system that promotes and protects it. To truly convince the public, including civil society activist groups, it is essential to engage them in such a way that they all see themselves as stakeholders in a healthy and robust IP system. To do so, they must be included in an ongoing dialogue and feel empowered by the system.

The World Intellectual Property Organization (WIPO) has proclaimed the universal value of IP,² and has shown that IP is native to all peoples,

relevant in all times and cultures, and that it has marked the world's evolution and historically contributed to the progress of societies. Intellectual property is the heritage of us all.

The great African-American chemist and inventor, George Washington Carver, is famous for teaching that invention is available to all peoples, regardless of their economic condition, race, or nationality. Carver invented, and obtained patents³ on crop-rotation methods for conserving nutrients in soil and discovered hundreds of new uses for crops such as the peanut, which created new markets for farmers in the United States of America. His relevance today is greater than ever, as we grapple with the increasing technological divide between rich and poor countries.

"It is not the style of clothes one wears, neither the kind of automobile one drives, nor the amount of money one has in the bank, that counts. These mean nothing. It is simply service that measures success."⁴

His message was that the power of imagination applied to solving practical problems, is not the exclusive province of any nation or people, but is an empowering force that can advance individuals and nations. Intellectual property is relevant to agriculture as well as to analog signals, to medicinal roots as well as to microbiology, to folk music as well as to file transfer protocols.

This book is about the economically empowering force of IP. It is an exploration of the concepts behind the different forms of IP, and how they operate in real life, rather than a technical legal treatise. It is practical in approach, and the successes of IP empowerment are illustrated throughout the book in boxed articles showing real life stories of businesses throughout the world and how they have used IP. For readers who are not familiar with intellectual property, some history is useful to put it in perspective.

THE HISTORY OF INVENTIONS AND INTELLECTUAL PROPERTY

Few will disagree that today's science, technology, and creative arts shape our day-to-day lives. Early technological breakthroughs catapulted the human race out of feudal systems of society (see Table - 1.1). In the last 100 years or so, technological leadership has become a determining factor in wealth creation and has fueled the growth of nations.⁵

TABLE-1.1 MAJOR INVENTIONS THAT HAVE CHANGED THE COURSE OF HUMANITY

Name	Country	Invention	Description
Johannes Gutenberg	Germany	Printing press	Around 1440, Gutenberg developed the first movable type. Metal pieces made separately for each letter could be used over and over to print copies of various books.
Conrad Gesner	Switzerland	Pencil	Around 1560, Gesner came up with the idea of enclosing a piece of graphite (from the Greek word graphein, meaning to write) with wood as a writing tool.
Maharaja Jai Singh	India	Astronomical Instruments	In 1728, Jai Singh, a scholar (he read the works of Ptolemy, Euclid and Persian astronomers as well as Arab mathematicians), built five astronomical observatories in Delhi, Jaipur, Varanasi, Ujjain and Mathura. The instruments at these observatories, which are still functional, measure precisely time and the position of the sun and stars.
Samuel Morse	United States of America	Telegraph & Morse Code	Morse developed the telegraph as well as an electronic alphabet. In 1840, he submitted a patent application for his invention.
Alfred Nobel	Sweden	Dynamite	In 1863, Nobel developed his first important invention, dynamite, which enabled the detonation of nitroglycerin using a strong shock.

