IAFeS Edition

ARISTOTELIAN THINKING IMPACT in the Technological Evolution and Social Progress

15th NETTIES Conference
(Network Entities)
Piraeus University of Applied Sciences (P.U.A.S), Athens
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1 Preface

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INTRODUCTION

4 Aristotle and Alexander: from Thinking to Practicing Politics

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Despite the fact that Alexander the Great is easily visualized as a military agent and reformer, it becomes gradually more popular to evaluate him as a political instigator. The influence of his former tutor, Aristotle, and the impact of Aristotelian political philosophy on the policies that Alexander exerted during his attempt to organize the institutional function of his newly founded empire is the focus of the work at hand. Aristotle's principles of political philosophy are compared and contrasted to various decisions and reforms of Alexander, that allow us to infer that at least some of his former tutor's ideas had informed the way that Alexander regarded politics.

4.1 Introduction

The conquest of the East by Alexander the Great informed not only the geography and the politics of the known world, but still raises issues of contemporary interest, concerning multiculturalism, cultural integration and even mechanisms of organization governance.(1) Alexander was an exceptional personality, with progressive ideas that surpassed its times, especially those regarding cultural fusion and the creation of a state comprised of equally functional individuals, transgressing concepts of ethnocentrism.(2) Even if it is easier to think of Alexander as a military leader and not as a political instigator or reformer, it is exactly this that should draw our attention.(3) It is also interesting to relate the political implementations of Alexander in relation to the political ideas of his tutor, Aristotle and contemplate on the impact of Aristotelian thinking on his tutee, Alexander. I will try to consider the effect of Aristotelian political thought on Alexander's policy, concentrating on the principle doctrines of Aristotle's political philosophy.

4.2 Aristotle's political thinking and Alexander's political implementation

From a methodological point of view, our first concern should be the lack of a written corpus or precise information regarding the teaching of Aristotle to Alexander, during the time that the first was invited by Philip II to tutor the young prince. Aristotle's written work was composed after his fleeing from Macedonia to Athens as resident alien between 335-323 B.C. It is during this period that he worked on the *Politics.* He returned to Macedonia after the death of Alexander, in fear of persecution due to his connection with the royal court of Pella. Despite the lack of precise information regarding the teaching of Alexander, we can infer the main principles from later sources, such as Plutarch's, *Life of Alexander,* where he states that "It would appear that Alexander received from him not only his doctrines of Morals

and of Politics, but also something of those more abstruse and profound theories which these philosophers, by the very names they gave them, professed to reserve for oral communication to the initiated, and did not allow many to become acquainted with".(4) According to Plutarch (*Life of Alexander*) the works of Aristotle were published when Alexander was away on his campaign, causing the complaints of Alexander who wished to be the sole beneficiary of his tutor's political teaching:

[7.6] *For when he was in Asia, and heard Aristotle had published some treatises of that kind, he wrote to him, using very plain language to him in behalf of philosophy, the following letter.*

[7.7] *Alexander to Aristotle, greeting. You have not done well to publish your books of oral doctrine; for what is there now that we excel others in, if those things which we have been particularly instructed in be laid open to all? For my part, I assure you, I had rather excel others in the knowledge of what is excellent, than in the extent of my power and dominion. Farewell.*

[7.8] *And Aristotle, soothing this passion for pre-eminence, speaks, in his excuse for himself, of these doctrines as in fact both published and not published:*

[7.9*] as indeed, to say the truth, his books on metaphysics are written in a style which makes them useless for ordinary teaching, and instructive only, in the way of memoranda, for those who have been already conversant in that sort of learning.*

In any case we can safely infer that Aristotle's expressed an idea of naturalism in his political philosophy, immediately influenced by his observation of nature; his interest in comparative politics and his sympathies for democracy as well as monarchy may have been encouraged by his travels and experience of diverse political systems; he criticizes harshly, while borrowing extensively, from Plato's *Republic*, *Statesman*, and *Laws*; and his own *Politics* is intended to guide rulers and statesmen.

4.2.1 Principle of teleology

According to Miller, Aristotle begins the *Politics* by invoking the concept of nature. In the *Physics* Aristotle identifies the nature of a thing above all with its end or final cause (*Physiscs* II.2.194a28–9, 8.199b15–18). The end of a thing is also its function (*Eudemian Ethics* II.1.1219a8), which is its defining principle (*Meteorology* IV.12.390a10–11). On Aristotle's view plants and animals are paradigm cases of natural existents, because they have a nature in the sense of an internal causal principle which explains how it comes into being and behaves (*Phys*. II.1.192b32–3). For example, an acorn has an inherent tendency to grow into an oak tree, so that the tree exists by nature rather than by craft or by chance. The thesis that human beings have a natural function has a fundamental place in th*e Eudemian Ethics* II.1, *Nicomachean Ethics* I.7, and *Politics* I.2. Thus teleology is crucial for the political naturalism which is at the foundation of Aristotle's political philosophy.(5)

It seems that Alexander's inherent wish to become a leader and transgress limits and limitations (6) was recognized very early by his own father, as we infer

from the anecdote on the story of the horse Bucephalas, recounted by Plutarch, who connects this story with his version of how the tutorship of Aristotle came to be: "Philip and his company were speechless with anxiety at first; but when Alexander made the turn in proper fashion and came back to them proud and exultant, all the rest broke into loud cries, but his father, as we are told, actually shed tears of joy, and when Alexander had dismounted, kissed him, saying: "My son, seek thee out a kingdom equal to thyself;

Macedonia has not room for thee." And since Philip saw that his son's nature was unyielding and that he resisted compulsion, but was easily led by reasoning into the path of duty, he himself tried to persuade rather than to command him; and because he would not wholly entrust the direction and training of the boy to the ordinary teachers of poetry and the formal studies, feeling that it was a matter of too great importance, and, in the words of Sophocles "A task for many bits and rudder-sweeps as well," he sent for the most famous and learned of philosophers, Aristotle, and paid him a noble and appropriate tuition-fee. The city of Stageira, that is, of which Aristotle was a native, and which he had himself destroyed, he peopled again, and restored to it those of its citizens who were in exile or slavery".(7)

4.2.2 Principle of community

Miller draws attention to the second principle of Aristotle's political philosophy, which is the principle of community: Aristotle maintains that the city-state is the most complete community, because it attains the limit of self-sufficiency, so that it can exist for the sake of the good life (*Pol*. I.2.1252b27–30). The *Politics* further argues that it is part of the nature of human beings that they are political or adapted for life in the city-state. Individuals outside of the city-state are not self-sufficient, because they depend on the community not only for material necessities but also for education and moral habituation. "Just as, when perfected, a human is the best of animals, so also when separated from law and justice, he is the worst of all" (1253a31–3). On Aristotle's view, then, human beings must be subject to the authority of the city-state in order to attain the good life. The following principle concerns how authority should be exercised within a community.(8)
In his essay "On the Fortune and Courage of Alexander the Great" Plutarch claims that "by founding over seventy cities (*poleis*) among the barbarian tribes and seeding Asia with Greek magistrates, Alexander conquered its undomesticated and beastly way of life" (*Mor.* 328E). This is a notion distinctively different to the principles of Plato, for example, who did not advise for the founding of cities. It is in accordance, though, with the aforementioned principles of Aristotle. It is not important to numerate the precise number of cities founded by Alexander, as both ancient and modern scholarship is divided, nevertheless recognizes the importance of the cities.(9) Arrian provides us with a revealing account on Alexander's intentions, which is in accordance with the Aristotelian thinking. Arrian refers to the foundation of a new city at the Tanais river, Alexandria Eskhata (151-153):

He was himself planning to found a city on the Tanais, and to give it his own name. For in his view the site was suitable for the city to rise to greatness, and it would be well placed for any eventual invasion of Scythia and as a defence bastion of the country against the raids of the barbarians dwelling on the other side of the river. He thought the city would actually rise to greatness because of the number of settlers and the splendour of its name.(10)

Of course, Aristotle might have been provided the general model, but the fine-tuning of this belonged to Alexander. "The degree of independence which individual *poleis*, or groups of *poleis*, enjoyed in the new age of empires and kingships appears to have varied widely. While it is striking that Aristotle seems to have paid so little attention to the new emerging political realities (the shape and consequences of which may in any case not have been so obvious to a contemporary observer as they are to us) the old issues about the organization and administration of the polis still remained very much alive".(11) The most crucial factor is the realization of the necessity of the city-state that became the means of stability for the new formation of his empire and the cradle of a civilization that aspired to the merging of

both old and new, local and imported from the Greek world and the importance of the *polis*, as stated by Aristotle.

4.2.3 Principle of rulership

"Aristotle believes that the existence and well-being of any system requires the presence of a ruling element: "Whenever a thing is established out of a number of things and becomes a single common thing, there always appears in it a ruler and ruled …. This [relation] is present in living things, but it derives from all of nature" (1254a28–32). Just as an animal or plant can survive and flourish only if its soul rules over its body (*Pol*. I.5.1254a34–6, *De Anima* I.5.410b10–15; compare Plato *Phaedo* 79e-80a), a human community can possess the necessary order only if it has a ruling element which is in a position of authority, just as an army can possess order only if it has a commander in control. Although Aristotle follows Plato in accepting this principle, he rejects Plato's further claim that a single science of ruling is appropriate for all (see Plato *Statesman* 258e-259c. For Aristotle different forms of rule are required for different systems: e.g., political rule for citizens and despotic rule for slaves. The imposition of an inappropriate form of rule results in disorder and injustice. This point becomes clearer in the light of the following corollary of the principle of rulership".(12)
Let us compare the views of Aristotle to the notions of rulership by Alexander. First of all, with regards to the notions on political rule for citizens and despotic rule for slaves. Aristotle asserted this influence particularly with regard to the so-called barbarians–a term that was used to characterize essentially all non-Greeks. Alexander himself was already passionately anti-Persian; and Aristotle provided him with the intellectual justifications for his fated and inherited mission. Aristotle believed that slavery was a natural institution, and that barbarians were by nature meant to be slaves. He therefore encouraged Alexander to be a leader to Greeks and a despot to barbarians, treating the former as friends and the latter as beasts. It is however an utter exaggeration to say that Aristotle considered all barbarians to be natural slaves. Aristotle says that freedom should be offered to slaves as a reward (4. 7. 10. 1330a32-33). However, slavery is not a permanent situation and according to Aristotle, one could be educated out of slavery, perhaps under a virtuous master. Nowhere does Aristotle claim that it is unjust to free natural slaves. He says that is it is unjust to enslave those who are not natural slaves. In short, masters are those who are naturally virtuous and slaves are those who had wrong upbringing or are corrupted. Many "barbarians" are in this condition, but, rationally speaking, many Greeks would be in this position, too. It is true, of course, according
Then with regards to the notion of the ruling element in position of authority: according to Appian, "it is a conceivable theory that, if he both believed that all men were brothers, and also desired that the peoples of the world he knew, whether in his Empire or not, should live in unity and concord (see. App. 25. Vi), then he must have desired to bring all people under his rule in order to promote unity".(13)

4.2.4 Principle of the rule of reason

"Aristotle agrees with Plato's dictum that, whenever a system contains a rational element, it is appropriate for it to rule over the nonrational part, because the rational element alone knows what is best for the whole (see Plato *Republic* IV.441e). Aristotle elaborates on this principle: observing that different individuals can expemplify rationality in different ways and to different degrees, he maintains that different modes of rule are appropriate for different

sorts of ruler and subject. For example, a child has a deliberative capacity, but it is undeveloped and incomplete in comparison with an adult's, so that a child is a fit subject for paternal rule by its father; but paternal rule would be inappropriate between two adults who both have mature rational capacities (see *Politics* I.13 and III.6). In a political context the principle of the rule of reason also implies that different constitutions are appropriate for different city-states depending on the rational capacities of their citizens. This is an important consideration, for example, in Aristotle's discussions of democracy and the rule of law (see *Politics* III.11 and 15–16)".(14)

Without a doubt Alexander had realized the necessity of variable constitutions according to the rational capacities of their citizens. The most noted example is the issue of his deification, which led to much opposition on the side of his Macedonians who could not fathom the political benefits – even political need – for this decision.(15) In the 6th paragraph of the so-called stone or stēlē of Behistun(16), Darius claims the legacy of his sovereignty as deriving straight from Ahura-Mazda.(17) Divine origin and protection had been the characteristic of all Egyptian and Persian rulers.

Most of our ancient sources agree that what Alexander really wanted from his visit to Ammun was confirmation of his divine patronage and his right to rule the world.(18) It is the story recorded by Curtius Rufus, who describes the famous linguistic slip of the priest of Ammun, who greeted Alexander as *son of Zeus,* simply by changing the final "n" of the vocative case into an "s", thus turning it into a genitive, translated as 'Hail, son of Zeus!" instead of 'Hail, young man!'. Curtius Rufus concludes his anecdote by informing us that Alexander not only allowed everyone to address him as Son of Zeus, but he also gave orders that this should be carried out.(19) Plutarch states that "nothing happened to Alexander, nor was he drunk; he was merely using the fame of his divinity only to subdue others".(20) Curtius also agrees that by doing this, Alexander simply wanted to boast the glory of his achievements.(21) Why did he do this?

If Alexander wanted to legalize his ascendancy to the throne of Persia as a legal heir of the Achaemenid line of Kings, he had to demonstrate to his local subjects his divine origin, just like their previous rulers. Of course this led to great conflicts with his Macedonian associates, who, according to Curtius, "turned their back to their king, who was persistently talking about his immortality, making them feel awkward".(22) It is true, that the only irresolute problem for Alexander was the making of his associates see eye-to-eye his visionary concept of a progressive joint administration of their new empire.

The same can be told of Alexander's decision to start wearing Persian attire – again, a burning issue which brought great discomfort to his Macedonian companions. Plutarch explains it in the most evident manner: "Considering carefully this order of affairs, Alexander did not favour the Median raiment, but preferred the Persian, for it was much more simple than the Median. Since he deprecated the unusual and theatrical varieties of foreign adornment, such as the tiara and the full-sleeved jacket and trousers, he wore a composite dress adapted from both Persian and Macedonian fashion, as Eratosthenes has recorded. As a philosopher what he wore was [p. 403] a matter of indifference, but as sovereign of both nations and benevolent king he strove to acquire the goodwill of the conquered by showing respect for their apparel, so that they might continue constant in loving the Macedonians as rulers, and might not feel hate toward them as enemies."(23)

4.3 Conclusion

Although difficult to judge the immediate influence of Aristotle's philosophy of politics on his young student, Alexander, the comparison of Aristotle's principle doctrines of political

thought to the implantation of Alexander's policies, reveals a close connection between the two great thinkers. Alexander definitely did not follow uncritically his tutor's teachings, as is evident in his treatment of his Persian subjects, whom he did not consider barbarians as Aristotle might have envisaged, but appointed many Persians in high ranking positions in the army and the administration of the satrapies. However, he was influenced in many regards by his tutor's ideas and applied them extensively while trying to create a model administration for his newly founded empire. In this respect Aristotle's most noted political wish as expressed via his *Politics*, that is the teaching of a ruler, was accomplished. Most of all, Alexander was the realization of every tutor's dream: teach someone the wish for life-long-learning. This is what we infer when we allow once more Plutarch to sum up the influence of Aristotle on Alexander with the following words: "For a while he loved and cherished Aristotle no less, as he was wont to say himself, than if he had been his father, giving this reason for it, that as he had received life from the one, so the other had taught him to live well. But afterwards, upon some mistrust of him, yet not so great as to make him do him any hurt, his familiarity and friendly kindness to him abated so much of its former force and affection, as to make it evident he was alienated from him. However, his violent thirst after and passion for learning, which were once implanted, still grew up with him, and never decayed".(24)

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5 ARISTOTLE, BEAUTY AND MULTISENSORY IMAGERY IN MODERN TIMES

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5.1 ABSTRACT

The pursuit of the paper rests on the investigation of the ideal of beauty, arts through the senses and imagination that is related to the organization, structure, and workings of the human brain. The Theory of Mind which goes back at least to Aristotle takes as its starting point commonsense mental states, such as thoughts, beliefs, desires, perceptions and imaging.
An increasing number of psychologists, neuroscientists, and philosophers study the neural basis of the process of imagination and creativity which is focused on cognitive and systems neuroscience.
The neuroscience of aesthetics analysis offers insight into emotion, the adaptability of neural structures in different human beings, and understanding of the relation between complex neural systems ranging from those underpinning imagery to those supporting memory and identity.
Employing the tools of cognitive neuroscience traditionally addressed within humanities, and combining both our knowledge and our ways of knowing, this paper offers Aristotle's and a modern perspective on aesthetics, imagery, new vision on emotions, knowledge and human cognition.

