

DYP NOTES

CHAPTER 6.- INTELLECTUAL PROPERTY

1.-THE INTELLECTUAL PROPERTY LAW

IT facilitates the distribution, copy and/or manipulation of digital works. However, this should be implemented in compliance with laws regulating **intellectual property rights**. The affected people are:

- Authors of literary, photographic, cinematographic or musical works.
- Computer engineers, particularly **software authors** and/or **database creators**.

The law does not reach all the cases and many times we must rely on **good business practices** and **codes of conduct**.

1.1.-BERNE CONVENTION

The Berne Convention for the Protection of Literary and Artistic Works was an international agreement governing **copyright** (1886). Before the Berne Convention, national copyright laws usually only applied for works created within each country. This convention set up a bureau to handle administrative tasks. In **1967**, it became the **World Intellectual Property Organization (WIPO)**, and in **1974** became an organization **within the United Nations**.

The copyright of authors resident in Spain, or in any other signatory country of the Berne Convention or member country of the World Trade Organization (WTO) bound by the provisions of the TRIPS (**Trade-Related Aspects of Intellectual Property Rights**) agreement, will be **automatically protected in all countries** that have signed the Convention or that are members of the WTO.

In Spain the main law regulating copyright protection is the **1996 Intellectual Property Law**.

In Europe, the most relevant laws are: the Copyright Directive 2001/29/EC and the Directive on Copyright in the Digital Single Market (2019), which offered the press publication right and increased the liability for platforms.

The subject matter of intellectual property includes all **original literary, artistic or scientific productions** expressed in any mode or form, whether tangible or intangible, known at present or that may be invented in the future, including **computer programs**. These exclusive rights allow owners of intellectual property to benefit from the property they have created, **providing a financial incentive for the creation of an investment in intellectual property**.

The intellectual property of a literary, artistic or scientific work belongs to its author **due to the mere fact of its creation**. This law encompasses **rights of personal and economic character** giving the author full control over and the exclusive right to the exploitation of the work, without any limitation whatsoever other than those specified by law.

1.2.-AUTHORS' RIGHTS

Author's rights:

- **Moral rights** are the rights which cannot be waived or assigned.
- The **exploitation rights** in the work may be assigned by inter vivos transfer, the assignment being limited to the right or rights assigned, to the means of exploitation expressly provided for and the time and territorial scope specified.

The **Ministry of Culture** is the Spanish body in charge of proposing the measures needed to adequately protect intellectual property. As copyright is automatically protected in Spain, authors do not have to register their work in order to assert their rights. However, there is an **Intellectual Property Register** in Spain, which can be used on an entirely voluntary basis.

Moral rights:

1. The right to decide whether his work is to be made **available to the public**, and if so in what form.
2. The right to determine whether such communication should be effected **in his name under a pseudonym or sign or anonymously**.
3. The right to claim **authorship of the work**.
4. The right to demand **respect for the integrity of the work** and to object to any distortion, modification or alteration of it or any act in relation to it that may be prejudicial to his legitimate interests or to his reputation.
5. The right to **alter the work** subject to respect for the acquired rights of third parties and the protection requirements of goods of cultural interest.
6. The right to **withdraw the work from circulation** due to changes in his intellectual or ethical convictions, after paying damages to the holders of the exploitation rights. If the author later decides to resume exploitation of his work, he shall give preference, when offering the relevant rights, to the previous holder thereof, and shall offer terms reasonably similar to the original terms.
7. The right of **access to the sole or a rare copy of the work**, when it is another person's possession, to exercise the right of communication or any other applicable right. The aforesaid right does not allow the author to demand the work to be moved, and access to it must be in the place and manner that cause the least inconvenience to the holder, who will be indemnified, where appropriate, for any damages caused.

Exploitation rights refer to that authors hold exclusive exercise of the right to exploit their work in any form and especially the rights of:

- Reproduction.
- Distribution.
- Communication to the public.
- Alteration.

These rights may not be exercised without their authorization, except where this Act allows it.

The exploitation rights in the work shall run for the life of the author and for seventy years after his or her actual or declared death. As in the rest of the European Union, **copyright** applies for the author's lifetime and, as a general rule, for 70 years after his or her death.