Name	Country	Invention	Description
Alexander G. Bell	United Kingdom	Telephone	In 1876, Bell received a patent for his "method and apparatus which transmits vocal or other sounds telegraphically by causing electrical undulations." Bell's inventiveness was rewarded with 18 patents granted in his name and another 12, which he shared with his collaborators.
Guglielmo Marconi	Italy	Radio	The invention consisted of a device which enabled electromagnetic waves to travel through the air while preserving their features. In 1886, Marconi applied for a patent for his invention.
Orville and Wilbur Wright	United States of America	Airplane	In 1903, the Wright brothers invented their first flying machine in Kitty Hawk, North Carolina.
Vladimir K. Zworykin	Russian Federation	Electronic Television	In 1929, Zworykin invented the cathode-ray tube needed for television transmission.
Ladislao Biro	Argentine/Hungary	Ballpoint Pen	In 1938, Biro received a patent for a pen with a tiny ball bearing at its tip. As the pen moved along the paper, the ball rotated, picked up the ink from the cartridge and left it on the paper.
Konrad Zuse	Germany	Freely Programmable Computer	Zuse is considered the inventor of a modern (electromechanical binary) computer for his Z1 model completed in 1941
Gertrude Elion	United States of America	Immune System Drugs to Fight Cancer and AIDs	Gertrude Elion, the daughter of Lituanian and Polish immigrants, was a chemist who studied the human immune system and, in her work at Glaxo-Wellcome in 1956, developed "target specific" drugs to block the replication of cancerous cells. In 1998, she received the Nobel Prize for Chemistry.

Name	Country	Invention	Description
James Russell	United States of America	Compact Disc	In 1965, Russell developed a system that recorded, stored, and replayed music using light (and laser technology) rather than touch. Russell received 22 patents for his system.

From the earliest rituals, through the beginning of music and dance, burial rites, cave paintings, the written word, and theatrical representation, to the use of modern technologies such as the phonogram, celluloid film, wireless broadcast, software, and digital recording, humankind has identified and defined itself through cultural creativity and expressions in the form of artistic creations and performances. Much of this creativity survives and thrives today in folklore or other forms of traditional knowledge. Today's music, films, books, art, and other forms of creations or expressions are indicators of social progress and the quality of life. As the private property of their original creators, they are prized by society for many reasons (including their economic, political and cultural role) but their particular value is that the legacies of human endeavor live in their expression.

Intellectual property is an old concept. The Venetian Law of 1474 is often referred to as the first systematic approach to protecting inventions by a form of patent, as it stipulated an exclusive right of an individual which limited the public interest for the first time. Sixteenth-century Tudor England already had a patent system, and the Statute of Monopolies in 1624 was the first written law which provided for the grant of a monopoly for an invention for a limited period of time.

The second half of the 18th century was a golden age of trade and industry for many countries, as well as a time of artistic creativity, scientific innovation, and political revolution. It was during this Age of Enlightenment that some countries established their first patent systems. For example, the first patent law in France, which provided for the protection of inventors' rights, was enacted in 1791, after the French Revolution and the Declaration of the Rights of Man and of the Citizen. In the United States

of America, in 1788, the Constitution specifically provided for patents and the protection of inventions by granting exclusive rights to inventors.

In the case of copyright, it was the spread of the printing press that provoked the need for a copyright law. Book production in the first millennium was a tedious, slow affair. Scribes wrote and copied books by hand, some with more artistic skill than others. Written works were for the elite only. Organized religion was a prime moving force in the preservation of knowledge in books, as well as the proliferation of multiple copies of books. The invention of movable type and the printing press by Johannes Gutenberg around 1440, was one of the historical events that contributed to the birth of the first copyright system in the world.⁶ As in the protection of inventions, it was also Venice that granted John of Speyer, the first printer, the exclusive right to “print the letters” in 1469.⁷

With Gutenberg's invention available everywhere in western Europe by the second half of the 15th century, the Roman Catholic Church began to ban books written by reformers, and monopolies of the press emerged in England and France. In the 16th century, monopolies by printers continued in order to protect publishers' profits and to permit control over printing. In 1710, the Statute of Anne was enacted by the British Parliament, diminishing some of the control of publishers over printing and also recognizing authors' rights, giving them or their heirs exclusive powers to reprint a book for 14 years after it was first published.⁸ Called an “act for the encouragement of learning”, the Statute of Anne was one of the inspirations for the intellectual property protection in the United States Constitution.⁹