5.2 Key words:

Beauty, Aristotle, neuroscience, imagery neural systems, cognition

An attempt to speak about the power of beauty and multisensory imagery would locate its ideal starting point in asking what is Beauty? what is Aesthetics? what is Imagery? What is this potential that arouses our emotions when we read literary work, listen to music or see wonderful paintings? This suggests that the aesthetic quality of creativity and imagination is indispensable to its identity, whereas with philosophy it is the intellectual quality of ideas propounded that is as well crucial.
The idea is that beauty applies to any kind of things, and to judge anything beautiful is always the highest form of aesthetic praise. Philosophical aesthetics has tried to rescue the concept of beauty, suggesting that it is the best general concept of "aesthetic value". It is hard to imagine a subject matter more elusive than aesthetics. It is easy enough to characterize it as the philosophy of art, or to capture greater portion of the aesthetic tradition, the philosophy of art and beauty- but once said it brings other questions over mind "What is art?" "What is creativity?"

The classical conception is that beauty consists of an arrangement of integral parts into a coherent whole, according to proportion, harmony, symmetry, and similar notions. This is a primal Western conception of beauty, and is exemplified in classical and neo-classical architecture, sculpture, literature, and music wherever they appear. Aristotle says in the Poetics that “to be beautiful, a living creature, and every whole made up of parts, must … present a certain order in its arrangement of parts” (Aristotle, volume 2, 2322).
And in the Metaphysics’, he claims “The chief forms of beauty are order and symmetry and definiteness, which the mathematical sciences demonstrate in a special degree” (Aristotle, volume 2 1705 [1078a36]). This view, as Aristotle implies, sometimes resembles a mathematical formula, such as the golden section, but it need not be thought of in such strict terms. The conception is exemplified above all in such texts as Euclid's Elements and such works of architecture as the Parthenon, and, again, by the Canon of the sculptor Polycleitus (late fifth/early fourth century BCE).
The ancient Roman architect Vitruvius gives as good a characterization of the classical conception as any, both in its complexities and, appropriately enough, in its underlying unity:
Architecture consists of Order, which in Greek is called taxis, and arrangement, which the Greeks name diathesis, and of Proportion and Symmetry and Decor and Distribution, which in Greek is called oeconomia. Order is the balanced adjustment of the details of the work separately, and as to the whole, the arrangement of the proportion with a view to a symmetrical result.
Symmetry also is the appropriate harmony arising out of the details of the work itself: it’s the correspondence of each given detail to the form of the design. As in the human body, from cubit, foot, palm, inch and other small parts come the symmetric quality of eurhythmy. (Vitruvius, 26–27).
What follows is an attempt to extrapolate from the realm of general aesthetics a more specific concept of beauty, which can be included within the realm of philosophy. Indeed, insofar as art is the object of inquiry of aesthetic and not of logic, and is the process of creativity and imagination not of thought, any talk of logic of creativity might seem misleading.

Aquinas, in a typically Aristotelian pluralist formulation, says that “There are three requirements for beauty. Firstly, integrity or perfection—for if something is impaired it is ugly. Then there is due proportion or consonance. And, clarity: whence things that are brightly colored are called beautiful” (Summa Theologica I, 39, 8). Aquinas definition of beauty is as “that which pleases merely on being perceived.” In the distinctly aesthetic domain, we find D. Diderot in the 18th c. proclaiming: “Beauty is a
term we apply to an infinitude of being; but whatever differences there may be among these beings, it must be the case either that we falsely apply the term beautiful, or that there is in all these beings a quality of which the term beauty is the sign.” But it was E. Kant who tried to develop a detailed account of beauty in his Critique of Judgment, the book that was to transform the way we conceive beauty. In case of literature, the form is not strictly perceptible. If literature may be aesthetically good (whatever point may ultimately attach to judging it so), and if “beauty” is the term for aesthetic value, then we should acknowledge that a novel or short story or a poem can be beautiful.

In the 18th c. when D. Hume, T. Reid and E. Kant were writing, beauty was a preeminent aesthetic attainment normally sharing the limelight only with the sublime and standing in opposition to the ugly.

So, we can say that an approach to literary(artistic) creation is the philosophical study of art form to the extent that we take the same attitude to it as we do to art. The notion of any aesthetic attitude is thus of central importance. It is commonly held to be a style of perception concerned neither with the information to be gained from the literary work-novel, short story, poem, play-nor with their practical uses, but rather with the qualities of the contemplative experience itself. Works of literature are human productions designed to reward this kind of attention. Aesthetics aims to define the concept of the aesthetic attitude and the work of literature. It asks to what extent works of literature should be representative, and to what extent they should express the emotions of their creators. It aims to identify the characteristic value, which we call beauty, of aesthetically satisfying works of creative literature. It considers the problem of the nature of a work of literary existence, and that of the relation between aesthetic and moral value of a literary work. (Graham G., Philosophy of the Arts: Introduction to Aesthetics, 1997)

But what is this basis on which we call some works and not others beautiful? It must be proportion, genre, style, purpose, and proper use of language. And according to E. Kant, the relevant response that is central to finding something beautiful is one of pleasure; the experience of beauty relates to pleasure.
The relationship between beauty, imagery and mental representations induced through perception has been the subject of philosophical discussion since antiquity and of vigorous scientific debate in the last century.

The debates around imagination and internal representation or imagery are like those surrounding emotion. Plato believed that literature functions primarily if not exclusively by evoking images. These images he saw as a source of danger, for in their similarity to the images of perception and to the echoes of things as they are (the ideals, which we cannot directly perceive), the images of poetry can trick us with their simulation of truth.
The evocation of images then puts poets on a par with painters, as peddlers of falsity. However, from Aristotle through the Renaissance, rhetoricians have seen the production of mental images as necessary to the evocation of emotion by artful language, and the vividness of the images the writer evokes have been understood as central to the arts of words and persuasion.

For Aristotle, painting, poetry and music (the last by extension, for poetry was generally accompanied by instruments and was itself sung) were linked because they were all imitative. Music was understood in ancient Greece to mimic human voice, and thus to mimic emotional expressions. Aristotle argued that while the tools of imitation differ in some of the arts (in painting and poetry it is color and line versus word) and are the same in others (poetry and music share sound, rhythm, and meter), both form and content ultimately work to unite the arts, because we use the arts as extensions of and tools for our understanding of the world.

Both Plato and Aristotle defined the concept of imagination as a picturing activity. For Plato, the forms that hold meaning exist in a transcendental world, completely apart (and above) the material world. In the Timeaus, Plato describes the creation of the cosmos (nature) by a divine craftsman/architect (demiurge) as a physical representation of this Ideal other-world. Art by humans, an exercise of the imagination, is therefore seen as a copy of a copy since the artist makes a copy of nature (a painting of a flower for example) that is already a copy made by the demiurge of the Ideal flower (which exists only as an idea). For Plato, these second-hand copies have the power to lead us away from pure reason (the Spiritual/Good),

and towards the illusory world of imitations (the Material/Bad). Imagination then, for Plato, turns us away from reason (the ultimate good) and towards idolatry and illusion.

Aristotle, firmly embraced the material sensory world as the source for ideas that lead to knowledge. His realist epistemology moved the discussion of imagination from the metaphysical to the psychological level and was a radical development and departure from Plato's idealist epistemology. By embedding the meaning of reality in the sensible/tangible world, rather than in a transcendental other-world, Aristotle redefines the role of imagination and the importance of the senses. The seat of the soul was in the heart for Aristotle, and the head was a cooling system for thought. Both acts brought meaning to within grasp of the sensing, imagining, thinking human.

Aristotelian philosophy explained five senses (sight, hearing, smell, taste and touch), each with their own receiving organ (eye, ear, nose, tongue and skin and a medium that conjoins them. Sensation in the form of multi-sensory impressions was required for the mind to perceive impressions of the world. Aristotle, in his treatise On Memory states, "Without an image, thinking is impossible." (14) These sensory impressions were processed by the "common sense" where the image of figure, size, number, movement and rest were generated and merged with the sensation data from each of the five senses to create an image.

The Aristotelian theory of sensation identified the head as containing three ventricles which each oversaw receiving, processing and storing of sensory information. These ventricles were depicted as three "spaces" located at the front, center and back of the head. Common sense was situated, like a filter, in the front section of the front ventricle. Once processed, these images were passed along to the larger ventricle space of phantasia or imagination that then informed the second ventricle, estimation (recognition) and finally passed the image on to the third ventricle, memory.

For Aristotle, memory, like a reservoir of stored sensations, was the main source of our images. While he tries to define, what imagination is, Aristotle finds that it is sort of a species of sensation, but special in that it has privileged contact with reason. Aristotle does conclude his discussion on the imagination in his On The Soul (429a5) by drawing attention to the etymological connection between sight and imagination: "As sight is the most highly developed sense, the name fantasia (imagination) has been formed from faoV (light) because it is not possible to see without light."

Aristotle defines the imagination as "the movement which results upon an actual sensation." In other words, it is the process by which an impression of the senses is pictured and retained before the mind, and is accordingly the basis of memory. The representative pictures which it provides form the materials of reason. Illusions and dreams are both alike due to an excitement in the organ of sense like that which would be caused by the actual presence of the sensible phenomenon.
To imagine something is to form a sort of mental representation of that thing. Imagining is typically distinguished from mental states such as perceiving, remembering and believing in that imagining S does not require (that the subject consider) S to be or have been the case, whereas the contrasting states do. It is distinguished from mental states such as desiring or anticipating in that imagining S does not require that the subject wish or expect S to be the case, whereas the contrasting states do. It is also sometimes distinguished from mental

states such as conceiving and supposing, because imagining S requires some sort of quasi-sensory or positive representation of S, whereas the contrasting states do not.
Contemporary philosophical discussions of the imagination have been primarily focused on three sets of topics. Work in philosophy of mind and philosophy of psychology has explored a cluster of issues concerning the phenomenology and cognitive architecture of imagination, examining the ways that imagination differs from and resembles other mental states both phenomenologically and functionally, and investigating the roles that imagination may play in the understanding of self and others, and in the representation of past, future and counterfactual scenarios. Work in aesthetics has focused on issues related to imaginative engagement with fictional characters and events, identifying and offering resolutions to a few (apparent) paradoxes. And work in modal epistemology has focused on the extent to which imaginability—and its cousin conceivability—can serve as guides to possibility.

An important aspect of the beauty and richness of literature is the imagery that is evoked by choice language. Mental imagery is a cognitive function that has been intensively studied by psychologists and cognitive neuroscientists. An interesting finding that has emerged from such studies by Stephen Kosslyn and others has established that imagery and perception share substantial neural processing resources. Thus, to “see in the mind’s eye” is associated with activity in the same visual regions of the brain as those active during seeing itself.
Moreover, mental imagery is not a monolithic process, nor is its use monochromatic. Imagery can occur in other sensory modalities such as hearing, touch or smell. Imagery can also support perception, in the same modality (Kosslyn) or in a different modality (Sathian). Individuals vary widely in the extent to which they rely on verbal codes, spatial imagery that registers relationships between things or their parts, and object imagery that produces detailed “mind-pictures” of things (Kozhevnikov & Blajenkova, Sathian). These individual differences in style probably reflect corresponding differences in brain networks (Kraemer). It is interesting to speculate that writers may have particularly well developed abilities not just in their use of language for abstract verbal coding, but also in their employment of choice language to skillfully evoke mental imagery, and possibly in their brain networks. Memory is defined as the permanent possession of the sensuous picture as a copy which represents the object of which it is a picture. Recollection, or the calling back to mind the residue of memory, depends on the laws which regulate the association of our ideas. We trace the associations by starting with the thought of the object present to us, then considering what is similar, contrary or contiguous.

Reason is the source of the first principles of knowledge. Reason is opposed to the sense insofar as sensations are restricted and individual, and thought is free and universal. Also, while the senses deal with the concrete and material aspect of phenomena, reason deals with the abstract and ideal aspects. But while reason is the source of general ideas, it is so only potentially. For, it arrives at them only by a process of development in which it gradually clothes sense in thought, and it unifies and interprets sensepresentations. This work of reason in thinking beings suggests the question, “How can immaterial thought come to receive material things?” It is only possible in virtue of some community between thought and things. Aristotle recognizes an active reason which makes objects of thought. This is distinguished from passive reason which receives, combines and compares the objects of thought. Active reason makes the world intelligible, and bestows on the materials of knowledge those ideas or categories which make them accessible to thought. This is just as the sun communicates to material objects that light, without which color would be invisible, and sight would have no object. Hence, reason is the constant support of an intelligible world. While assigning reason to the soul of humans, Aristotle describes it as coming from

without, and almost seems to identify it with God as the eternal and omnipresent thinker. Even in humans, in short, reason realizes something of the essential characteristic of absolute thought -- the unity of thought as subject with thought as object.

The relatively recent advent of functional neuroimaging has allowed neuroscientists to look for brainbased evidence for or against the argument that perceptual processes underlie mental imagery. Recent investigations of imagery in many new domains and the parallel development of new meta-analytic techniques now afford us a clearer picture of the relationship between the neural processes underlying imagery and perception, and indeed between imagery and other cognitive processes. These findings have important implications for investigations of imagery and theories of cognitive processes, such as perceptually-based representational systems.

Perception describes our immediate environment. Imagery, in contrast, affords us a description of past, future and hypothetical environments. Imagery and perception are thus two sides of the same coin:
Perception relates to mental states induced by the transduction of energy external to the organism into neural representations, and imagery relates to internally-generated mental states driven by representations encoded in memory. Various forms of mental imagery have been implicated in a wide array of cognitive processes, from language comprehension (Bottini) to socially-motivated behaviors such as perspective taking (Ruby and Decety), to motor learning (Yágüez et al.) Understanding the networks supporting imagery thus provides valuable insights into many behaviors.
To elaborate Aristotle’s position regarding sensation and imagination, it is important to delineate the departure he makes from the philosophy of Plato (c. 424-347 BC) before him, and the positive influence this had for the understanding of the senses in Western thought.
Scholars continue to demonstrate that investigating aesthetic experience requires multidisciplinary inquiry, using cognitive approaches to brain and behavior for the study of music, literature, creativity, visual arts, or film.
This paper concentrated on vital issues of neuro-aesthetics to understand the relationships between beauty, emotions, the complex mixture of pleasure and displeasure to help create aesthetic experience for the attainment of knowledge.

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6 Theory of Science: An Aristotelian approach

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7 Aristotelian Thinking vs. Artificial Intelligence

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7.1 Abstract

Scientifically, Artificial Intelligence (AI) is intelligence exhibited by machines, resp. by software. Technologically, AI is the result of data inputs, algorithms, and computational power. Colloquially, we speak of AI when a machine mimics cognitive functions such as learning or problem solving. Philosophically, the main AI question is "Can there be an intelligent machine at all?" Would Aristotle, who was the first to define and formalize logic, be fond of machine learning or would he condemn it for the lack of ethics? Is AI something that mankind should embrace or fear? Based on definitions of so called weak and strong AI recent leaps forward in development, current success stories as well as myths and facts are presented. Basic features of machine learning and artificial neural networks, which essentially contribute to the exponential growth of AI, are explained and examples including current realizations of androids are given. The hypothesis, that exponentially growing progress in AI achievements gives rise to the so-called “singularity” will result in unfathomable changes to human civilization will be discussed. Notions and believes of relevant stakeholders from leading global players and renown AI-protagonists are contraposed.

7.2 Keywords

Artificial Intelligence, machine learning, singularity, exponential growth

INNOVATION

8 Block Chain – The Technology behind Cryptocurrencies like Bitcoin, Ethereum and the Internet of Values

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8.1 Introduction

Blockchain establishes a system of creating a distributed public ledger or register in the digital online world. This allows participants to know for sure that a digital event happened by creating an immutable record in a public ledger. It opens the door for developing a democratic and scalable digital society not based on any kind of centralized authority. There are tremendous opportunities in this disruptive technology and the Blockchain revolution has just begun.
“The technology likely to have the greatest impact on the next few decades had arrived. And it’s not social media. It’s not big data. It’s not robotics. It’s not even AI. You’ll be surprised to learn that it’s the underlying technology of digital currencies like Bitcoin. It’s called the Blockchain.” (Source: Don Tapscott)

8.2 Bitcoin Payment system

The Bitcoin payment system is somehow fancy and exiting but it´s only one well known application based on the revolutionary Blockchain technology. The implementation of the Bitcoin application is used as an example to show how the Blockchain technology works.