1.3.-AUTHORS' RIGHTS VS COPYRIGHT

Author's rights contrasts with the **Anglo-Saxon** concept of "copyright" which only dealt with economic concerns.

The copyright notice consists of:

- The © symbol, or the word "Copyright" or abbreviation "Copr."
- The year of first publication of the copyrighted work.
- An identification of the owner of the copyright, either by name, abbreviation, or other designation by which it is generally known.

A directive of the European Union allows its member nations to include in their legal frameworks this **private copy exception** to the authors' and editors' rights. If a member State chooses to do so, it must also introduce **compensation for the copyright holders**. Compensation takes the form of a **levy excised on all the machines and blank materials** capable of copying copyrighted works.

The **right to equitable remuneration for private copying: reproduction carried out exclusively for private use**, by means of non-typographical technical apparatus or instruments, of works publicly exploited in the form of books or publications assimilated there to by regulation for those purposes, and also in the form of phonograms, videograms or other sound, visual or audiovisual media, **shall give rise to a single equitable remuneration** for each of the three forms of reproduction mentioned, payable to the persons in Subparagraph (b) of Paragraph (4) of this Article and **intended to compensate for the intellectual property royalties** that are not received on account of the said reproduction.

1.4.-PRIVATE COPYING VS BACKUP COPY

In **Spain**, anyone was allowed to make a private copy of a copyrighted material for their own use and the source copy does not even have to be legal. Making copies for other people, however, is forbidden if done for profit. Private copying is not applicable to electronic databases and to computer programs. A backup copy is allowed providing that the copier has accessed the original material legally.

Intellectual property also subsists, as provided in Book 1 of this Act, in **collections of the works of others, or of data or other independent elements, such as anthologies and databases**, which, by reason of the selection or arrangement of their contents, constitute intellectual creations, without affecting any rights that might subsist in the said contents. The protection given to such collections under this Article **relates solely to their structure**, meaning the form of expression of the selection or arrangement of their contents, but **does not extend to those contents**.

2.-SOFTWARE: A PARTICULAR CASE

The Copyright Act includes computer programs as objects of protection. Computer programs whose purpose is to cause harm are not eligible for protection. The protection granted to the author by this Act may be enjoyed by **legal persons** in the following cases:

- Work of joint authorship.
- Collective works.
- Composite works.

The rights in a work that is the **unitary result of the collaboration of two or more authors** belong to all of them. The intellectual property rights in a work of joint authorship belong to all the authors **in the proportions determined by them**. In the absence of provisions in this Act, the rules laid down in the Spanish Civil Code on joint ownership apply to such works.

A work is called a collective work if it is created **on the initiative and under the direction of an individual or legal person**, who edits it and publishes it under his name, and where it consists of the **combination of contribution by various authors** whose personal contributions are so integrated **in the single, autonomous creation** for which they have been conceived that it is not possible to ascribe to any one of them a separate right in the whole work. In the absence of agreement to the contrary, the rights in the collective work will belong to the **person who publishes it and discloses it in his name**.

A **composite work** is a new work that incorporated a **pre-existing work without the collaboration of the author** of the later is regarded as a composite work, subject to the rights accruing to the latter and to his or her due license.

An **independent work** is a work that constitutes an **autonomous creation**, even if published in conjunction with other works, is regarded as an independent work.

Program source code, which can be likened to an intellectual work, can be entered in the intellectual Property Register. The register has **evidentiary effects of authorship** and ownership of the work as well as **advertising effects**. An alternative non-exclusive measure would be the software escrow.

2.1.-SOFTWARE LICENSES

The owner of proprietary software exercises certain exclusive rights over this software. The owner can restrict use, inspection or modification of source code, and redistribution. In the proprietary software industry, an **end-user license agreement** or **software license agreement** is the contract between the licensor and purchaser, establishing the purchaser's right to use the software.

An example of **end-user license agreement** are the many form contracts are only contained in digital form, and only presented to a user as a **click-through** where the user must "accept" the software.

Terms of Service are rules which one must agree to abide by in order to use a service. Terms of Service can also be referred to as **Terms of Use** or sometimes merely a **Disclaimer**, especially regarding the use of websites. ToS and EULA are for different things, as ToS are policies that you agree to when you use a service.