Even at this early stage, the development of patent and copyright laws reflected the fluctuations of the economy. Following the eclipse of Venice after 1600, there was a shift of economic progress from southern to northwestern Europe. Before 1800, though examples of industrial concentration can be identified in several European countries, manufacturing growth was still largely a matter of multiplication of small-scale artisan production rather than of radical new methods and organizations. However, between 1750 and 1870, Europe experienced major change stemming from, among other things, growing cities, railway building, the investment of capital, the growing transoceanic economy.¹⁰ Towards the

end of the 19th century, these factors led to large-scale industrialization, supported by new ideals of industrialism, the emergence of stronger centralized governments, and stronger nationalism. These developments led many countries to establish their first modern patent and copyright laws.¹¹

However, the development of the modern concept of IP laws was not always straightforward. In the 19th century, free trade movements that called for abolishing the patent system received wide support.¹² But the strong wave of nationalism that characterized the period appears to have played an important role in supporting the introduction and maintenance of modern industrial property laws.

THE FIRST INTERNATIONAL IP TREATIES: PARIS AND BERNE

In the second half of the 19th century, goods and workers crossing national borders brought a wave of globalization to industrial powers. Although patent laws had been enacted in several countries, the demand for international protection of inventions began to be felt. In fact, foreign exhibitors refused to attend the International Exhibition of Inventions in Vienna in 1873 because they were afraid their ideas would be stolen and exploited commercially in other countries. This incident resulted in the birth of the Paris Convention for the Protection of Industrial Property in 1883, the first major international treaty designed to help the people of one country obtain protection in other countries for their intellectual creations. Such protection took the form of industrial property rights, in the form of patents (invention), marks, and industrial designs.

In the mid-1800s, renowned authors were finding their works illegally reproduced and for sale in countries other than their own, and from which they received no royalties. In order to eliminate this practice, the famed French author of *Les Misérables* and *The Hunchback of Notre Dame*, Victor Hugo, organized a group of prominent authors into the International Literary Association, which later became known as the International Literary and Artistic Association, with the intention of establishing some basic form of international protection for their works.

In 1886, to provide the basis for mutual recognition of copyright between different states, another major international IP treaty was enacted, the Berne Convention for the Protection of Literary and Artistic Works.

The crux of both conventions was the principle of national treatment, that is, equal protection between nationals and foreigners. This principle is best defined, in the original text of the Paris Convention, by the provision on national treatment in Article 2:

“The subjects or citizens of each of the contracting States shall, as regards patents, industrial designs, trade marks and trade names, enjoy the advantages that their respective laws now grant, or may hereafter grant, to nationals. Consequently, they shall have the same protection as the latter and the same legal remedy against any infringement of their rights, provided they observe the formalities and conditions imposed upon nationals by the domestic legislation of each State.”

In the first one hundred years since the establishment of the Paris Convention and the Berne Convention, we have seen growth in the protection of inventions, marks, and other objects of industrial property and of copyrighted works at the international level. In these first hundred years, we have also seen the early development of cooperation among states in the field of intellectual property.¹³ The continued support for, and development of, the IP system over the last century attests to the fact that many states recognize the role of IP in promoting and stimulating innovation and technological and artistic achievement.

Indeed, as the former Director General of WIPO, Arpad Bogsch, stated:

“The search for new technological solutions and cultural creative activities deserves constant encouragement because, as the history of nations has shown, in addition to spiritual development, inventions and cultural creations are the main sources of social and economic development of mankind. Food, health, communications and other fundamental needs for the survival of the human race have improved, are improving and will continue to improve because of inventions and creations.”¹⁴

The history of IP is a much longer topic than can be covered in this chapter. What is important to note here, however, is that the premise underlying IP has always been the recognition that ownership of inventions and creative works stimulates their creation and, with such creation, also stimulates economic development. The continuum from problem → to knowledge → to imagination → to innovation → to intellectual property and finally → to the solution in the form of products, continues to be a powerful driving force for economic development. As we will explore in this book, in today's world the connection between IP and economic development is more relevant than ever before, as IP comes to the fore in international debate.