“Blockchain is to Bitcoin, what the internet is to email. A big electronic system, on top of which you can build applications. Currency is just one.” (Source: Sally Davies, FT Technology Reporter)

8.3 Topics in this Presentation

- Blockchain as Technological Revolution
- Internet of Information
- Financial Crisis 2007/2008 and Satoshi Nakamoto, November 2008
- Internet of Values
- The Man in the Middle
- The Double Spending Problem
- Public Ledger
- Blockchain and underlying Technologies
- RSA Crypto System named after R.L. Rivest, A. Shamir, and L. Adleman
- Private / Public Key Cryptography

- Hashing and SHA-256 secure hash algorithm
- Bitcoin: A Peer to Peer Electronic Cash System
- Bitcoin Transaction
- The Miners
- Adding Blocks to the Chain
- Ethereum, Platform for smart Contracts
- Future Outlooks

E-Mobility and the Blockchain: The „Car eWallet“

8.4 Using Bitcoins

Bitcoin.org - https://bitcoin.org/en/
Get a Wallet, Breadwallet - https://breadwallet.com/
Securing your wallet
Bitcoin price is volatile
Bitcoin payments are irreversible
Bitcoin is not anonymous
Unconfirmed transactions aren't secure
Bitcoin is still experimental
Government taxes and regulations

8.5 Conclusion

"At its core, the Blockchain is a global database – an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions, but virtually everything of value and importance to humankind: birth and death certificates, marriage licenses, deeds and titles of ownership, educational degrees, financial accounts, medical procedures, insurance claims, votes, transactions between smart objects and anything else that can be expressed in code." (Source: Don Tapscott)

The potential impacts of Blockchain technology on society and the global economy are hugely significant.

“Every human being on the planet with a smart device will have equal access. Expanding the total addressable market by a factor of 4” (Source: Brock Pierce)

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9 Oulu – new rise after Nokia Mobile Phones

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9.1 Abstract

Oulu, The Capital of Northern Scandinavia is the slogan inspired by Oulu city marketing department. The “Miracle of Oulu” has been mentioned and presented e.g. in practically all Netties conferences. The success story which started in the beginning of 1990´s, was possible due to long lasting and intensive scientific work and at the same time raised specific education which covered all levels from basic elementary schools to universities. “Nokia-tune” and the brand of Nokia were well-known throughout the whole world. The City of Oulu and it´s both universities: scientific Oulu University and more practical Oulu University of Applied Sciences were tuned to educate as many ICT-specialists as possible. Lots of engineers moved to Oulu from other districts of Finland and in many cases from abroad. Large number of SME´s and even bigger companies worked practically only for Nokia as subcontractors. City of Oulu got taxes more than ever. The influence of Nokia in all means was very high. Due this reason Nokia-based risks grew huge for the whole society.
After year 2010 happened several dramatic changes. Nokia started co-operation with Microsoft. Successful own operating system Symbian was replaced by Windows and finally the whole mobile phone business was sold to Microsoft with results that we all know now. At the end of year 2000 Nokia had in Finland 24500 employees. At the end of 2014 the amount was only 7000. Oulu region lost 3500 Nokia-based working places. Globally Nokia is still a big company with its more than 90 000 employees, but the best business and knowledge of Oulu, mobile phones technology, their design and production, has practically disappeared.
Many changes have been necessary after those dramatic years to keep wheels running in Oulu. Still today the amount of ICT-employees in city is higher than ever. This has been possible after strong and successful marketing of city and the huge potential of new ICT-knowledge-based products and services. Many large ICT-companies have been established to district and over 300 new small and micro-sized companies are now in rapid growth. Shortage of ICT-specialists is already reality.
State of art-report looks how this has been possible and what kind operations has been done during years 2010 – 2016. Connection to Aristotelian thinking is thin but somehow similar than his theories of causality.

9.2 Introduction

Oulu, The Capital of Northern Scandinavia is the slogan inspired by Oulu city marketing department. The “Miracle of Oulu” is a slogan in many conferences and other occasions. The success story since late 1980’s is based on long lasting and intensive scientific work and at the same time raised specific education which covered all levels from basic elementary schools to universities. “Nokia-tune” and the brand of Nokia Phones were well-known practically throughout the whole world. The City of Oulu with its 200000 inhabitants has two

universities: scientific Oulu University and more practical Oulu University of Applied Sciences. Both of them educated as many ICT-specialists as possible. A great number of engineers also moved to Oulu from other districts of Finland and in many cases even from abroad. Large number of SME´s and even bigger companies worked practically only for Nokia as subcontractors. City of Oulu got tax income more than ever. The influence of Nokia in all means was very high. It meant that Nokia-based risks grew huge for the whole society. It was difficult even to imagine, what might happen if major changes might happen. The growth of the business overwhelmed all questions.

Figure 1: Mobile phone innovations made in Oulu 1981 - 2015.

9.3 From Nokia to Microsoft

After year 2010 happened several dramatic changes. World economy was in recession. Nokia started deep co-operation with Microsoft. The own operating system Symbian was replaced by Microsoft Windows and finally the whole mobile phone business was sold to Microsoft. The result of this operation was nearly disastrous. The consequences of the operation we all know now.

At the end of the year 2000 Nokia had in Finland about 24500 employees. Instead of that at the end of year 2014 the equivalent amount was only 7000. Oulu region lost 3500 Nokia-based working places. Globally Nokia is still a big company with its more than 90 000 employees, but the best business and knowledge of Oulu, R&D of mobile phones, practically disappeared from the company. Today Nokia is a big data network-company and it tries to get big deal of growing IoT-business. Newest 5G-test networks are already in operation in Oulu area test laboratories. Numerous companies prepare new business ideas and completely new type of products based on this technology.

Figure 2: The influence of 5G technology.

9.4 Oulu after Microsoft days

Many operations have been necessary after those dramatic years to keep wheels running in Oulu. Today the amount of ICT-employees in the city is higher than ever. This has been possible due to efficient and successful marketing of the city and the huge potential of new ICT-knowledge-based products and services. The network-based way of working together with all kind of organizations – so called Oulu collaboration model, showed its efficiency once again.

Many ICT-companies settled in Oulu-area and over 300 new small and micro-sized companies are now in rapid growth. Shortage of ICT-specialists is already reality.

Ten years ago Oulu had eggs in the same basket. Nokia Phones gave work and welfare for the whole district. Education capacity prepared enough well trained new workers for the needs of ICT-industry. Research activities and research financing per capita in Oulu area was among the highest in Europe. When dramatic changes occurred media channels and newspapers were full of negative news in various media channels. ICT-sector was any more "sexy" among applicants. The result of that was that few young people started ICT-education. Not even heavy marketing did help. It took several years to change the situation nearby normal. ICT education volume in Oulu and in whole Finland is still at lower level than during most hectic years.

What actually happened? During years 2010 - 2016 Nokia diminished in Oulu 1600 employees, Microsoft 500, Broadcom 450 and Accenture 390. Together these big players fired nearly 3000 highly skilled and well-educated specialists who mainly worked in R&D. It meant that whilst sub-contractors had to fire nearly 600 workers because Nokia/Microsoft and other big players discontinued their contracts.

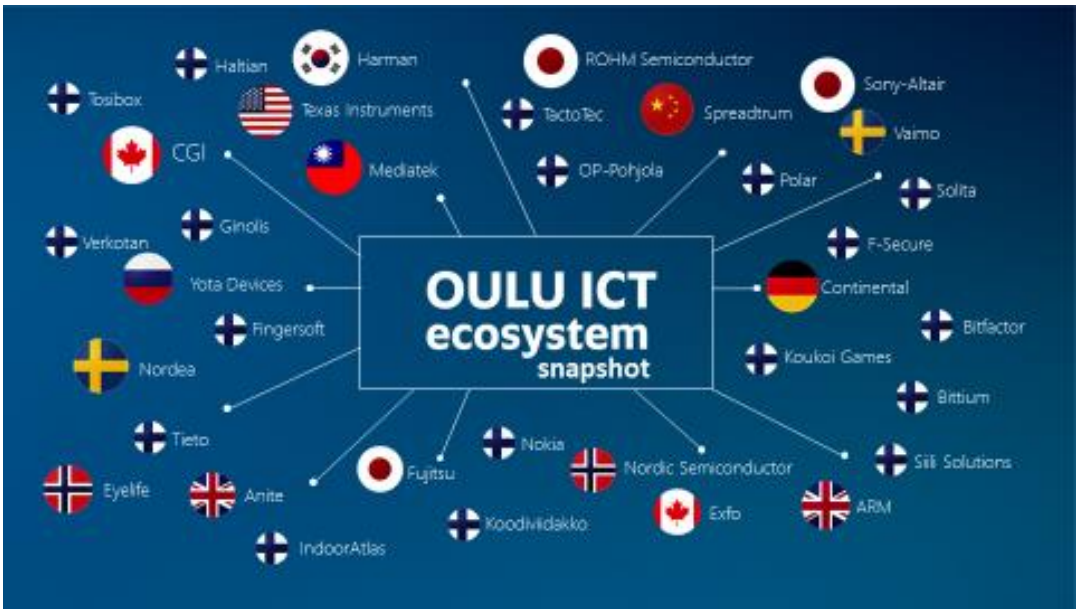

Figure 3: ICT companies and their nationalities today

9.5 Oulu 2.0

Oulu got between years 2010 – 2016 eight new R&D companies from abroad. Companies such as Mediatek (Taiwan), Nordic Semiconductor (Norway) and Spreadtrum (China) are big and they all came in the city because there was plenty of knowledge and highly skilled R&D staff.

More than 300 new companies have been founded during the same period. Largest ones of them have already more than 100 employees. A great number of those are still small or even micro-sized. Common features for most of them is rapid growth, strong networking and targeting to international markets. Most interesting and fastest growing ones work in game business. Printed intelligence is the core of the products in many new companies. Banking business has set up own ICT development centers in the city.

About 300 smaller start-ups have today about 900 workers. 2600 new ICT jobs has been generated during years 2010 - 2016. Skilled workers who like to stay in Oulu act like a honey pot for companies who need new and skilled staff. Existing global networks made it easy to find right knowledge and spread product development even in different continents, if necessary.

Both universities and City of Oulu together with state officials were immediately ready to start and finance new education programs for newly unemployed people. Surprisingly there was very little need for larger study groups. Some people finished their interrupted studies and some of them refreshed their original graduations but only few study groups started. This was surprising. Part of the phenomena was due to “Spirit of Oulu”. Most of fired workers had excellent national and international networks. Some new companies started even on the very same day when Microsoft gave the announcement of closing the whole site. Haltian is one of new companies born this way. Now they have more than 100 workers and their own new products are used form children to elderly people. Most workers came directly from original Nokia division and they had long history working together.

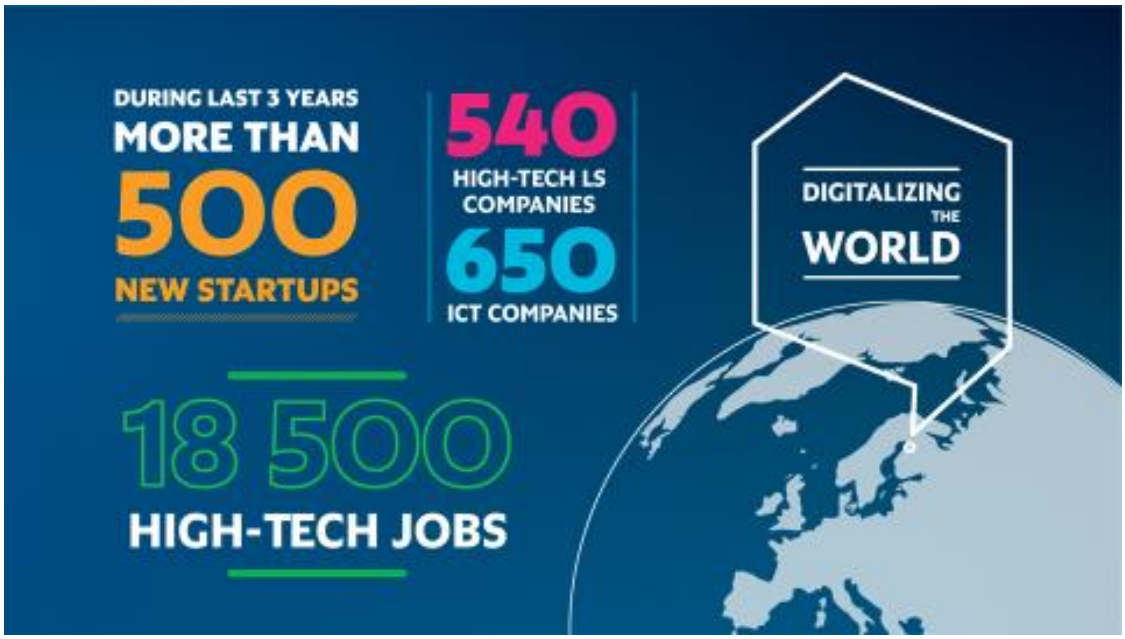

Figure 4: ICT business in Oulu today.

Before the year 2010 most ICT-companies were deeply involved in Nokia products. Only few of them, like Polar electro, had own products and own brand. This weakness was well known and often discussed but working as sub-contractor was in many cases easier. This gave work enough and there was no need for own marketing. Economically this was not very beneficial. Nokia had several contractors and price level was as low as possible.
Today it is typical for nearly all new companies that they have own product families and they sell and export those widely. Naturally they don´t sell their product millions like Nokia did but at the same time companies are not any more so depended of their contractors.

Figure 5: The influence of Oulu in ICT is global

9.6 Conclusion

This state of art-report tells how it has been possible to survive after very dramatic changes in most important business of Oulu and what kind operations has been done during years 2010 – 2016. Connection to Aristotelian thinking is thin but somehow similar than his theories of causality. Today education and scientific research are in key position when we think various countries and districts and their resilience against big and fast crisis, which are nowadays typical in world economy.
Oulu has survived and it is going fast forward. It is very important to change information in all levels and make networking between science, education and companies. The Oulu case confirms this once again.

9.7 Acknowledgements

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10 Lacunarity - the bridging mobility

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10.1 Summary

The structure of our societies is changing. Home and residence are given a new meaning in a time of spiritual and physical nomadism and strong migration. The family image is evolving into an intensified single household. Cities reach their limits and therefore place new challenges on transport systems.
As a result of these changes the human being has to become more mobile. The name “automobile” cannot be used any more. Both parts of the word are no longer justified. It is not "auto", not independently and automatically, it must be controlled. And it is in its mobility - "mobile" - restricted, reduced.
A new type of vehicle is coming, that is neither a bike nor a car. On average 1,2 people travel with a car. New vehicles should be designed for maximal two persons.
There is a lot of future in "individual mobility". As our society and the necessary infrastructure has fewer and fewer pedestrians, a new way of "walking" is expected. An "electric walking". A supported and accelerated walking.

10.2 History of mobility

Aristotels travelling
http://www.stepmap.de/landkarte/aristoteles-leben-1395420

We feel that the world has never been as mobile as it is today. It is true that today we are moving faster than in ancient times and in the Middle Ages, but society was also mobile in the past. "Not our century, but the Middle age deserves the title" mobile ". It was a basic feature of the Middle Ages: kings, merchants, beggars and crooks, the soldiers of the armies followed by the mercenaries and the prostitutes, the students and many professors. They all had long years of wandering before they could settle permanently, if at all. "[1]

Even the scholars of antiquity had to be mobile.

Aristotle was born in Chalcidice[2], north of present-day Greece. In

[1] FRIED, Johannes: „Mobilität im Mittelalter: Gelehrte auf Wanderschaft“, Frankfurt 2014 http://www.muk.uni-frankfurt.de/49106961/004?
[2] Stageira

order to improve his career prospects as a philosopher, he moved to Athens. Here was the center of the scholars,but he ended his life in the east of the country, on the island of Euboea[3].
Hundreds of kilometers were traversed. Although at a lower speed, than would would be undertaken today, the distances themselves were not less.

In the Middle Ages it were the pilgrimage routes and today they are the tourist routes on which the masses move. Like tourists, the people moved in the ancient world. In the last fifteen years of his life, the poet Aischylos[4] spent several periods in Sicily.