2.2.-FREE SOFTWARE

“Free software” is matter of liberty, not price. A program is free software if the program’s users have four essential freedoms:

1. The freedom to run the program, for any purpose.
2. The freedom to study how the program works and change it so it does your computing as you wish. Access to the source code is a precondition for this.
3. The freedom to redistribute copies so you can help your neighbour.
4. The freedom to distribute copies of your modified versions to others. By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

A **freeware** is a software available for zero price, but not necessarily with the right to modify and redistribute it.

There are different types of licenses:

- Public domain software.
 - The copyright has expired.
 - The work was not copyrighted.
 - The author has released the software onto the public domain.
- Copyleft.
- Weak copyleft.
- Copyfree.

In Copyleft, the author retains copyright and permits redistribution under the restriction that all such redistribution is licensed under the same license. The **GNU General Public License** is the most well-known example. Additions and modification by others must also be licensed under the same “copyleft” license whenever they are distributed with part of the original licensed product. This is also known as a **Viral license**. Due to the restriction on distribution not everyone considers this type of license to be free. Copyleft licensing places more requirement in terms of distribution and combination with software under other licenses.

The strength of the copyleft governing a work is an expression of the extent that the copyleft provisions can be efficiently imposed on all kinds of derived works.

Weak copyleft refers to licenses where not all derived works inherit the copyleft license. Generally, it is used for the creation of software libraries, to allow other software to link to the library, and then be redistributed without the legal requirement for the work to be distributed under the library’s copyleft license. This allows programs of any license to be compiled and linked against copylefted libraries, and then redistributed without any re-licensing required.

In **permissive licenses**, the author retains copyright solely to disclaim warranty and require proper attribution of modified works, and permits redistribution and **any** modification, even closed source ones.

2.3.-SOFTWARE PATENTS

With regard to **industrial property**, no single law covers all aspects. Instead, this is regulated by a package of laws, including the following:

- Patent Law.
- Trade Mark Law.
- Law on Legal Protection of Industrial Designs.

The only body in Spain with authority to grant patents and trade marks is the **Spanish Patents and Trade Marks Office**, which come under the control of the Ministry of Industry, Tourism and Trade.

European patents are granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application. The following in particular are not regarded as inventions:

- Discoveries, scientific theories and mathematical methods.
- Aesthetics creations.
- Schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers.
- Presentations of information.

A **patent** is an exclusive right granted for an invention, a product or process that provides a new way of doing something, or that offers a new technical solution to a problem. For an invention to be patentable it must:

- **Be novel**, it does not form part of “prior art”.
- **Involve an inventive step** not obvious to a skilled person in the field.
- **Have an industrial application**, it can be used in some kind of industry.

A patent provides patent owners with protection for their inventions. Protection is granted for a limited period, generally 20 years if maintenance fees are paid.

Intellectual and Industrial Property, better known as **IP**, refer to creations of the mind: inventions; literary and artistic works; and symbols, name and images used in commerce. IP is divided into two categories:

- **Industrial property**, which includes inventions, trademarks, industrial designs, and geographic indications of source.

Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs.

CHAPTER 7.- DIGITAL FORENSICS

1.-WHAT IS DIGITAL FORENSICS?

The term forensics can be defined as the application of science to a matter of law. **Digital forensics** is a branch of forensic science encompassing the **recovery and investigation of material found in digital devices**, often in relation to computer crime. Originally, it was used as a synonym for **computer forensics** but has expanded to cover investigation of all devices capable of storing data.

Computer forensics involves the **preservation, identification, extraction, documentation, and interpretation** of computer media for evidentiary and/or root cause analysis. Information collected assists in arrests, prosecution, termination of employment, and preventing future illegal activities.

2.-SUB-BRANCHES

Sub-branches relating to the **type of digital devices** involved:

- Computer forensics.
- Database forensics.
- Mobile device forensics.
- Network forensics.
- Forensic video.
- Forensic audio.

The basic approach is processing to answer questions about digital states and events (searching and analysing).

3.-COMPUTER EXPERTS

Computer experts support or refute a hypothesis before **criminal or civil courts**. In the **private sector**, such as during internal corporate investigations or intrusion investigation.