TYPES OF INTELLECTUAL PROPERTY

Since the birth of the two pillars of IP, i.e. industrial property and copyright, other forms have been developed and established either as subsets of the previously existing types of IP or as new breeds.

The convention establishing WIPO of 1967¹⁵ stipulates that IP shall include rights relating to the following:

1. Literary, artistic and scientific works
2. Performances of performing artists, phonograms, and broadcasts
3. Inventions in all fields of human endeavor
4. Scientific discoveries
5. Industrial designs
6. Marks and commercial names and designations
7. Protection against unfair competition
8. All other rights resulting from intellectual activity in the industrial, scientific, literary, and artistic fields.

Several international treaties concluded since 1967, notably the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) of the World Trade Organization (WTO), further clarified and elaborated new types of intellectual property, for example, the design of integrated circuits, based on earlier work undertaken by WIPO. This trend shows the dynamic nature of IP in response to technological and cultural developments concerning, for example, computer hardware and software, digital communications, the Internet, and genomics.

The areas mentioned under (1) belong to the “copyright” branch and under (2) to the “related rights” branch of intellectual property. The areas under (3), (4), (5), (6), and (7) constitute the industrial property branch of IP.

The most common forms of intellectual property are briefly defined below.¹⁶

Patent (Invention)

A patent is an exclusive right granted for an invention (a product or a process that provides a new way of doing something, or offers a new technical solution to a problem). It provides protection for the invention for a limited period, generally 20 years from the filing date, in the country or countries in which it is patented, in exchange for the inventor’s public disclosure of the invention. A patent owner has the right to decide who may – or may not – use the patented invention, and may give permission to, or license, other parties to use the invention on mutually agreed terms. The owner may also sell the right to the invention to someone else, who will then become the new owner of the patent.¹⁷ Once a patent expires, the protection ends, and the invention may be used by anyone.¹⁸

Trademark

A trademark or “mark” is a distinctive name, logo or sign¹⁹ identifying the source of goods or services. Trademarks help consumers distinguish a product or service from one source from those produced by another source. A mark provides protection to its owner by preventing confusion as to source in connection with the distribution of goods or services or licensing others to use them. The period of protection varies, but a mark can remain valid indefinitely through continued commercial use or a registration and renewal process.

Patents and trademarks are often referred to collectively as “industrial property”.

Copyright and Related Rights

Copyright consists of a bundle of rights given to creators in their literary and artistic works. These creators, and their heirs, hold the exclusive rights to use or license others to use the work on agreed terms. The creator of a work can prohibit or authorize,²⁰ for example:

- its reproduction in various forms, such as a printed publication or a phonorecord;
- its public performance, as in a play or musical work;
- its broadcasting, including by radio, television, or satellite;
- its translation into other languages, or its adaptation, such as the adaptation of a novel into a screenplay.

Copyright applies to many different types of artistic works, including paintings, music, poems, plays, books, architecture and choreography, as well as to works that are generally not considered artistic such as computer software, maps and technical drawings.

Related rights are rights that have evolved in the last 50 years or so “around” copyright, and include the right of a performer in his/her performance, the right of a producer of a sound recording in the recording, and the right of a broadcaster in a broadcast.

Many creative works protected by copyright generally require mass distribution, communication, and financial investment for their dissemination (for example, publications, sound recordings, and films). Hence, creators often sell the rights to their works to individuals or companies that can package, market, and distribute the works in return for payment (lump sum or royalties). These economic rights have a time limit, according to the relevant WIPO treaty, of the life of the author plus 50 years after the author’s death. In some countries, that term has been extended to 70 years. Copyright may also include moral rights, which involve the right to claim authorship of a work, and the right to oppose changes to it that could harm the creator’s reputation.