Pilgrims
https://upload.wikimedia.org/wikipedia/commons/1/17/Supplicating_Pilgrim_at_Masjid_Al_Haram,_Mecca%2C_Saudi_Arabia.jpg

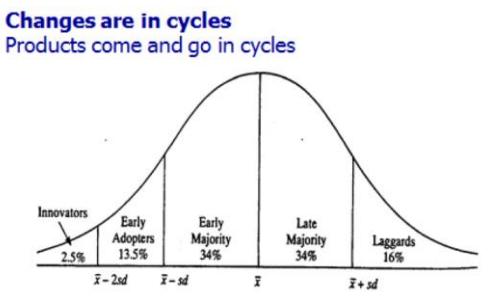
Nevertheless, humanity has never been as mobile as it is today. With the growing prosperity and the abolition of many borders in Europe, "freedom" came as a new symbol. Freedom moves a society. The severe barbed wire boundaries must be overcome.
Our economy has been labor-intensive and therefore needs more mobility. Mobility of goods, information and products and their managers.
In addition, increasingly liberalized markets turn the world market into a "global village".

10.3 Cesare Marchetti

Changes happen cyclically. This was the finding of the researcher Cesare Marchetti[5] who also gave formulas on how to calculate these cycles. In addition to long-term cycles, there are also changes in medium-term periods.


Cesare Marchetti
http://www.iahe.org/boardofdirectors.asp?did=14

In the economy world ups and downs are common. The intensity of growth is sometimes slower and is accelerated again by new events. Stagnation and depression are followed by an upward trend. These cycles were often discussed. It is only after researches by Cesare Marchetti that they are known to follow a certain scheme. Old technologies are replaced by new ones. This substitution is a result of social behavior and new economic structures. They follow certain rules.



Marchetti began his research on counting fishes in the Adriatic Sea. He found that it is possible to calculate the fishing results of the fishermen. Many predators reduce the number of bait fish. The predators have too little to eat and their population goes reduces. This allows the bait fish to multiply again and the cycle starts again. This

[3] HARTMANN, Martin: „Das aktuelle Genie“
www.zeit.de/2013/48/sachbuch-aristoteles-hgellmut-flashar
[4] 525-456 v.Chr.

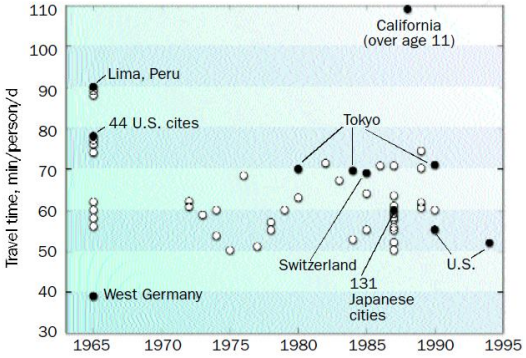
[5] Cesare Marchetti (born 1927 in Lucca) is an Italian physicist and system analyst. He worked in the field of energy engineering and related system theory. He gave his name to the „Marchetti constant“ and the „Marchetti curve“.

knowledge is expressed graphically in an "S-curve". It is also used in business.
The cycle includes the following steps:

- Genesis / Origination (= low spread, low growth)
- Growth (= high growth, fast distribution)
- Saturation
- Replacement

This formula is now used worldwide in a wide range of areas:

- Development of the automotive industry in a particular country
- Increase of global air traffic and transport volumes
- Worldwide tankers
- Demand for primary energy from certain countries
- Technological substitution
- Replacement of horses by vehicles, etc.



Although we often feel that many things are developing faster, the innovation cycle remains constant. The innovation phase is repeated every 55 years.

The discussed cycles are only medium and long term. A change beyond this would be a change in the biosphere towards the neo-sphere. Development of earth-bound people to knowledge-based individuals.
In the development towards the knowledge society, mental and moral aspects have more significance for our behavior. A change that can not be valued at the present time. Our life is too short to calculate the future impact.
The distance between the innovation waves is 7 years. These innovation waves can also be demonstrated in transport policy.

Cesare Marchetti also calculated the size of cities and came to the conclusion that this is dependent on the factor time. People want to reach their destination within an hour within a city. In the Middle Ages, when people walked, this was a distance of 3 kilometers. Today, with transport systems such as car, subway or other public facilities, this can be 80 kilometers. To this extent the cities have grown. At the beginning of the 20th century the main changes were in the areas of transport and communication. The new emerging infrastructures changed people's lives. The function of houses and streets has been redefined. The development of cities that have reached their limits go from the horizontal expansion with high-rise buildings to the vertical. Overcoming short distances has increased.

10.4 Residence

Residence and home have a new dimension. Increasing mobility needs a new definition for one's own place of residence and the term "home".
The reference to the place of birth is decreasing. Place of birth and place of dying are different in many cases. The art of life is changing. Two trends stand out:

- Migration
- Social change through more single households, fewer children, older people and larger living areas.

The co writer of this paper – Peter Kotauczek – is a good example: He has

- 4 residences and
- min 5 identities (entrepreneur, artist, researcher, husband, overaged child),

which are changing and overlapping in space and time.

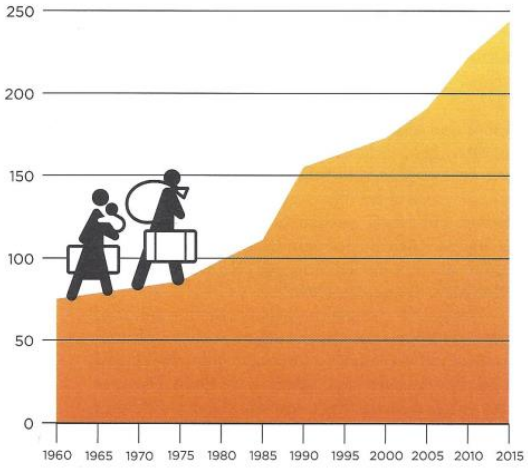
10.5 Singles

Families are smaller today. In recent years, single households have doubled.

Single households in Austria
1986 780,000
2016 1.430.000

40 per cent of the 4 million households in the country were single households. This made an increase of households from 2.8 to 3.9 million. On average, only 2.22 people live in one household. The largest group of single-person households are the "under 25-year-old", followed by "over 65-year-old" and „45 to 54-year-olds“.

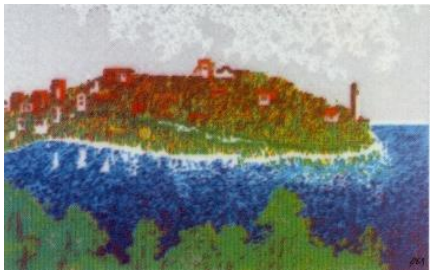
10.6 Migration



In addition to this reduction in population density, there is worldwide migration. People always been mobile and have left their homeland to settle in a new country. Between and 1914, 50 million people left Europe and began a new life in America. In the 20th century the movement towards North America and Europe to Latin America was established. In 1984, the United States recorded half a million immigrants. Cities like York, Los Angeles and San Francisco have foreigners.
In Europe, this situation is new today. France has 3 million "black people". The number of inhabitants in Austria grew by 1 million because of the political change in Eastern Europe. Wars also trigger migrations. In 2000, 21 million people left their home countries because of war. In Europe 7.5 million migrated because of the war in Yugoslavia. In 2015 the United Nations registered nearly 250 million migrants. The United States have the most migrants with 47 million followed by Germany and Russia with 12 million each.

All public figures and statistics do not include short term migrants, split migrants and occasional migrants. Maybe this figure would be higher than all the existing statistics. There is no differenciation between poor and rich people.
Rich migratants are called managers, tourists and globetrotters.

There are real and virtual migrants. "Within their networks, migrants function as mediators or



mediators of other world views, new technical or technological, economic or cultural knowledge and competences, thus providing migrant workers and those who receive benefits through the transfer of money and knowledge in their home countries. More to empower, more influence and decision-making competences."[6] Virtual migrants are created on virtual internet sites, such as the "BEKO Island"[7] in Second Life. The nice thing about BEKO Island 2.0 is that there are ONLY migrants. This is the ideal multicultural island. No one cares what the other does or does not do. Ideal to study the details of the split migrantism. Migrants with the same diverse identities, behaviors, possessions or traditions are present on this island. We can learn a lot from the observable phenomena of the real migrants, as they are currently flying uncontrolled in Europe.
We are all more or less beloved / tolerated migrants on this earth / in this state / in this community, because our being here is always limited in time. The study of temporal patterns of migration appears to us as a worthwhile scientific goal[8]. BEKO Island 2.0 is the ideal laboratory. Split migration, short-term migration, migration gaps, social migration or parallel migration are new, currently observable phenomena in the real world, which have not yet been investigated at all. We are concerned with exploring these phenomena abstractly and experimentally.

These virtual countries also create their virtual currency like bit-coins.
The BEKO Iceland is just one example. Worldwide, more and more are being created. A project in Norway is called Liberstad. „Liberstad, aims to create a private, tax-free city for libertarians who respect the non-aggression principle and private property rights. Holding a presale now, the project's organizers accept bitcoin for land and plan to make it the city's primary currency. Bitcoin.com talked to John Holmesland, the general manager of the company that operates Liberstad, to learn more about how the project is progressing.“[9]

The virtual world allows one individual to have multiple identities and thus have different migrational patterns in parallel. In colloquial languageone it says "he / she leaves a double". Sientistc call this "split migration". The modern computer technology (Clouding) and the blockchain algorithms allow to live different interrelated identities that occupy different physical and abstract spaces.

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[6] Oltmer, Jochen: „Globale Migration, Geschichte und Gegenwart“, Munich 2012
[7] https://www.facebook.com/Mikrostaat/
[8] Institute of Human Informatics
[9] HELMS, Kevin: „Libertarian City Liberstad in Norway is Moving Forward Using Bitcoin as Primary Currency“, https://news.bitcoin.com/the-libertarian-city-liberstad-in-norway-is-moving-forward-using-bitcoin-as-primary-currency/

10.7 Worknomades

Nomads confuse the order of settlers. Nomads have moved around the world.
In the German language, "nomads" are those people who, as cattle breeders, move from one pasture to another. In English, hunter-gatherers are also included.
All forms were pushed to the margins of society by industrialization and greatly reduced.
The knowledge society re-cultivated it on an intellectual level. Today, nomads are moving around in the virtual world or working - for example, trade representatives - in their "catchment area". The area assigned to them by the employer. Similar to the nomads who guarded their herds of cattle and accompanied them through the feeding grounds. They were only allowed to do so in the areas assigned to them, otherwise there was war with the neighboring tribes. Looking at today's policy, similar conditions arise again. Wars are shifted to trading levels, for example when the new American President rejects international trade activities and protects only his own country.

Worknomades
http://www.spiegel.de/fotostrecke/arbeitsnomaden-die-teuersten-staedte-der-welt-fotostrecke-138597-5.html

People have always been mobile, have always traveled from one place to another. Stopping in one place is not typical for humans. There is no time in the history of mankind in which people have not moved. They have always sought new places. Not only physically but also mentally. Travel in the world of ideas.
One third of the people of the modern era were always on the road. Being settled was a privilege and only temporary. The sedentary is more recent and was defined only with the advent of transport technologies like the railway in the 19th century.
In the Middle Ages the leading class of society was mobile. They were the privileged ones.
Just as today's pope traveled much, the medieval popes were very mobile. They rode themselves on their journeys.
Professional qualifications are now growing faster and people have to relocate their jobs. The more rapid change of the place of life is therefore not just based on physical mobility, but also on mental level.

In 2014 only 8 per cent of Austrians were privileged not to follow their jobs:

Commute	per cent
Not	8
In the same city	30
In an other city	32
In an other regions	25
In an other country	5

An influence factor that people live outside a city and commute to work is the higher housing prices in the cities.

Internet supports intellectual nomadism. It allows people to live in many different countries, regions and "worlds".[10]

[10] BRÄUNINGER, Michael: „Wien-Pendler. Der ÖAMTC testete drei Pendler-Strecken: Der Öffentliche Verkehr hat leichte Vorteile“, in auto touring 05/2016, page 33

This spiritual nomadism is not only virtual but real. Communication is with real people in real continents. Communication is possible in real time. It does not replace the physical journey but is mentally real.

10.8 Immobility

The traffic of the 21st Century suffers from the disease, "immobility". On average an Austrian motorists stays 78 minutes in a traffic jam. This is called "Floating Parking". The individuality of driving got lost.
The average speed in the western cities is 16 to 24 kilometers per hour. In the German city of Cologne, the average speed is only 20 kilometers per hour, but in many other European cities already 10. The transport speed of a car has reached the speed of a bicycle or a pedestrian.

10.8.1 „Headrests View Generation“

The psychology of the motorist has no regard for facts and rational cost calculations. A change can be expected from the first generation of drivers who grew up "with the view of the headrest." So those children who were strapped in a car seat while driving could see only the back of the front seat. They have a different approach to driving. They have not experienced the passing of the car windows freedom of the countryside. For them it was a transport from A to B without any adventures on the way. For them, the "drive" has become irrelevant. For them, the transport function in urban areas with their cost-benefit ratio is not of interest.
For younger people the local mobility is stagnating. They do not like to have an own car. In the period 1997 to 2007, the use of a car by young people decreased. In Vienna, the age group 20 to 29 years of age drove ten kilometers less by car every day and used more public transportion. This generation is MULTIMODAL. They always use the cheapest possibility of transport and change between public transport and private transport. In doing so, they also increasingly rely on sharing systems.

10.9 Individual Mobility

If every point should be reached from any point, then it is to a large extent only individually possible. The "individual mobility" has a big future. As our society and the infrastructure has fewer pedestrians, a new way of "walking" expected. „Electrical Walking". A supported and accelerated walking. Like an electric toothbrush accelerates tooth brushing and increased the quality, an electronic pedestrian is a new way of transportation, which is adapted to the new environmental conditions.

10.10 Networked Mobility

Any form of transport praises its options. The bus of the dense network in the city; the train, the high speed; car sharing the loss of their investment; eBikes the vigor saving driving; etc

Each transport system has its advantages and disadvantages, which looked at as a whole could bring benefits to the consumer. Networked Mobility allows the traveler to use all forms of transportation, from bicycles to taxi and to the aircraft.
A colleague came with his “eScooter” to a seminar. From there he went to the nearest available car sharing car. This car took him to the city boundary, where his own car was waiting for the cross-country trip.

A network must coordinate the different forms of transportation. If the local bus departs 2 minutes before the arriving train, he has missed his functionality.
Flexibility could give back individuality.

10.11 Lacunarity

Each complex traffic system has gaps. This also applies to systems of passenger traffic. The gaps are created wherever the person boards or leaves a vehicle or changes transport system. If a trip begins, the person must reach – from their own position A - the position B where the vehicle stands. At each change of system the means of transfer must be done: from the taxi to the train or the train to an aircraft. This transfer must be done by own funds. Usually he is relying on the natural resources of his body, not only of themselves but also to transport some luggage. This phenomenon of gaps is called by Mandelbrot “Lacunarity”. "A fractal is called lacunar if it has large gaps, that is, if the gaps include large intervals.”[11]
Lacunarity of a mixed traffic system is a measure of the loss of convenience of the traveler.

The most popular case is currently the own parked car right outside the front door. The car can be parked everywhere on a reserved parking space in front of each goal (work, shopping, entertainment destination). This ideal has led to the known problems of space requirements and various displacement phenomena. Since this ideal is associated with very high expenditure on infrastructure and already concerns physical limitations, some lacunarity in the transport system is inevitable and growing.
In the minds of road users “Lacunarity Liberty” is enshrined as a desired destination. Nobody wants to go far to his pickup spot, no one wants to travel long distances between transport systems on foot. Even those people who want to enjoy walking the pickup spot in front of the house and are the exit point immediately have arrived. Each lacunarity in the system is therefore perceived as a deficiency.

Complex networked traffic systems inevitably generate lacunarities. This regularity can be observed everywhere where technically different systems meet each other. Typical examples are large railway stations, airports or ports. When such bodies come together various transport systems are in the toughest competitive interface. The planner must therefore always make priority sequences, which in turn act to increase lacunarity.

[11] MANDELBROT, Benoit B.: "Die fraktale Geometrie der Natur", Basel 1987, Pag
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http://books.google.at/books?id=bkVNilU3SvwC&pg=PA326&lpg=PA326&dq=lakunarit%C3%A4t&source=bl&ots=KByOu1i4qO&sig=gK2J_rBhBTqrsaBDAmmqcjeL2Ng&hl=de&sa=X&ei=KCAOUbbCEMbTtQaZ5oHIAg&ved=0CC8Q6AEwAA#v=onepage&q=lakunarit%C3%A4t&f=false

Nowhere should anyone have to cover such large distances in large modern airports or shopping malls.
If one has the misfortune to have to use a less privileged transportation system for arrival, you can very quickly accumulate a few kilometers for transfer. Anyone who has ever experienced an overnight flight connection in London Heathrow knows what should be expressed here.