4.-WHO USES COMPUTER FORENSICS?

Users of computer forensics:

- Criminal Prosecutors.
- Civil Litigations: fraud, divorce, harassment, or discrimination cases.
- Insurance Companies: fraud, worker's compensation, arson.
- Private Corporations: harassment, fraud, and embezzlement cases.
- Law Enforcement Officials: backup search, warrants and post-seizure handling.
- Individual/Private Citizens: claims of harassment, abuse, or wrongful termination from employment.

5.-FORENSIC METHODOLOGY

The three A's:

- **Acquire:**
 - Do not alter or damage the original.
 - Preserve the state of the computer.
- **Authenticate:** proof that your recovered evidence is the same as the original.
- **Analyse:**
 - Inspect evidence without altering it.
 - Use evidence to reconstruct events.

Acquisition of a forensically sound, verifiable image of each computer, drive, server or other device. This is done using hardware write blockers appropriate to the device, forensically sound software tools, and established acquisition procedures.

The **analysis** process is always performed on the image and not the device, attempts to gather information and answer the questions indicated when the goals of the project were defined. This step is where data is recovered, evidence of activity is collected, and pieces of the overall puzzle are put together. Analysis results are often used to refine the scope and goals of the overall project or stimulate and support further examination.

A **post-analysis report** details the results of all the preceding steps. May also include deposition or court testimony to support the results as part of a court proceeding.

The presentation of evidence discovered must be made in a manner which is understood by lawyers, non-technically staff/management, and suitable as evidence as determined by laws.

Factors influencing the results:

- How soon we are called after the initial incident.
- If any other recovery procedures have been attempted.
- The condition of the hardware/software involved.
- If someone has tried to hide or destroy evidence or data.
- The amount of information that is provided before we start.

6.-EXPERT REPORT

An **expert report** is a study written by one or more experts that states findings and offers opinions. In law, expert reports are generated by expert witnesses offering their opinions on points of controversy in a legal case or the other in a litigation in order to support that party's claims. The reports state facts, discuss details, explain reasoning, and justify the experts' conclusions and opinions.

A **digital expert report** may include something similar to:

- An overview/case summary.
- Forensic acquisition and exam preparation.
- Findings and report.
- Conclusion.

Report template:

- Executive summary:
 - Author, investigators, examiners.
 - Why was the investigation undertaken?
 - List significant findings.
 - Include signatures of examiners.
- Objectives:
 - Task of the investigation.
- Computer Evidence Analysed:
 - Detailed description of evidence.
 - Linked with evidence tags.
 - If possible, with digital imagery of evidence.
- Relevant Findings.
- Supporting Details.
- Investigative Leads.
- Additional Report Sections.

7.-TYPES OF CASES

Type of cases:

- Copyright infringement.
- Industrial espionage.
- Money laundering.
- Piracy.
- Sexual harassment.
- Theft of intellectual property.
- Unauthorized access to confidential information.
- Blackmail.
- Corruption.
- Decryption.
- Destruction of information.
- Fraud.
- Illegal duplication of software.
- Unauthorized use of a computer.
- Child pornography.

8.-DIGITAL EVIDENCE

A **digital evidence** is any information being subject to human intervention or not, that can be extracted from a computer. Must be in human-readable format or capable of being interpreted by a person with expertise in the subject. Might be required for a wide range of computer crimes and misuses.

CHAPTER 8.- BUSINESS ETHICS

1.-MORALS, ETHICS, LAWS

The International Centre for Information Ethics offers a helpful distinction of classifications:

- **Morals** are customs and traditions.
- **Ethics** are critical reflection on morals.
- **Laws** are norms formally approved by state power or international political bodies.

1.1.-HAVING AN ETHICAL DILEMMA?

Ethical: in accordance with principles of conduct that are considered correct, especially those of a given profession or group.

The **golden principle** behind this is that we should treat others the same way that we want others to treat us. There are three questions you should ask yourself whenever you are faced with an ethical dilemma:

- **Is it legal?**
 - In other words, will you be violating any criminal laws, civil laws or company policies by engaging in this activity?
- **Is it balanced?**
 - Is it fair to all parties concerned both in the short-term as well as the long-term?
 - Is this a win-win situation for those directly as well as indirectly involved?
- **Is it right?**
 - How does this decision make you feel about yourself?
 - Are you proud of yourself for making this decision?
 - Would you like others to know you made the decision you did?