- 1 Patents and expired patents, for example, surround our daily life and concern products such as electric lighting (patents held by Edison and Swan), plastics (patents held by Baekeland), ballpoint pens (patents held by Biro), and micro-processors (patents held by Intel).
- 2 WIPO, World Intellectual Property Declaration (WO/GA/26/4 Annex IV) presented to the Assemblies of Member States of WIPO (September 2000). See, http://www.wipo.int/about-wipo/en/pac/ip_declaration.htm
- 3 www.invent.org/index.asp; patent Nos. 1,522, 176; 1,541, 478.
- 4 www.ideafinder.com/history/inventors/carver.htm
- 5 See, for example, the growth models in Robert Solow, "Technical Change and the Aggregate Production Functions," *Review of Economics and Statistics* 39 (1957): 12-13 and Paul Romer, "Endogenous Technological Change," *Journal of Political Economy* 98 (1990): 5, pt. 2, S74-S75. See Chapter 2 for greater detail.
- 6 Gutenberg is credited with printing the oldest surviving printed book in the western world, the Gutenberg Bible, which has 42 lines per page and is sometimes known as the 42-line Bible or Mazarin Bible. He also fashioned a font of over 300 characters, as well as a variable width mold to accept his blend of lead, antimony and tin which was used in type foundries into the last century.
- 7 To print the letters means to produce multiple copies of a document by using the printing press method. John of Speyer designed the first type of roman character on which he received a patent, which expired at his death in 1470.
- 8 See, for example <http://artnetweb.com/iola/journal/history/1994/copyright.html#fn3>, <http://hutzley1.tripod.com/copyright/history.htm>, <http://www.platopress.co.uk/copyright/intro/history02.htm>, and <http://arl.cni.org/info/firn/copy/timeline.html>
- 9 <http://english.ttu.edu/kairos/3.1/coverweb/ty/anne.html>
- 10 J. M. Roberts, *A History of Europe* (Oxford: Helicon Publishing, 1996): 214, 217, 326.
- 11 For example, in Germany, the first federal patent law was enacted in 1877. France modernized its 1791 law in 1844. Many other countries introduced modern patent laws in the 19th century: Italy (1859), Argentina (1864), Spain (1878), Brazil (1882), Sweden (1884), Canada (1886), India and Japan (1888), Mexico (1890), Germany (1891), and Portugal and South Africa (1896).
- 12 Consequent to the free trade movement, the Netherlands abolished its patent law in 1869, although subsequently a new one was re-introduced in 1910.
- 13 The International Bureaus created to carry out administrative tasks for the implementation of the two conventions were the predecessors of the World Intellectual Property Organization (WIPO).
- 14 Arpad Bogsch, then Director General of WIPO, *The Paris Convention for the Protection of Industrial Property from 1883 to 1983*, (Geneva, WIPO1983): Preface.
- 15 *The Convention Establishing the World Intellectual Property Organization* (signed at Stockholm, July 14, 1967 and amended on September 28, 1979). See, <http://www.wipo.int/clea/docs/en/wo/wo029en.htm>
- 16 Condensed from the WIPO website (<http://www.wipo.int>).
- 17 Patent rights are usually enforced in a court which, in most systems, holds the authority to stop patent infringement. Conversely, a court can also declare a patent invalid upon a successful challenge by the defendant or a third party.
- 18 Once the patent of the invention expires (even before the expiry of the patent term, the patent expires if its inventor or patent holder stops paying the patent maintenance fees) the patent holder can no longer exercise control over the use made of the invention; that is, the exclusive rights of the owner to the invention cease and the invention becomes available for commercial exploitation by others.
- 19 Its origin dates back to ancient times, when craftsmen reproduced their signatures, or marks, on their artistic or utilitarian products. Over the years the practice of using these marks evolved into today's system of trademark registration and protection.
- 20 The creator – or the owner of the copyright in a work – can enforce rights in the courts where the owner may obtain an order to stop unauthorized use (often called piracy), as well as obtain damages for loss of financial rewards and recognition.