Float Walker
http://www.schweber.at/

The larger the cities, and the more people that live in a confined space, the more oppressive are the problems of lacunarity. The road users have not only an objective time and effort but also a significant problem of frustration. Overcoming the constraint of time and distance gaps to fit and conform to the system is perceived more and more as a restriction of freedom and theft of life. It leads to stress and unpleasant feelings. Although the experts know these relationships, they cannot stop, with current concepts, the growing lacunarity. The trend is also influenced by non legal actions. Many „roads“ are used against the law. Citizens are more and more doing unlegal things, f.e. double citizenship – which is not allowed.

10.12 Electrical Walking

The automobile is increasingly being driven out of the city by politics. Paid parking, reduction of parking spaces and low transport speed are damaging the use of the traditional "automobile". Extreme political parties also pursue the goal of forbidding private mobility in the city. People have always been mobile and will remain so. They need new alternatives. Our society must forget the the name "Automobile". Both parts of this word have lost their authority. It is not "auto", not self-contained and not automatic. In its mobility - "mobile" – it is reduced.

A new type of vehicle will come, which is neither a bicycle nor an automobile.
On average, a car is currently traveling with 1.2 passengers. This means, that we need vehicles with one, but a maximum of two person capacities.
According to experts, the transition to a new generation takes about 30 years. All the alternatives offered today are pioneers and transitional solutions to a new vehicle type.

10.13 The Float Walker

If the gap closure could be transformed into a positive movement experience, a great deal would be gained. Moreover, if the current preference of gap minimization is reduced, more flexibility and freedom of choice would be achieved. At present, every user of traffic systems tries to keep the number and size of the connection gaps as small as possible. It takes a lot of time and effort to change the system.

The designers of shopping centers have recognized this and are striving for locations where as many traffic systems form a node. The gap becomes an experience. Now you can not build a shopping center at each node. In addition, every possibility of shopping again entails an individual transport problem. The transport operator becomes a small freight carrier. He becomes the transport vehicle of his own. Watching the crowded people who are postponing the crowds during the peak season. Passangers do not enjoy this. This is particularly true for those more old fellow

citizens who are already struggling with walking. An ever-growing population in the cities. A suitable infrastructure can not be provided at every possible gap. The transport user must bring this infrastructure component by himself. Like his smartphone. "Bring your own device" is a keyword in the networked communication system.

In peripheral locations, where traffic systems are already widespread, interface handling is often much more dramatic. What is needed is an "adhesive" that fills the gaps.
This "glue" could be an electrically operated device, a small electric vehicle. Easily transportable and like an umbrella to take away, in order to be used more quickly - electrical walking - in case of need.

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11 Knowledge, Knowledge Management and Organisational Learning: Some Aspects for Discussion

Graham ORANGE

11.1 Abstract:

This session will be a discussion whereby it is hoped that the group will reach a consensus of what is meant by knowledge. There is no single definition of ‘knowledge’ and each of us has our own understanding of that term. By reaching a common understanding we can then discuss the merits or otherwise of the need to manage knowledge within an organisational context moving on to the application of knowledge and the concept of organisational learning. In developing these concepts we will consider how Aristotelian thinking has influenced our understanding of knowledge and learning.

Information-Communication-Technologies

12 Implications of Aristotelian theory on ICT

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12.1 Abstract

Human being has the ability to improve himself by perceiving and continuously pursuing knowledge, which in order to be produced there has to be a certain flow of information. In the ancient times and especially in Athens, that was believed to be one of the cultural centers of the world, the role of the information channel was played by the great philosophers like Aristotle, who were discussing matters openly in the Academy of Athens. Nowadays, we live in the world of information and in combination with the rapid technological advancements all the necessary information is being processed by the Information and Communications Technology, hence ICT.
Bearing in mind that ICT has an impact on our social life, social networking is considered to be a part of ICT. The purpose of this paper is to make effort to identify the philosophical implications on ICT, and especially those of the Aristotelian theory. After a brief introduction of Aristotle and his basic elements of theory, as well as a short listing of the recent developments on ICT, we are going to see how the agents' theory as well as the theory of friendship affect ICT. Then along with the theory on privacy we are going to examine the moral and ethical issues on ICT.
Keywords: ICT, Aristotle, friendship theory, privacy theory, ethics

12.2 Introduction

Human by his nature is an evolving species and throughout this evolution process technology was always a steady companion. Even from ancient times there are great examples of civilizations that used the given technology of the period in order to thrive and grow their empires. For example ancient Greeks were very fond of technology that was adding value to their everyday life and was assisting them in various tasks, with many paradigms of early automations being invented so as to aid them with their daily activities. Even Aristotle was admiring the capability of his generation to come up with numerous pieces of machinery aiming to ease the everyday life. After all he was a student of Plato who was the first to compliment the excellent work of the technicians of his time. Aristotle in his "Mechanics" expressed the belief that the proper use of technology will accelerate our way of acting and will offer us the ability to deal with difficult to solve situations. Furthermore instead of only admiring the technology he was also experimenting with it and a great example is the hydraulic alarm clock he created in order to wake up after a short period and keep up with his work.
Aristotle instead of viewing just the problem he was trying to cope with every single detail that caused the problem having in this way the whole procedure of the situation that went faulty. This kind of logic was inspirational for generations and generations of scientists from

all the fields. One of the followers of Aristotle's logic was the British mathematician and philosopher George Boole. Boole made an effort to convert Aristotle's logic of existing or not into a mathematical expression with the use of only two numbers, one and zero. Through a system of equations he managed to turn logic into a mathematical expression. Needless to say that Boole's system was the predecessor of the way of the computers are functioning.
Nowadays technology has reached to a whole new level and is beyond any doubt a part of our everyday life and it even some times defines our activities. The most crucial element that operates technology is the flow of information, therefore ICT plays important role in the way the world is moving forward. Each piece of information is critical to the survival of technology, both formal and informal, therefore all social interactions and especially the trend of the social media that has been developed the recent years is considered a valuable tool in the information exchange. In this context the last years we have seen or we expect to experience networks operating in a 5G range, allowing not only for fast connection but also interconnection of various networks, the network of fiber optics being expanded everywhere, virtualization of all networks, accessibility for everyone, big data exchange networks, advancing cyber-security technologies, communications respecting the environmental and energy efficiency measures, continuously evolving smart mobile technologies, more intensive work on internet governance and finally the discovery and experimentation on molecular communications.
The purpose of this paper is to try to combine the theories and beliefs of Aristotle with the rapidly growing ICT. So, after a short description of how Aristotle perceived things around technology and not only, we are about to identify parts of his theory that affect the way technology works even today. Based on the theories of agents and friendship we will attempt to understand to what extend the new technologies are affected by those theories. Continuing with the theories of privacy, morality and ethicality we are going to see to what extend the new technologies are affected by those terms.

12.3 Aristotelian Logic

According to Aristotle the logic (λογική) derives from the verb say (λέγω) which actually is the expression of the human spirit towards a problem that may have more than one solutions and it is important to understand that logic is not the filling of a blank but a completion of a whole. Aristotle used to depict critical problems that were offering him a chance to judge initially the existing conditions, express light distinctions and then move forward to locate the core of the philosophical dilemma. The very first solution that is promoted used to be his, offering most of the times however more than one alternative answers. After all he considered more important the discussion leading to a philosophical explanation than the explanation itself.
Furthermore he is convinced that each science is ruled by their own principles, method and even language. Ethics for example cannot be faced in the same way as physics because the human act does not obey the laws of nature. There is even the chance two different fields within the same science, like biology and cosmology, to adopt their own distinguish set of principles.
The work of Aristotle affected a plethora of researchers of the pathway of logic and as it is natural he created both rivals, as well as followers. The most characteristic rivals of Aristotelian theories were Locke and Kant who ironically considered that Aristotle wanted to be God by introducing humans to logic and that after him the logic did not move any forward. On the other hand there are some admirers of Aristotelian logic like Ross, who insisted that the only thing that Aristotle did was to show to humans the way they were always thinking,

as well as Leibnitz, who characterized Aristotelian theory as the most beautiful actualization of human spirit. Moreover the British mathematician and philosopher George Boole based his algebra on the Aristotelian logic that was testing if one condition is true or false, thus generating the binary numerical system on which the philosophy of later computers was based.
Finally logic and the characterization of a condition as true or false depends not on words but on signals and body language, therefore is international and never local. Also according to Aristotle in the sequence of logic, quality leads than quantity and approval comes first from denial.

12.4 Agent´s Theory

In his Metaphysics Aristotle moved one step further than the Parmenedian and Platonic dichotomy of being versus non-being, introducing us the theory of agents. According to Aristotle everything that is consisted of substance and tends to make a spatial movement is called an agent. From plants and animals to human being and even the celestial bodies of the universe. He was actually convinced of the existence of a divine entity, which he named the prime unmoved mover, that had a separate way of thinking and was generating primordial instincts causing this spatial movement of the agents, therefore none of them can be characterized as soulless. There is always a cause for such movement and for the animals for example may be the search for food, however, any slight movement affects other agents too.
Aristotle presents human as the most intelligent of the agents due to his intellectual skills and the possession of knowledge of how to produce something external to the agent, which is called techne (τέχνη). In his Politics Aristotle introduces us various other types of human agents like politicians, kings, managers, family heads, masters and slaves. According to Aristotle each one of these agents was using necessary tools in order to preserve the well-being of his commandment. For example masters used both living tools, the slaves, as well as tools without soul, so as to produce the necessities for the preservation of their household. However, he introduces us and a third type of tools, the artificial ones, which are produced within the household in order to increase the productivity of the other tools. Actually he admired the ability of some of those artificial agents to operate autonomously and he expressed the belief that if mankind reaches to a point that has for example machines that play music by themselves, eventually there is not going to be any need for the use of slaves.
The most important thing was that master had the total control of what was being produced and he was the one to decide which part of it was going to be sold in the market for money. In Ancient Greece masters were always men as they were considered more capable to deal with all these situations. How the master was going to manipulate the tools in hand so as to sustain a worthy level of living, was totally up to him. It is more than understandable that the pursuing of more money through the sale of the production was preserving a life but not necessarily a good one. If he managed to keep all of the household actions on a viable level then we could speak for the virtuous agent.
Nowadays ICT and biotechnology has been rapidly developed, in order to reach to a point of creating a new form of life. There are numerous examples of ICT being used as a digital implant, so as to support humans, generating this way the cyborgs. Also the various kinds of robots may have parts of living beings, introducing this way a new species of life. However, the important thing is that all these robots are controlled by their programmers and they tend to learn whatever their programmers plan. They are not allowed to take autonomous series

of actions, at least not outside the framework that has been established by the programmer, following this way the perception of Aristotle on the matter of ownership. It is beyond any doubt acceptable the fact that we are counting more and more on various digital data such as biometrics in order to preserve our well-being and from this point of view we have excelled what Aristotle perceived as sustaining of a good life. There may be even a time that all these technologies are going to be more autonomous and operate without the support of the human, but scientists believe that this day will not come soon. However, it must be clarified that there is no possibility of the artificial life to mimic the natural effects on the human body, such as illness or facticity, thus human bodily existence is considered ambiguous while these technologies being actually immortal.

12.5 Friendship Theory

In the information exchange process there are two major channels through which this transaction is materialized, both formal and informal ones. Through the recent decade has been an exceptionally development of the informal route with the increase of the social media. However, the meaning of a social network is not at all new. Generally we could say it is a formation of people with common interests in order to exchange views, ideas and even other pieces of information. In a sense from our birth we participate in a bunch of social networks with the very first of them being our family, our classroom and school community in general, as well as our friends from the neighborhood. Within this context Aristotle developed his friendship theory that we analyze bellow.

In Ancient Greece the word friendship (φιλία) stated the mutual attraction between two people and in a sense our friends can be anyone from our family, neighborhood friends, people from the same town or region, our colleagues, our brothers in arms etcetera. According to Aristotle friendship is based on the search of something loveable, which can either be the virtuous, the pleasurable or the useful, generating in this way the three levels of friendship. These are, the friendship of utility that is based on certain characteristics that attract one another, like money and very highly profiled acquaintances, that someone can exploit for their own benefit, friendship of pleasure, where simply one enjoys the companionship of the other over simple things, like the love for the same style of music or the same board games and finally the virtue friendship, which is based on mutual admiration of each other's character and values. Of course Aristotle considered the third kind of friendship being the ideal one and the one that is more durable in time as it is based less on self-interest. Furthermore he considered essential the fact that both persons that characterized as friends should feel the same way for each other, otherwise this kind of relationship is something else rather than friendship.

A new kind of friendship has been developed the recent years and it is called online friendship, which is not necessarily taking place only on social media networks as it has been mentioned above, but also through multiplayer online gaming platforms, or even other online communities. People just sit in front of a computer and interact with other people that are in front of their computer, either via exchanging instant messages, or through video chatting. The face to face contact of the friends has been lost and this is something that concerns a lot the philosophers, who can see clearly that the virtue friendship that Aristotle was describing has been sacrificed due to the virtual one. They realize that in most of the cases of online friendship the levels of utility and pleasure friendship can be covered, however, they believe that the Aristotelian virtue friendship cannot be achieved mainly due to three reasons. Firstly the selected presentation of oneself online prevents us from truly knowing our friend's character. Secondly the multiple filters in communication online can

lead to distortion and loss of important clues, as well as the inability to engage in a variety of activities with our online friend. And finally there is an increased skepticism regarding the way that the Internet and especially social networking sites tend to shape how we interact and relate to one another. Especially young people who interact via these networks tend to search for fast-paced and shortened contacts, something that keeps them away from the Aristotelian ideal.
There are critics who believe that filtering any means of online friendship via the Aristotelian approach tends to appeal that online friendship is purely artificial and cannot be compared to offline one that can reach the levels of virtue friendship. On the other hand there is a number of critics that can reassure us that the virtue friendship can occur even in the online digital world. It is purely up to the interpreter of the Aristotelian framework of friendship how they will depict the actualization of the various levels of friendship.

12.6 Privacy Issues

As Aristotle expressed “we are social animals”, therefore our involvement in the digital world of online societies is inevitable and a matter of safety of the information that is filtered through these channels and up to what level the exploitation of anyone’s information respects the privacy boundaries occurs. Anything that is posted online on the social media is directly becoming a public good that anyone can use or reproduce as they like. Therefore we should all be very careful when we are expressing our beliefs and ideas within these communities and we share them online. There is always the possibility for some people to use such information in order to harm us willingly or not. Apart from other persons there are also companies that may wish to exploit our preferences with the sole purpose of gaining more publicity that is translated into money.
With the rapid advancements technology can play important role in protecting the privacy of the users and every online meeting point or community should fulfil a list of criteria, regarding privacy protection, which are based on the following principles:

- The implementation of Value Sensitive Design methods establishes a set of rules and regulations with respect to human values and engulfs various approaches, like the Privacy by Design or the Privacy Impact Assessment approach, which adopt a list of guidelines for those who operate online and the boundaries they should respect. Moreover there is a set of rules adopted by the International Organization for Standardization (ISO) that is considered a worthy privacy tool, in total accordance to the Data Protection Directive issued by the European Union.
- Privacy Enhancing Technologies can ensure the anonymity and freedom within the privacy boundaries that any user of the online facilities should enjoy. For example increased sensitivity of the security protocols serves as the best method for implementing a privacy respectful digital environment.
- Modern cryptographic techniques ensure the trusted pathway that any online user would be willing to follow. Especially homomorphic encryption guarantees that the user will be able to come up with the results he desires, through a totally safe environment.
- Identity Management techniques can assist the companies into providing a more client-oriented and personalized environment. Through the use of cookies companies can achieve more information on the habits of the person of interest and therefore send for example a more personalized advertising.

12.7 ICT Ethics

For Aristotle ethics is a virtue, therefore it cannot be characterized as a purely intellectual condition, rather than an action that involves appropriate emotional responses and stands as the mean situation between two extremes, excess and deficiency. For example the courageous person is the mediocre between coward and rash person. However, he emphasizes that in our effort to find the mean we should not let our emotions overwhelm us, like when we are angry we should always be aware of not exaggerating and not undermine the reason. Furthermore not every effort of finding the mean situation is measurable, as not all the problems are quantifiable. To overcome such conflict the virtuous agent equips the weapon of logic, in order to reach to the most appropriate decision. After all Aristotle believes that the person who acts virtuously does so for the greater good and not motivated by any self-interest.