2.-WHAT IS BUSINESS ETHICS?

It usually isn't illegal to lie to customers, but it isn't good business.

2.1.-IS BUSINESS ETHICS AN OXYMORON?

By an oxymoron, we mean the bringing together of two apparently contradictory concepts. To say that business ethics is an oxymoron suggests that **there are not, or cannot be, ethics in business:**

- Business is in some way unethical.
- Business is in at best amoral.

2.2.-BUSINESS ETHICS AND THE LAW

Business ethics is the study of business situations, activities, and decisions where issues of right and wrong are addressed. It is worth stressing that by “right” and “wrong” we mean morally right and wrong.

The law might be said to be a definition of the minimum acceptable standards of behaviour. However, many morally contestable issues, whether in business or elsewhere, are not explicitly covered by the law. In one sense then, business ethics can be said to begin where the law ends. Business ethics is primarily concerned with those issues not covered by the law, or where there is no definite consensus on whether something is right or wrong.

Discussion about the ethics of particular business practices may eventually lead to legislation once some kind of consensus is reached, but for most of the issues of interest to business ethics, the law typically does not currently provide us with guidance. For this reason, it is often said that **business ethics is about the “grey areas” of business, or where “values are in conflict”.**

2.3.-FACTORS THAT AFFECT BUSINESS ETHICS

Ethical codes that govern businesses often address certain main **areas**:

- Honesty.
- Objectivity.
- Integrity.
- Carefulness.
- Openness.
- Respect for intellectual property.
- Confidentiality.
- Responsible publication.
- Responsible mentoring,
- Respect for colleagues.
- Social responsibility.
- Non-discrimination.
- Competence.
- Legality.
- Human subjects protection.

2.4.-QUESTIONS TO ENSURE ETHICAL BEHAVIOR

Ask yourself these **6 questions**:

1. Do I have sufficient **information** to make an informed decision?
2. Have we **anticipated** the consequences of our decision?
3. How does the decision **affect** other people?
4. Is the decision **fair** to all parties involved?
5. Is everyone affected either **informed** or a part of the decision?
6. If this was someone else’s action, would I **appreciate** how it would affect me?

2.5.-WHY BOTHER WITH ETHICS?

There is little evidence that ethical behaviour increases profits or that unethical behaviour decreases profits, but:

- Society as a whole benefits by encouraging economic competition and **no one wants to compete with unfair competitors.**
- People feel better when they behave ethically.
- **Unethical behaviour can be costly**, if there is public outrage leading to a boycott.

2.6.-ETHICAL CONSCIOUSNESS / STAKEHOLDERS

Stages of **ethical consciousness**:

1. Jungle Law.
2. Anything for profit.
3. Profit maximization in the short term.
4. Profit maximization in the long term.
5. Stakeholder concept.
6. Corporate citizenship.

Stakeholders are people or groups that have an interest in the organization:

- Stakeholders include employees, customers, suppliers and others.
- Stakeholders often want different outcomes and managers must work to satisfy as many as possible.

Managers often must choose between the conflicting interest of stakeholders. Ethics guide people in dealings with stakeholders and others, to determine appropriate actions.

3.-CORPORATE SOCIAL RESPONSIBILITY

The **corporate social responsibility** is:

- An obligation, beyond that required by the law and economics, for a firm **to pursue long terms goals that are good for society.**
- The continuing commitment by business to behave ethically and contribute to economic development **while improving the quality of life of the workforce and their families as well as that of the local community and society at large.**
- About how a company manages its business process **to produce an overall positive impact on society.**

In October 2011, the European Commission published a **new policy on corporate social responsibility**:

- It states that to fully meet their social responsibility, enterprises “**should have in place a process to integrate social, environmental, ethical and human rights concerns into their business operations and core strategy in close collaboration with their stakeholders**”.

- The aim is both to enhance positive impacts and to minimise and prevent negative impacts.