The important thing that Aristotle points out is that the theory of the mean may act as a guideline in identifying other similar attributes, however, the theory of ethic by itself is not able to lead anyone to a decision making process. This depends always on the circumstances that take place around the problem in hand and it is clearly up to the agent how they are going to interpret them, in order to reach to a decision they consider desirable. Also according to Aristotle there are certain emotions that are always wrong regardless the circumstances and in order to tame them actions should be determined by a governmental system, or simply follow some rules.

It is always upon the agent to choose to involve in the ethical process, which usually demands practical reasoning, the limits of which are determined by the virtuous agent that acquires it. Also it depends on the character of the person how he is going to face a situation and if he is going to adopt a virtuous act and therefore determine the concrete ends and justifiable means of the ethical approach.

The early approaches on computer ethics suggested the formulation of a set of rules that each professional of the computing field should follow, in order a moral action to be produced. In addition a program was being developed by Gotterbarn that was aiming to assist individuals, companies and organizations in determining likely ethical impacts of software development projects. It was upon the professionalization and ethical maturation of the computing practitioners that the activities of those projects are characterized as ethical or not.

In fact the situation with artificial agents is that both sides, programmers and artificial technology, learn from each other. There is even the belief that human could use the artificial agents in order to come up with moral issues and philosophical dilemmas that otherwise were left being unexplained, like the nature of evil. Also in the twentieth century the American philosopher John Dewey expressed his theory that solving problems in ethics is like solving problems in algebra, therefore ethics and morality are computable problems and the creation of information technology that embodies moral systems of thought is possible.

Another great researcher, Floridi, stated his belief that information is a legitimate environment of its own, thus it engulfs its own moral values and ethical concerns. This belief led him to the design of a theoretical model of moral action using the logic of object oriented programming. The model consists of seven components:

1. The moral agent a
2. The moral patient p
3. The interactions of these agents
4. The agent’s frame of information

5. The factual information available to the agent concerning the situation the agent is attempting to navigate
6. The environment the interaction is occurring in
7. The situation in which the interaction occurs

12.8 Conclusion

Although accused of trying to impose his ideologies on humans and with this way to steal a little from God's magnitude, Aristotle merely did some observations of the human activity and expressed the sensible actions of virtuous person, in his search for the well-being of his family or community. This kind of observations covered many fields of the human activity and therefore became common ground for every form of science. Indeed the theories of Aristotle are, as we have seen throughout this paper, applicable even today and help us understand a lot of things that are happening in our world. The most important thing is that still we are able to guide the technology we have in hand, in order to be more helpful in our lives and that the only way that it could harm us is if we show false intentions. If the user or the programmer of the technology does not have moral idiosyncrasy how do we expect from the technology to perform moral or ethical actions?

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13 ICT and the peripatetic school: A contemporary approach

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14 The AUTEX Network

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15 ICT Technology and 21st Century Learning

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15.1 Abstract

Technology has become part of life and schools have little choice but to embrace modern technology but essentially it must be ensured that technology serves needs of students and is utilized as a tool that enhances learning. Used appropriately technology can be integrated into a curriculum in ways that serve the needs of students but the tools of technology should never be seen as a means to an end in themselves. Used appropriately educational technology can enhance learning but on the other hand the recent OECD report “Making the Connection” has concluded that “on average, in the past 10 years there has been no appreciable improvement in student achievement in reading, mathematics or science in the countries that have invested heavily in information and communication technologies for education.” This is the case in many well-funded international schools and highlights the urgent need for schools in the sector to review their utilization of educational technology.
The tools of technology can be used in our classrooms to complement the overall learning experience of our children. The danger arises when the tools are technology are seen as ends in themselves which unfortunately is too often the case. Thus our schools need to ensure that students have limited screen-time, that technology is only integrated into the learning process when there is evidence that it enhances learning and that it is used in conjunction with a myriad of other appropriate pedagogical practices.
Furthermore, the technological revolution is not just affecting the economically developed world but is also transforming communications globally. It is now possible for American children to interact with children in Peru and French children with their counterparts in Cote

d’Ivoire. This enables International Schools to communicate and interact with one another frequently, often in real time, and can make the world a much smaller place.
The problem with universal access to technology is the fact that it provides almost unrestricted access to information. Much of this information is fantastic and can give a real boast to the learning experience. The danger exists where there is mis-information, inaccuracies and worst of all information that might promote prejudice, discrimination, hatred and violence. To an extent one might extend the same argument to the any medium of the written word but the key difference is the open access that the internet potentially provides. Once more the argument boils down to the appropriate use of technology and information.
Interacting with others is at the heart of our human experience and this must be something that international schools must be conscious of and promote continuously. Technology has the potential to enhance aspects of our human experience but must be used with the upmost care and with great responsibility in schools so that it enhances learning without ever undermining our humanity. And if the tool doesn’t enhance learning then it has no place in a classroom regardless of which century we are living in!

15.2 Keywords:

enhanced education, blended learning, information amount, learning experience.

16 Social Health Avatar: a Social Network Platform for anonymous health-related interaction between users and professionals

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16.1 Summary

Social Health Avatar, is the name of a Social Network platform for health-related exchange of information and monitoring, described in this paper. Even though the proposed platform manages to bring closer users and specialists, its main advantage lies on the potential for anonymity of the projected data, by emphasizing on the process and feed-back for them, rather than on the identity of the person that provided it.
Keywords— Social Network, platform, SIoT, avatars, health, anonymity.

17 Design and implementation of an indoors navigation system based on the use of autonomous intelligent vehicles

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17.1 Summary

The techniques and algorithms which are used in artificial intelligent vehicles dedicated in indoor navigation and accurate mapping creation is presented. Area detection systems for mapping, techniques and algorithms on artificial intelligence for localization and hybrid systems of Simultaneous Localization and Mapping (SLAM) are analyzed both theoretically and practically.
An analysis on the use and role of the sensors in the context of the above techniques and methods in order to provide localization follows, emphasizing on the use in autonomous vehicle. While the practical part in which the design and development of an artificial intelligence logic based on the use of Simultaneous Localization and Mapping (SLAM) for use in autonomous vehicles is presented in detailed, accompanied by the testing and evaluation results.

18 Computer Vision Applications in Service Robots

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18.1 Abstract

Over the past few years, service robots development has greatly advanced. An important aspect is the visual perception of the robot's environment. Hence, research on service robots is focused on computer vision algorithms and techniques. This paper aims to present and analyse the various approaches on the forementioned direction. Specifically, this paper focuses on people tracking and identification techniques. Data for computer vision algorithms are collected by sensors such as cameras (RGB, Depth etc.) and laser scanners. These techniques vary depending on the kind of data we acquired and of course, our aim in each case. Machine learning is the tool most frequently used, along with image processing and comparison.
Keywords: computer vision, people tracking/identification, service robots

18.2 Introduction

By principle, service robots are used to help the elderly in their home environment. Of course, this does not exclude the possibility to generally serve people in their homes. It is obvious then, that robots are required to detect, identify and track persons. Identification and tracking are critical for the best possible execution of any task. Their significance is better understood if real life scenarios are taken into consideration. For example, the robot must be able to identify which person is instructing it at any given time. Thus, the robot could either execute or ignore the command. Another important aspect is security. In case there is an intruder in the environment (or trying to intrude), the robot should be alarmed and execute an emergency plan, in order to prevent malicious situations.

18.3 Sensors

There is a huge variety of sensors utilised to perform vision related tasks. Of course, cameras are the heart of these systems. The point is to choose an appropriate one, that can provide the developer with data whose input will make sense and attribute to the algorithmical approach he wants to use.
Cameras are usually sorted by the nature of the image in their output. Mostly known types are: a) grayscale, b) Red-Green-Blue (RGB) and c) RGB-Depth. In service robots, RGB-D cameras are more commonly encountered. These sensors offer the flexibility to have various data types available and use them as anyone may, in different tasks running simultaneously. Microsoft Kinect (both versions) and Asus Xtion Pro are the most popular.

***Figure 1**: Most popular RGB-D sensors [F1][F2]*

Another useful sensor is the laser scanner. It is primarily used for environment mapping and navigation. However, it can be used for people detection and tracking too. For this purpose, pattern recognition techniques are trying to learn and recognize the pointclouds belonging to human legs. Again, a variety of data is obtained via the sensor, such as position in 3D-space and intensity.

***Figure 2**: Indicative laser scanners [F3][F4]*

18.4 Mapping and Navigation

In a domestic environment, a robot must have the ability to navigate without damaging the surroundings and, most importantly, without hurting any people. After accomplishing this, the robot is able to follow persons around and navigate itself to any position that is called or needed.
The problem described above is called Simultaneous Localization and Mapping (SLAM). The challenge is to construct and update a map of the environment, while, as the name implies, keeping track of the robot location. By robot location, both the position and orientation of the robot are described. Many SLAM algorithms have been developed for various scenarios and applications, such as Unmanned Aerial Vehicles (UAVs) and Service Robots. Moreover, not all algorithms use the same sensors. So, deciding which algorithm to put in use is affected by the equipment available and vice versa.
As formentioned, laser scanners are important tools for these problems. The idea behind its use is quite simple. As the laser scans the environment, the laser beams are reflected back to it when an obstacle is met. The distance is measured using the Time of Flight Principle. The conclusion is that this distance is an empty space, so the robot considers it as this. If the obstacle is moved, the map is updated with the new conditions.

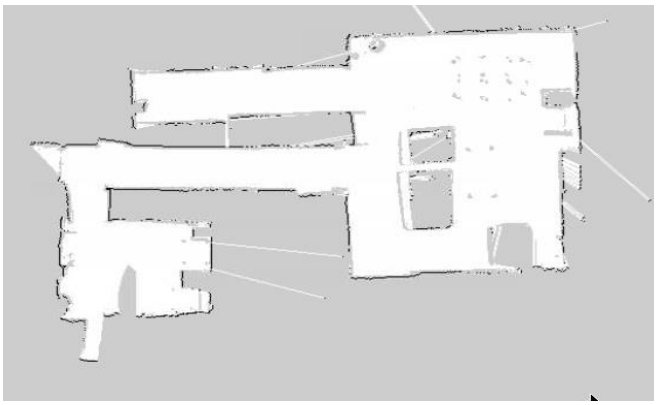

***Figure 3**: Example SLAM algorithm output map [F5]*

18.5 People detection and identification

The process of detecting people is crucial for serving the person in need. The robot has to be aware of the person's position in order to bring items to him. Moreover, it needs identify the target person, in case there are other people in the environment, for any reason.
Detecting people can be accomplished using pattern recognition with a laser scanner, as mentioned in section 2. There are more effective ways of doing so nevertheless. Some techniques are trying to detect the human body "piece-by-piece". It means that the algorithm is looking for a head, a torso, two arms and two legs. To accomplish these detections, usually Machine Learning-trained classifiers are used. This can be applied to directly detecting the whole human body too.
Face recognition is another robust approach. The Haar-Cascade algorithm is the most popular way to train classifiers for this task. The robot is expected to recognize the face of the operator among others and deliver to him. Face/head detection (and recognition in case of face) is also used to cross evaluate the data for people detection. For example, sometimes legs can be detected from a laser scanner. But, if no head is detected above them, then the assumption of person existence is false. Thus, the false positive leg detection is filtered out of the system.
Picture characteristics comparison is interesting too. When knowing the visual characteristics of a person and his identity is given, it is possible to compare these with any other person to re-identify him. When a person enters the robot's field of view, the comparison process begins. If they match in a large degree, then the "new entry" is actually an already known person. Again, this can become more robust using face recognition algorithms.

18.6 Object detection and recognition

Object perception is an important aspect for most service robots. The concept of perception includes both the position and object orientation. Orientation knowledge is crucial when it comes to manipulating the object. Manipulation is usually executed with a robotic arm gripper. So, the robot must be able to decide how to grip the object, in case of shape abnormalities or if special handling is required. Object perception algorithms vary, just as people identification case. Again, the use of algorithms is affected by the equipment available.
At this point, it should be mentioned that the Haar-Cascade Classifier [see P1] is able to be used in this kind of tasks as well.
A simple approach is detecting edges in images. Edge detection is based on brightness values. Discontinuity in brightness suggests that an edge exists in this line segment. Only sharp changes are taken into account when it comes to discontinuity. Then, the edges are connected and the contour of the object takes shape. The most popular algorithm is the Canny Edge Detector [see P2].

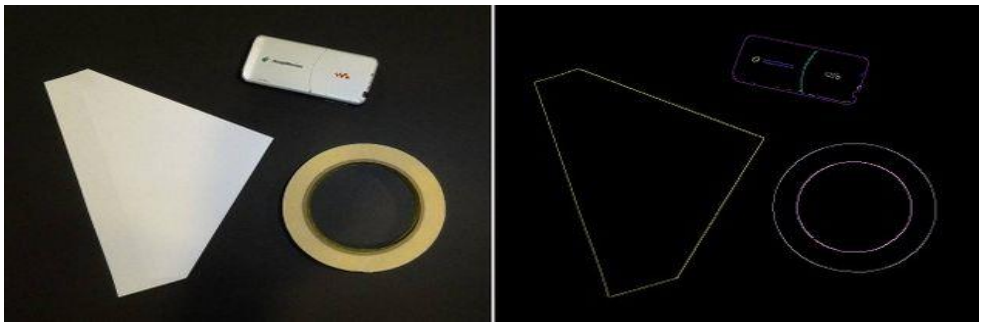

Figure 4: *Contour detection [F6]*

Another algorithm is based on plane detection. At first, surface planes are detected. Then, point clusters above this plane are considered as objects, after cross-matching some criteria of course. The drawback is that objects with planar shape (e.g. books, calculators) are hard to detect, especially when they are thin. Of course, the viewing angle affects the results. If the plane and camera are placed in parallel, there is a high chance that many points are not detected.
Scale Invariant Feature Transform (SIFT) [see P9] extracts features from an image. This way, it creates a description consisted of these features corresponding to the training sample. If the features extracted are not affected by image scaling and noise of any kind, then the recognition is more reliable. Also, feature position is of great importance. Relative positions between the training sample and the image in comparison should not be different or diverge a lot.
Speeded Up Robust Features (SURF) [see P10] is a feature extractor too. The difference is that it outperforms SIFT when it comes to computation speed and image transformation robustness. Roughly explained, the algorithm follows three steps: a) point detection, b) point neighbourhood detection and c) feature matching between training sample and comparison image.

18.7 Conclusions

Computer vision is a constantly growing field that offers solutions in various ways. It is interesting that for any given problem, there can exist more than one approaches. This makes it a fascinating subject, pushing the limits of creativity and imagination even further. The fact that research is focused on developing more and more reliable systems, gives confidence for a future algorithm or solution that solves multiple problems at once.

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19 The quest for credible earthquake precursors: the case of fracture-induced electromagnetic emissions

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19.1 Abstract

The hypothesis that the fracture-induced electromagnetic (EM) emissions, which emerge from a few days up to a few hours before the main seismic shock occurrence, permit a real time monitoring of the damage process during the last stages of earthquake (EQ) preparation, as it happens at the laboratory scale, is examined. This examination is performed through a shift in thinking towards the basic science findings of fracture and faulting processes.
Since 1994, a remote observation stations network has been developed in Greece for the recording of the pre-seismic EM variations at the MHz and kHz bands. Linking the obtained EM observations to corresponding distinctive last stages of the fracture / earthquake preparation is of crucial importance in understanding them. Based on a multidisciplinary analysis, the following four-stage model of earthquake dynamics by means of precursory EM emissions has been proposed, while certain “puzzling features” which are consistently observed in EM precursors and have been used as evidence for questioning their credibility have been explained. According to our four-stage model suggestion: The initially observed MHz EM anomaly is due to the fracture of the highly heterogeneous system that surrounds the formation of strong brittle and high-strength entities (asperities) distributed along the rough surfaces of the main fault sustaining the system. The MHz EM emission can be described by means of a second-order phase transition in equilibrium. The abruptly emerging strong sequence of kHz EM avalanches originates in the stage of stick-slip-like plastic flow, namely, the fracture of asperities themselves. The burst-like kHz EM emission does not present any footprint of a second-order transition in equilibrium. Between the aforementioned two stages of fracture process, an intermediate stage exists which shows tricritical behavior. Finally, the systematically observed EM silence in all frequency bands before the time of the earthquake occurrence is sourced in the stage of preparation of dynamical slip which results to the fast, even super-shear, mode that surpasses the shear wave speed.

Features characterizing the preseismic EM emissions during the different stages of this model have also been sought in the observables of different complex systems revealing striking dynamical analogies between the EQ generation and other extreme phenomena.

19.2 Keywords:

Earthquake; precursors; electromagnetic emissions; complex systems; universality

20 Aristoteles mechanics and ICT: Z generation's beneficial participation in political and social procedures

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21 The Impact Of Privacy On Wearable Computing Adoption

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21.1 Abstract

There are several factors that may influence the user's intention to adopt wearable computing, including technical and non technical factors. The scope of the current framework is to build a model for the measurement of the impact of the privacy factor towards the intention of the user to adopt the wearable computing.

21.2 Background

Wearable computing as an extension of mobile computing may overlap the market share of the mobile computing, such as smartphones; however, this fact depends on the behavior of the user towards the adoption and use of both wearable computing devices and «classic» mobile computing devices. The adoption of the wearable computing devices by the users depend on several factors that may affect his/her decision to adopt the wearable computing technology. MarketResearch.com which is a website that collects business intelligence reports from around the world, mentions a few of the most influential adoption factors (Staff, 2014). Security is also an important influencing factor, because a wearable computing device that has been hacked, may grant access to the personal data of the user from non authorized persons. The worst case scenario is the unauthorized person who gains access to the hardware may cause a physical damage to the user by increasing the temperature of the device or even making it to explode! The current research framework about the impact of security on the adoption of wearable computing is limited or even non existing.
An initial search on engines such as Google Scholar or Scopus offers limited results about the impact of security in general, on specific wearable health caring devices. Krupp and other researchers explored in 2014 the subject of security and privacy with the Google Glasses (Krupp, Schröder, & Simkin, 2014). Motti and Caine in 2015 researched the users' privacy concerns about wearable devices by conducting a qualitative content analysis of online comments regarding privacy concerns of wearable device users (Motti & Caine, 2015). The comments included concerns of criminal abuse, facial recognition, access control, speech disclosure and visual occlusion. Chan, Halevi and Memon, explored the user authentication on Google glass (Chan, Halevi, & Memon, 2015). They are referring to the vulnerability of several authentication mechanisms such as the audio passphrase to unlock the Google Glass. On this occasion, the problem is that the eavesdropping attack method is an obvious way for the hacker to find the password. Kirkham and Greenhalgh research the

risk of privacy on wearable computing for autism (Kirkham & Greenhalgh, 2015). An important risk is when the wearable devices collect audio recordings and then these data become accidentally available to the public.
The importance of security on the wearable computing as it is stated by the previous scholars and the underestimated factor of privacy on the adoption of the wearable computing, are several among the reasons that motivate me to explore the impact of security on the wearable computing adoption. By taking into account all this information, I define as a research question: *What is the impact of privacy on the adoption of the wearable computing?*

21.3 Reading The Literature

The research question of this academic effort is leading the literature review and the best way to deal with this, is to analyze each concept of the research question and then synthesize the knowledge towards answering the research question.
Mario Silic and Andrea Back in 2014 conducted a literature review about the information security research and its themes (Silic & Back, 2014). The two scholars identified thirteen research themes by using the information systems as a general application sector. The first concept of my research question is privacy which is part of the information security research area, so among all the security research themes, I am going to focus mainly on privacy. Mason states that privacy is one of the most important ethical issues of the information age (Mason, 1986) and the same argument is supported by Smith and other scholars who revise the information age and defining it as a networked society (Smith, Papadaki, et al, 2013). Privacy is the security area that is related to the relationship between technology and the access to personal data. Privacy is a widely explored subject at the information security research area.
The “wearable computing adoption” part of the research question is divided into the “wearable computing” that was explored in the background part of this work and the “adoption” part that refers to the information system adoption. Information system adoption is a multi disciplined research area; however this work is focusing only on the technology element of the information systems because it considers wearable computing as technology. The technology adoption is explored by several scholars as technology acceptance. According to Khasawneh, “technology adoption is the first use or acceptance of a new technology or new product” (Khasawneh, 2008). There are several technology acceptance models, however the most popular according to Gangwar (Gangwar, Date, & Raoot, 2014) and Oliveira (Oliveira & Martins, 2010), are:
Technology Acceptance Model (Davis, 1989), Theory Of Reasoned Action (Fishbein & Ajzen, 1975), Theory Of Planned Behavior (Ajzen, 1991), Technology Organization Environment (Tornatzky & Fleischer, 1990), Unified Theory Of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003), Diffusion Of Innovations (Rogers, 1995).
After the analysis of the research question, the next step is to perform the research at several sources of information in order to find the knowledge gap and build the research model. The search for the literature is implemented by searching at several online databases. I performed research on electronic databases such as Scopus, Web of Science and Google Scholar. I decided to use a keyword strategy with the keywords "wearable computing" and each name of the six most popular adoption models that were mentioned previously. I performed 6 times the research, based on the six information system adoption models and then ended in 9 research papers.

According to Webster and Watson (Webster & Watson, 2002) a literature review is a concept centric process and the first step is to group our results in a concept matrix which summarizes the findings of the literature review. Specifically, the concept matrix table shows the articles that feature one or more of the six adoption theories in order to explore wearable computing adoption.

Articles	**Concepts**					
	Technology Acceptance Model	Theory Of Reasoned Action	Theory Of Planned Behavior	Technology Organization Environment	Unified Theory Of Acceptance and Use of Technology	Diffusion Of Innovations
(Kim & Shin, 2014)	X					
(Carter, 2008)	X					
(Buenaflor & Kim, 2012)	X					
(Buenaflor & Kim, 2012)	X					X
(Grabowski, 2015)	X					
(Li, Wu, Gao, & Shi, 2016)	X		X			X
(Heetae, Jieun, Hangjung, & Munkee, 2016)	X					
(Trelease, 2006)						X
(Cecchinato, Cox, & Bird, 2015)						X

Table 1 **Concept matrix**

The summarization of the concept matrix results, leads to the building of the concept centric approach of the literature review analysis (Webster & Watson, 2002) which is the second step of the literature review. The first step showed that there are 9 articles which discuss the wearable device adoption based on the six adoption models. The second step is to match those results with the privacy concept, so as to detect what has been written regarding the role of privacy on the wearable computing adoption.

Only two out of the nine papers, discuss the impact of privacy on the wearable computing adoption and those two papers use the TAM model as the research model. The paper of Buneaflor & Kim reveals that people, who use wearable devices, try to hide their personal information from the device due to the fear of unauthorized access to their data. For instance, they try to not show emotion when they wear devices that capture the emotion. Li and other scholars found that perceived privacy negatively affects the adoption of using wearable healthcare devices. So, what we know about the impact of privacy on the wearable computing is very limited. Based on the literature review method and the time of searching the databases, the results reveal that there is a knowledge gap of detecting the impact of privacy on the wearable computing adoption. I only have 2 records; however two records are

not enough to generalize knowledge about the research question. The limited knowledge that I found through the literature review about the wearable computing adoption and privacy, defines an interesting knowledge gap that encouraged me to continue my research.

21.4 Research Methodology

According to the literature review findings, the most popular models for the wearable computing adoption are: Technology Acceptance Model (Davis, 1989) and Diffusion Of Innovations (Rogers, 1995). However, both papers that discuss privacy mainly use TAM as a research model. I am choosing TAM as my research model because it is mainly used to explore the impact of privacy on wearable computing adoption.
Technology Acceptance Model is an information systems theory that estimates how the technology users are going to accept the technology. Davis (1989) argues that there are two factors that influence the user's attitude towards using a technology. Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance"(Davis, 1989). The other factor is Perceived ease of use and it is defined as "the degree to which a person believes that using a particular system would be free from effort"(Davis, 1989).
However, I am willing to use a different version of TAM. My version derives of the supported TAM constructs that have a direct impact on the intention to use, according to the literature review, the first version of TAM and the construct of privacy. "Intention to use" is a construct that leads in the actual use of the device. I am assuming that the constructs that have a direct relationship with the intention to use, are the factors that strongly influence the wearable computing adoption. Based on the literature review, next table shows the supported TAM hypotheses that are featured in all the empirical papers that I found.

TAM Scholars	Supported Hypotheses
(Kim & Shin, 2014)	**AT → IU (Attitude → Intension to use)** **CT → IU (Cost → Intension to use)**
(Davis, 1989)	**PU → IU (Perceived Usefulness → Intension to use)**
(Heetae, Jieun, Hangjung, & Munkee, 2016)	**PV → IU (Perceived Value → Intension to use)**

Table 2 ***Supported TAM hypotheses***

By taking into account the new information, I form the hypotheses that will be tested in the research model:
H1: Perceived value has a positive effect on behavioral intention to use
H2: Perceived usefulness has a positive effect on behavioral intention to use
H3: Attitude towards using has a positive effect on behavioral intention to use
H4: Perceived privacy has a positive effect on behavioral intention to use
H5: Cost has a positive effect on behavioral intention to use

21.5 Conclusions

The current research effort was designed in order to answer the main research question and achieve the research goals. By taking into account the wearable computing adoption as a rationale, I followed a scientific methodology by reviewing the existing literature and building

a research model for testing. My research question was about the impact of privacy on the adoption of the wearable computing.
The big question is what is next? How can we improve the privacy measures in order to encourage more people to adopt the wearable devices? A sociotechnical approach based on the privacy characteristics could be the answer to the problem. I would extend my research by defining a new research question about the impact of social and technical privacy on the wearable computing adoption. As social privacy, I consider the personal information that is relevant to the social status of the user (Gender, age, etc.). As technical privacy, I consider the personal technical information of the user (Log files, smartphone synchronization, etc.). Probably I would use a hybrid research methodology of experiment for the technical privacy and survey for the social privacy. My results would be a comparison between the two research methods and this research would probably reveal useful details for both marketers and technical designers of the wearable devices.

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22 Green ICT: An actual big challenge for the Information and Communication Technology

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The paper presents the new challenges established by the tremendous increase of ICT devices and applications used in all our activity. Starting from the benefits given to our work by the new developments of Information and Communication Technologies, it has been seen a huge increase of the raw materials used for producing those devices, of the materials used for making use of the devices, of the consumables used to print/store data produced by those devices, but mainly of the energy used to make those devices work.
The main question is whether the way we use those devices is correct or we need to change something in our behaviour towards technology?
At the same time, we need to check if the technological improvements are not able to decrease the level of damages produced to the nature.

22.1 Introduction

The term *Green ICT* is a quite recent one, being one of the first to praise the third millennium.
Green is a term applied to all areas where energy is saved and resources are preserved and / or reused. The *Green* level is appreciated by the LEED assessments, done by the US Green Building Council (USGBC) or by the "Energy Star" ratings, done by the Environmental Protection Agency (EPA).
The need for introducing the concept of *Green ICT* has emerged in the context of more careful global concerns of protecting the planet, triggered by the awareness of a large amount of dangers brought about by the uncensored development of human civilization [Mingay, 2007], such as:

- the danger of exhaustion of energy resources
- The danger of exhaustion of raw material resources
- The danger of exhaustion of food resources
- The danger of rising above the critical threshold of the percentage of carbon dioxide in the atmosphere
- The danger of destroying the ozone layer of the atmosphere
- The danger of global warming

During the pioneering period of industrialization, its benefits seemed to be too great compared to the inherent shortcomings that one might be concerned about the latter. Of course, it was unpleasant to smell ugly in the cities, as was the case with Arad, and in the case of Timisoara, and especially in Bucharest, when in their perimeters, for instance, the technology was shaking with the skin, as it happens through the 19th century and the first

part of the 20th century. But it was considered worthwhile to wear gloves, hats and beautiful and comfortable leather clothes, on the one hand, and jobs that secured the income of a large number of families, on the other.
It had to come to true ecological disasters, such as the one in Germany in the Rhine-Ruhr area in the 1960s, when major rivers such as the Rhine became biologically dead so that the world wakes up or to have at least a throb.
Major measures to reduce the dangers listed above have been taken, as known, in the last decades of the twentieth century and in these first decades of the 21st century. But these measures are totally uneven on a planetary scale. They work very well in developed countries such as Germany and France - where the results are "seeing the naked eye" - but they are still quasi-existent in emerging countries such as China, Russia, India and Brazil and far from what should be in countries such as Romania.
Another problem, however, appeared on the agenda of this early third millennium, a much subtler than that of the classic industries: the issue of ICT industry and products. If the pollution in the classical industry has always been easy to detect "with the nose and the eye", and its energy consumption - intuitive to the appearance and size of the halls, information technology, its elegance and its distributed character, does not even let it suspect what harmful effects it has. Awareness of their existence and especially of their size was realized only at the end of the 2nd millennium and the beginning of the 3rd millennium, when a real explosion of the spread of this technology occurred. This was also the time for the emergence of the term *Green ICT*, first representing a desideratum, then a current and, inevitably, a new standard in the field. Although the term is quite new, the interest it brings is huge. It is not irrelevant, for example, that on March 15, 2012, at 22:00, the Google search engine found in just 0.14 seconds more than 1,400,000 links to documents with the term *Green ICT*.

22.2 Technology influence on environment

Information technology affects the environment by:

- the consumption of raw materials in its production
- the consumption of raw materials in its exploitation
- energy consumption in its production
- energy consumption in its operation
- substances released into the soil, water and the atmosphere in the production process, but indirectly also in the exploitation
- wastes generated in the production process but also indirectly in the exploitation process

Well, Green ICT means information & communication technology made with minimum inputs of raw materials and energy, with minimal releases of harmful substances to the soil, water and the atmosphere and with minimal amounts of waste and which, in exploitation, involves such minimal inputs of raw materials and energy, minimal releases of harmful substances into the soil, water and the atmosphere, and minimal amounts of waste [6].

22.2.1 Consumption of raw materials in the production of information technology

The raw materials used in the production of information technology are: silicon, gallium, arsenic, gold, silver, beryllium, mercury, cadmium, lithium, aluminium, copper, indium, antimony, tellurium, zinc, lead, etc. Obviously, with the exception of silicon, they all have little and problematic availability.

22.2.2 Consumption of raw materials in the use of information technology

In its exploitation, computer technology requires consumables like toner for carbon-based printers, waxes and various dyes, and ... plain paper, behind which there are so many killers of the trees.

22.2.3 Energy consumption in the production of information technology

The production of plastics and metals used in the manufacture of information technology requires large amounts of electricity.

22.2.4 Energy use in the use of information technology

In its exploitation, computer technology totalizes huge energy consumption. Paradoxically, right? It seems hard to believe, considering the size and appearance of today's ICT equipment, which makes us tempted to think of them as real jewelry. The explanation of the apparent paradox lies in the size of the problem. Even if a piece of ICT equipment is relatively small in energy consumption, the number of such equipment has become very high in recent years, the consumption of all of them is no longer negligible. Let's make a small calculation. It is estimated that over 1 billion computers existed in the world in 2010 [5]. Let's assume that a computer consumes an average of 100 Watts and that, according to EuP Preparatory Study's, the time a computer is powered in a year is 2,200 hours. It will result that all the computers in the world consume per year:
1,000,000,000 computers x 100 W/comp x 2,200 hours/year = 220 TWh/year
The world's electricity now accounts for about 70% of fossil fuels: coal, crude oil, gas. Or, as we know, they are in limited quantities and their rate of exhaustion is galloping. In addition, the process of producing electricity from fossil fuels is polluting, with significant heat, carbon dioxide and other residues. Of course, the so high proportion of conventional electricity in total world electricity seems disconcerting, but this is the reality of the present, despite all the efforts and progress made in recent years. Let's make a calculation. Knowing that 1 TWh of electricity involves a release of 0.415 million tons of CO2, it turns out that the 1 billion computers in use at the planetary level are responsible for loading the earth's atmosphere with:
220 TWh/year x 0.415 million tonnes CO2/TWh = 91.3 million tonnes CO2/year
In fact, both energy consumption and carbon dioxide production are much larger if other equipment than computers (printers, scanners, etc.) are taken into account and if it we also

take into account the manufacturing and transportation processes. Some authors' estimations [5] are that the ICT industry affects the environment more than aviation! To see if this is credible, let's make a transport calculation. It is shown that a computer, considering its keyboard display and at least 50% of the printer that accompanies it, weighs on average about 15 kg. That means that 1 billion computers weigh about 15 tons of finished material, which had to be produced - how much, at the entrance to the process? - and transported and which, at some point, will become ... domestic or industrial waste! How many trucks are needed to carry 15 tonnes of ICT equipment? No more, no less than 375 thousand trucks! This is the real dimension of the problem!
Considering all of the above, McCinsey & Company [7] shows that global carbon dioxide emissions from the ICT sector in the period 2002-2020 follows the graph in Figure 1:

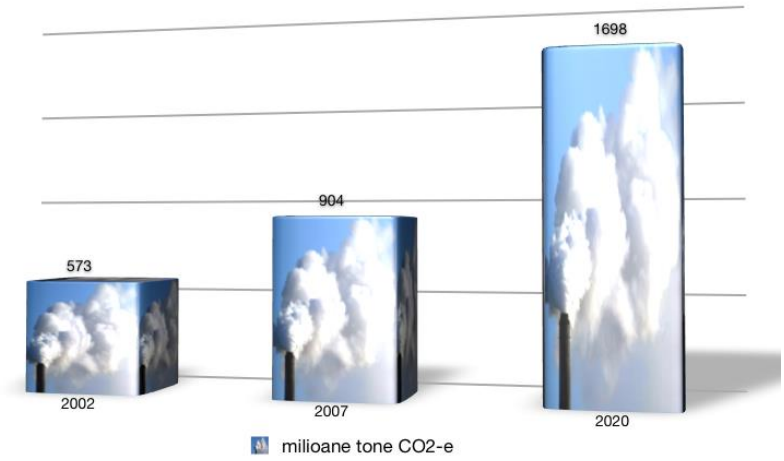


Figure 1: *Global carbon dioxide emissions from the ICT sector*

22.2.5 Hazardous substances released into soil, water and the atmosphere in the process of production and operation of information technology

In the process of producing information technology, a lot of dangerous chemicals are used, which ultimately end up as residues in soil, water or atmosphere. In addition, in the end, each computer encompasses substances such as lead and mercury, extremely harmful to the human body and to life in general. Mercury affects nervous system, circulatory system, immune system, reproductive system, kidneys, etc. Lead negatively affects the brain, memory capacity, reactions.