3.1.-IS CSR THE SAME AS BUSINESS ETHICS?

There is clearly an **overlap** between CSR and business ethics:

- Both concepts concern values, objectives and decision based on something than the pursuit of profits.
- And socially responsible firms must act ethically.

The **difference** is that ethics concern individual actions which can be assessed as right or wrong by reference to moral principles. CSR is about the organisation's obligations to all stakeholders.

3.2.-DIMENSIONS OF CR

Dimensions:

- **Economic:** responsibility to ear profit for owners.
- **Legal:** responsibility to comply with the law.
- **Ethical:** not acting just for profit but doing what is right, just and fair.
- **Voluntary and philanthropic:** promoting human welfare and goodwill.
- **Being a good corporate citizen contributing to the community and the quality of life.**

CHAPTER 9.- COMPUTER ETHICS

1.-PROFESSIONAL ETHICS

Professional ethics must take into accounts:

- Relations between professionals and clients.
- Relation between profession and society.
- Relations among professionals.
- Relations between employee and employer.
- Specialized technical details of the profession.

A computing professional must understand:

- Cultural, social, legal, and ethical issues in computing.
- Responsibility and possible consequences of failure.

1.1.-WHAT DO PROFESSIONAL ETHICS PROVIDE?

They provide:

- Add a level of professionalism.
- Define and promote a standard when dealing with clients and employers.
- Protect the profession as a group.
- Classify the rights of members, clients, and employers.
- Provide a guideline in questionable areas.

1.2.-PROBLEMS WITH PROFESSIONAL ETHICS

They cannot cover all aspects of the profession.

1.3.-PROFESSIONAL CODE OF ETHICS

Professional code of ethics:

- Symbolize professionalism.
- Protect group interests.
- Specify membership etiquette.
- Inspire good conduct.
- Educate and discipline members.
- Foster external relations.
- Enumerate principles, express ideals.
- Put forth rules, offer guidelines.
- Codify rights.

1.4.-PROBLEMS WITH CODES OF ETHICS

Problems:

- A legal system is not a complete and correct guide to moral behaviour.
- Codes of ethics are mostly voluntary.
- May encounter situations for which the code makes no explicit recommendations.
- Goodness cannot be defined through a list of Dos and Don'ts.
- You must use your internal sense of ethics.

2.-COMPUTER ETHICS

Ethical problems related to computers are not unique, but they tend to occur on a much larger scale and scope:

- Scope: communications networks bring the world together.
- Anonymity: beneficial but creates problems of integrity.
- Reproducibility.

When computers first began to be used in society at large, the absence of ethical standards about their use and related issues caused some problems. However, as their use became widespread in every facet of our lives, discussions in **computer ethics** resulted in some kind of a consensus. Today, many of these rules have been formulated as laws, either national or international. **Computer crimes** and **computer fraud** are now common terms. There are law against them, and everyone is responsible for knowing what constitutes computer crime and computer fraud.

2.1.-IT ETHICS

Some users view their computers actions as less serious as their actions in the real world.

2.2.-CATEGORIES OF COMPUTER ETHIC ISSUES

Categories:

- **Privacy:**
 - Computers create a false sense of security.
 - People do not realize how vulnerable information stored on computers are.
- **Property:**
 - Physical property.
 - Intellectual property.
 - Data as property.
- **Access:**
 - Access to computing technology.
 - Access to data.
- **Accuracy:**
 - Accuracy of information stored.

There are **three** major areas which come under the umbrella of computer ethics:

- Copyright and intellectual property.
- Netiquette: appropriate online behaviour.
- Day-to-day ethics.

2.3.-CODES OF ETHICS

Various national and international professional societies and organizations have produced code of ethics documents to give basic behavioural guideline to computing professional and users.

The ten Commandments of computer ethics by the Computer Ethics Institute:

1. Not use a computer to harm other people.
2. Not interfere with other people's computer work.
3. Not snoop around in other people's files.
4. Not use a computer to steal.
5. Not use a computer to bear false witness.
6. Not use or copy software for which you have not paid.
7. Not use other people's computer resources without authorization.
8. Not appropriate other people's intellectual output,
9. Think about the social consequences of the program you write.
10. Use a computer in ways that show consideration and respect.

The IEEE-CS and ACM Software Engineering Code of Ethics and Professional Practice are built on 8 principles:

1. Public Interest.
2. Client and Employer.
3. Product.
4. Judgment.
5. Management.
6. Profession.
7. Colleagues.
8. Self.

CHAPTER 10.- GREEN IT

1.-UNDERSTANDING GREEN IT

An increasing number of IT organizations are joining the movement of **corporate social responsibility**. They have a new perspective on how to reduce the ecological footprint of their organization and the business process supported by IT services, Green IT. **Green IT** is about the efficient application of intelligent, energy, eco-friendly technology and techniques throughout the organization.

1.1.-SUSTAINABLE DEVELOPMENT

It comes from the Latin word “susteneare” meaning “to hold up”. From there it evolved long ago to mean to keep something going or extend its duration.

In the 18th century the Germans developed a form of forestry designed to keep the forest going as productive systems over the very long term by keeping a balance between cutting down trees and the growth of new trees. In the English speaking world this was called sustainable forestry. The idea was later extended to sustainable fisheries.

In the 1960s and 1970s the term was for the first time applied to the macro context of environmental issues where there was a need to sustain the whole environment and human society.

1.2.-THE TRIPLE BOTTOM LINE

For enterprises, the idea of sustainable development has found a translation in the Triple Bottom Line concept. Based on the idea that the responsibility of an enterprise lies with its stakeholders rather than with its shareholders. This means that the traditional reporting framework should take into account social and environmental performance in addition to financial performance. People, planet and profit succinctly describe the triple bottom line and the goal of sustainability.

The **Triple Bottom line** approach means that organizations should behave in profitable, social and environmental responsible way. What corporate social responsibility (CSR) really means is clarified by the International Organization for Standardization standard ISO 26000:

- The objective of social responsibility is to contribute to sustainable development.
- “The essential characteristic of social responsibility is the willingness of an organization to incorporate social and environmental considerations in its decision-making and be accountable for the impacts of its decisions and activities on society and the environment”.



1.3.-THE IMPACT OF SUSTAINABLE COMPUTING PRACTICES ON CSR

The amount of energy which is needed by the IT industry has a consequence that the IT sector is also responsible for a large amount of CO₂ and other greenhouse gas (GHG) emissions. According to Gartner this amounts to 2% of the total worldwide emissions of greenhouse gasses. This is about as much as the aviation industry.

IT can contribute in a positive way to CSR goals by:

- Lowering energy usage and thereby lowering electricity bills. Organizations and temperature control in data centres which can lead to lower energy usage.
- Using energy from sustainable resources as much as possible.
- Containing the growth of IT. Current trends show data centre capacity needing to double every 5 years.

Green IT can slow the need for expansion as well as reduce the demand for electricity, floor and rack space, and air conditioning by:

- Making use of virtualization techniques.
- Using data management software for efficient use of servers.
- Using compression techniques.
- Making IT systems and components more energy efficient.
- Implementing and forcing policies in relation to power management of PC's and notebooks, use of printers, etc.

The energy required for the manufacturing of all this electronic equipment, the so called **embedded energy** is also of importance. The energy used to produce electronic devices is considerably higher than the energy used during their operation. The embodied energy of the memory chip alone already exceeds the energy consumption of a laptop during its life expectancy of 3 years.

Apart from energy, a lot of other resources are needed during the manufacturing phase of IT and other devices.

At the same time the lifecycles of equipment are 3-5 years, which is rather short. Although there is a strict regulation since 2006 on the disposal of electronic waste in Europe, a lot of IT equipment still ends up on landfills as e-waste or is incinerated at the end of its lifecycle. Only

3.6 % of the waste generated by Americans in 2007 was recycled — the rest ended up in landfills or was shipped to developing nations like Ghana, Nigeria, Vietnam, India, China and the Philippines. In these countries e-waste creates a lot of health and environmental problems due to very primitive recycling methods, and by the harmful toxins within e-waste like lead, cadmium and mercury.

When it comes to embedded energy and use of resources, Green IT will have a very positive impact on sustainable development and corporate social responsibility (CSR) goals, by:

- Designing IT devices which need at least as possible scarce resources and energy to manufacture it.
- Extending the lifespan of computers.
- Designing IT devices and components which can either be fully recycled or are biodegradable.

Green IT as part of the CSR policy will also have positive effects on the good will of employees, customers, business partners, and people in general.

1.4.-DEFINING GREEN IT

Green IT is about greening the IT ecosystem which includes networks, the Web and an interconnected and dynamic relationship map that shows how various components influence and impact other components. “The Green IT ecosystem represents a way of thinking holistically about what, and why IT operates and about who and what their operations impact”.

The components of the IT ecosystem include:

- All computer hardware, software, and networks used inside an organization.
- Management strategy responsible for purchasing, implementing, running, and disposing of hardware when no longer needed.
- The people and the organizational culture that makes all the infrastructure and activities in the preceding bullets possible.
- The systems and networks that connect with the organization’s suppliers, customers and partners.

2.-LIFECYCLE MANAGEMENT

The **lifecycle** of a product includes all the production processes and services associated with the product lifecycle. Starting with the extraction of raw materials, production of semi-manufactures, production of the end product, usage of the end product up to its retirement, recycling or disposal. Packaging, transportation, storage, retail, and other activities between the stages are included where relevant. This product lifecycle is therefore identical to the complete supply chain of the product plus its use and end-of-life treatment.

2.1.-METHODS TO EVALUATE GREEN CREDENTIALS

Controlling the input is essential for the reduction of the ecological footprint during the operational use and end-of-life stages. The acquisition process is the toll-gate for this input. The acquisition process starts with the definition of requirements. By basing these requirements on business needs and criteria from the Green IT policy, products and suppliers can be evaluated (**Green purchasing**).

2.1.1.-ENERGY STAR

A purchasing department can check the Green credentials of a product by looking for the so called ENERGY STAR label. ENERGY STAR is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy aimed to save money and protect the environment through energy efficient products and practices.

2.1.2.-EPEAT

EPEAT is a comprehensive environmental rating that helps identify greener computers and other electronic equipment. EPEAT currently covers desktops, laptops/notebooks, workstations, thin clients and displays. Imaging devices have been announced (2012), later on also servers and mobile devices will be included.

2.2.-ENERGY STAR VS. EPEAT

EPEAT is a more comprehensive measure of reduced environmental impact than ENERGY STAR, as ENERGY STAR covers only energy efficiency. EPEAT's environmental criteria cover the Complete product lifecycle. EPEAT-registered products meet anywhere from 21 to 42 criteria in addition to the latest ENERGY STAR standard.

2.3.-THE DEFINITION OF E-WASTE

Electronic waste ("e-waste") is defined as "a type of waste, consisting of any broken or unwanted electrical or electronic device". As in most offices the average life-time of computer equipment is about three to five years, it's obvious the amount of e-waste is a serious issue.

Government and electronics manufacturers have realized that old equipment cannot just be dumped in landfills, because this will cause health issues. Also, we cannot store all this discarded equipment ad infinitum. It is clear that the solution must start with the design of electronic equipment. International laws and legislation forces manufactures to avoid hazardous materials and to use biodegradable materials and design for recycling or reuse. However, society has to deal with old equipment which has been manufactured some years ago.

2.2.1.-NEGATIVE IMPACT OF E-WASTE

In its original state electronic equipment is harmless. However, when discarded it generates persistent toxic substances and releases harmful compounds into the air. Persistent toxic substances and other heavy metals may end up in the ocean and re-distributed into the environment. This may cause bio-accumulation and biomagnification, and can affect each of us in one way or another.

Bio-accumulation occurs when an organism absorbs a toxic substance at a rate greater than that at which the substance is lost. The longer the biological half-life of the substance the greater the risk of chronic poisoning, even if environmental levels of the toxin are not very high.

Biomagnification is the sequence of processes in an ecosystem by which higher concentrations of a particular chemical are reached in organisms higher up the food chain, generally through a series of prey-predator relationships.

2.2.2-METHODS FOR END-OF-LIFE MANAGEMENT

All good things must come to an end, and this also applies to IT assets. As waste is recognized as a serious issue in the natural environment, best practices have been developed to deal with waste in real life.