22.2.6 Waste generated in the production and operation of information technology

Greenpeace estimates that 20-50 million tonnes of electrical and electronic waste are produced worldwide each year, of which about 2 million tonnes in the US, with only 12.5% of recyclable. In Europe, e-waste is the fastest rising. In developing countries, the rate of increase in the amount of e-waste is estimated at 300% over the next 5 years. Obviously, most of the waste resulting from the exploitation is not the cause of the products leaving their products or their inability to deal with applications, but the desire of users to always have new, fashionable products. In digital terms, the 1 billion existing computers in the world will

become warrants in the next few years about 15 million tonnes of waste, of which about 200,000 tons will be harmful substances, at least 3 million tons even dangerous.

22.3 Solutions

The negative aspects mentioned above should not be considered as a brake for the development of the ICT domain. On the contrary. We must be aware that, whenever there are problems, there are solutions and that, in order for solutions to be found, problems must be identified as clearly as possible. Once a problem has been identified, go through the chain of steps:
Exposing the Problem - Identifying / Creating Public Opinion - Solving Action

22.3.1 Standards

Resolving actions come from those who have both the necessary knowledge, the power and the will to change things. These may be manufacturers, traders, buyers, legislators or any combination of these. For example, legislators - with or without quotes - have set standards that can guide traders and buyers. The most common such standards are:

Energy Star – International standard

EPEAT – American standard

TCO – International standard

EU Ecolabel – European standard

The Nordic Ecolabel – Scandinavian standard

Der blaue engel – German standard

Buyers should only buy certified equipment in line with at least one of these standards. They are helped in this respect on the one hand by the fact that the labels of those standards appear on the equipment and on the other hand that governmental and non-governmental agencies provide them with all the information they need on their free access websites:

- Environmental Protection Agency
- Green Procurement Tool Kit
- GSA Carbon Footprint Tool
- Responsible Purchasing Network
- Sustainable Procurement Campaign

And if legislators and buyers understand and play the role well, then other actors, traders and producers can not do otherwise as they dictate. As proof, all major companies not only became sensitive to the subject, but actually turned much of their IT production into green IT.

22.3.2 Initiatives of major IT companies

Let's see, for example, what *Hewlett Packard* has planned for 2005-2011:

- reducing energy consumption and greenhouse gas emissions for all its products by 40% at the end of 2011 compared to 2005;
- the use of 100 million pounds cumulatively over the period 2007-2011 for the recycling of plastic from its printing products;
- saving 1 TWh through new orientations in designing the volume of its desktops and notebooks;
- 35% reduction in average weight of printer packs, 35% use of recycled paper in the carton used for printer packaging, and 50% reduce the volume of plastic used in printer packaging by the end of 2011 compared to 2005.

Obviously, without affecting the computational performance...
Unfortunately, not all those plans have been realised completely!
Sony has launched the "Road to Zero" plan, which aims to reach a zero-ecological footprint by 2050, that is to say, when the whole trace left on the environment in one year through consumption and spills disappears all In one year, by regeneration, respectively resorption / neutralization. The plan has set precise "mid-term" targets for 2015, namely:

- reducing the energy consumption of its products by 30% compared to 2008;
- reducing the weight of its products by 10% compared to 2008;
- 50% reduction of generated waste compared to 2000;

- 30% reduction of water consumption compared to 2000;
- 14% reduction in CO2 emissions in manufacturing and transport compared to 2008;
- 16% reduction in packaging waste compared to 2008;
- 99% or more increase of the waste recycling rate compared to 2000;
- a reduction of 5% in the rate of use of virgin oil based on the year 2008.

A final example of a project fitting in the "Green ICT" formula we present is LG's project called *LG Network Monitor*. It is based on the computational power level reached by the current desktops. This allows for a number of situations of using computer technology, especially in the functional or educational area, to use a single computer and, for each user, only one monitor, keyboard, mouse and possibly printer. The high computer computing power, its adequate memory resources and the right software can make users feel that they are not working on the same computer, but create the impression that each computer has its own. Obviously, through such a solution, all 6 parameters that define the concept of "Green ICT" are reached. In addition, user costs are considerably diminishing.

Figure 2. *LG Network Monitor project [2]*

22.3.3 Simple rules of use

Computing equipment suppliers provide customers and potential customers with information about themselves (ISO 14001 certified or not, with other certifications, etc.) and their products (devices meet or fail to meet the energy, environmental, recycling if they contain harmful substances, etc.). An argument for their acquisition is the consequence of both the exploitation and the end of the product's life, the environment.

Once the product has been purchased, users have to enforce and obey certain simple usage rules to reduce harmful effects.

22.3.4 Rules of use in the office

Idle and Sleep mode

Unless the devices have a recognized environmental certificate or have a sleep mode, when they are unused, they consume at least half of the co-current power of the normal work;

When the equipment is not in use, it must be put into sleep mode, so it is ready to return to the nominal mode.

Monitors

Flat panel monitors (LCD, Plasma, LED) consume less power or space when in standby mode. Some of them switch to standby mode after a certain period of inactivity.

Printers
Draft and Duplex modes (on both sides of the paper) optimize the use of supplies and paper;
Documents should be reviewed and evaluated on the monitor screen, printing only in required cases, reducing the number of unnecessary prints;
Reducing a large number of smaller printers at a central location, easily accessible by all users can improve print cost management, and reduce power and paper consumption;
A print management service can help reduce waste by printing only in exactly the right cases.

The thin client approach
Because PCs are generally used under their nominal capacity, thin client is an alternative to devices with low data traffic and computing power. This is a terminal (monitor, keyboard, mouse) connected to a server that runs the application directly on the server. Unlike network computers, thin client transfers on the network only refer to screen, keyboard, and mouse information, and not to a certain amount of data.

Use as Out of Office mode
When the user is out of the office for a while, appliances may be, and are recommended, turned off. External power sources consume current, even when the device itself is off. A warm charger is an indicator of current consumption.
When configuring devices, monitor screen savers must be removed, as they consume unnecessary energy. Monitors consume 60 to 80 watts in nominal work, and in idle mode only 10 watts. Laptops use 10 to 30 watts in nominal use, and 6 watts in idle mode. In hibernation mode, computers use zero watt, while sleep mode uses about 0.2 watts.
There is a debate about how to set up a computer that is not being used, which is more effective:

- Fully shutting down the computer is inefficient, as the boot time takes a few minutes;
- In the case of non-use for two or three days, the computer should be set to hibernation mode;
- For the night, the computer should be set to *sleep* mode.

22.3.5 Rules for use in the computing office

Computers, storage devices and air conditioners are usually inefficiently operated;
Many servers run at less than 30% of their capacity and yet on average they are more effective than desktop computers. If the workload for each computer could double, the number of devices in use could be halved, and this would reduce the impact on the environment;
A common way of doing this is through the use of virtualization software that allows users' applications to run whenever there is space available to them on the server. Previously, a server could have run a single application. Now everyone can run a set of apps and that makes it more efficient;
Reducing the number of equipment delivers space and redundant redundant equipment that can be reused or recycled;
Air conditioning equipment can work more efficiently if temperature is optimized temporally and spatially. Computing equipment can also work at higher temperatures (as per technical specifications), thus reducing energy consumption for cooling and filtering;
Residual heat can be reused to heat adjacent areas, reducing the energy required for this task;

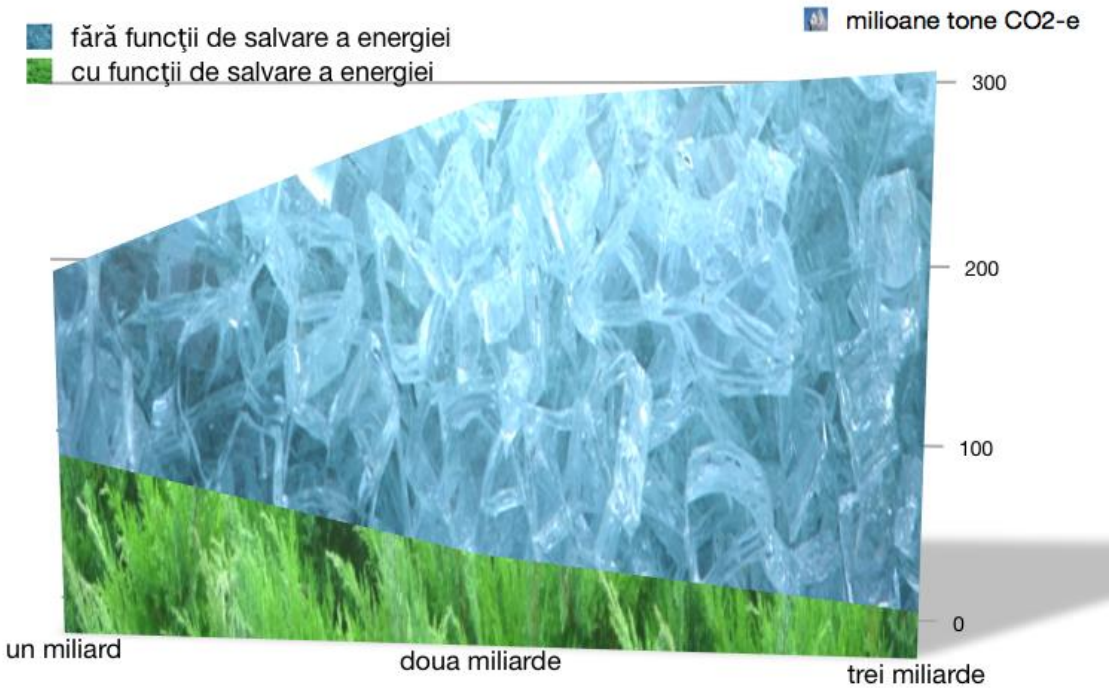
By means of outside temperature, in cold seasons, outside air is a source for the chiller. This is called "free cooling".

22.3.6 Rules after the expiry date of the product

Computing equipment can be recovered after the expiration of the exploitation period, and parts of it can be reused by entering the production circuit, thus saving raw material. It is important that, economically speaking, the recovery effort does not outweigh the benefits.
The priorities for all phases of production are, in order of importance, the reduction, reuse and recycling of materials, namely the use of technologies for lower consumption of raw materials, the introduction into production of recovered materials from end-of-life products and the existence of well- Effective for the recovery-reuse cycle.
If the life of IT products can be extended, the purchase of a new product is eliminated, thereby reducing the environmental impact, saving raw material and energy, manufacturing, packaging, transport and distribution effort.

22.4 Conclusions

Ensuring measures such as those presented and others to reduce the consumption of raw materials and energy, releases of harmful substances to the soil, water and the atmosphere and the quantities of waste in the process of manufacturing and transportation of information technology, respectively its exploitation, can make the number of computers grow further, at the level of necessity, but at the same time the ecological footprint of computer technology is diminishing.
A relevant example [5] in this regard is provided by the graph showing the evolution of the amount of CO2 released into the atmosphere by various computer numbers, respectively with no energy saving functions:



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EDUCATION

23 New paradigms and approaches in Learning: Abstractions from the European Leonardo Learning Award

Koch G.

24 Enhancing students' relationship to the world in higher education - An exploration supported by Aristotle's Book VI of The Nicomachean Ethics

Willy Aastrup, Aarhus (DK)

Gerhart Rott, Wuppertal (D)

This presentation will examine some features of the added value of guidance and counselling in the present days dynamics in higher education (HE).
One of the important challenges HE has to meet is how higher education with its widening access and increasing demands by academic knowledge as well as by society can sufficiently enhance students' critical and self-reliant reflective capacity to relate to the world.

While exploring this question the presentation will focus on the interaction of guidance and counselling, student centred learning and the development of career management competence.

This exploration will be substantiated by drawing on Aristotle's Book VI in his work The Nicomachean Ethics on practical wisdom and will relate his perspective on the interplay of episteme (ἐπιστήμη) and phronesis (φρόνησις) to the challenges mentioned above.

25 Music in Aristotelian System of Education

Zelemenou M. M.

26 Redesigning e-Learning Courses: A Student-centered Approach

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26.1 Abstract

In this paper we present a student centered approach for redesigning e-learning courses through the analysis of students' preferential structures. Our approach analyzes the students' preferences in the following dimensions: (a) the dimension of students' learning behavior, (b) the dimension of students' learning performance, and (c) the dimension of students' feedback. Students' preferences are identified before they are exposed to the e-learning course using the Criteria Weights Assessment through Prioritization (WAP) method from the domain of Decision Making. The WAP method provides a valuable source material that includes weights of individuals' preferences that become input in a clustering process that determines clusters, i.e. groups of preferences among students. Based on these clusters we analyze their behavior in the other three dimensions and we provide a framework for the decision maker capable to provide significant feedback for the redesign process of the course.

26.2 Keywords

Redesign e-learning courses, Weights Assessment through Prioritization (WAP), e-Learning courses, analyzing students' preferences, learning analytics.

26.3 Motivation

The emergence of new trends such as "Open Educational Resources" and "Open Courses" made possible the so-called "wrapping" of a course around a variety of online learning resources developed by third parties, instead of the from scratch production of learning material (Caulfield, 2012; Fisher, 2012; Koller, 2012; Mangan 2012; Shirky, 2012). For example, Greek universities recently developed, under the framework of the "Open Courses" program, an impressive repository containing more than 3600 courses with open access that can be used complementary to the teaching in the classroom in an effort to improve the efficiency of the courses in higher education. These courses incorporate a wide variety of

open resources such as video-lectures, self-assessment exercises, podcasts and other multimedia content resulting in a very large repository of Open Educational Resources (Open Academic Courses Project, 2016) (Psaromiligkos et. al., 2016). In such a context it is vital as well as challenging to design and even more to redesign engaging e-learning courses.

Recent advances in education demonstrate at a great extend the student-centered and personalized dimension of learning. Although technology has many potentials to satisfy such requirements in practice it has been proved a difficult task. Given the numerous e-learning resources an instructional designer is facing a big challenge: "how to design/redesign the appropriate mix of learning activities that will satisfy the students' preferences in order to increase motivation and engagement and finally enhance the learning performance?" The design/ redesign process is an iterative process because the final product is a "moving target". During this process a designer needs sophisticated support and a well designed methodology in order to evaluate the various alternatives. Learners' perception is central in such a process (Jung, 2011) (Dondi et al., 2006) (Ehlers, 2004) (Cashion and Palmieri, 2002).

In this paper we present a decision support approach for redesigning e-learning courses through the analysis of students' preferential structures. We see an e-learning course as a system (Moore et. al., 2005) that is comprised of the following interrelated subsystems (1) the human subsystem (2) the web-based learning resources subsystem, and (3) the technological infrastructure subsystem. Our approach analyzes the students' preferences in the following dimensions: (a) the dimension of students' learning behavior, (b) the dimension of students' learning performance, and (c) the dimension of students' feedback. Students' preferences are identified before they are exposed to the e-learning system using the Criteria Weights Assessment through Prioritization (WAP) method from the domain of Decision Making (Spyridakos et. al., 2016) (Tsotsolas et. al., 2016). The WAP method provides a valuable source material that includes weights of individuals' preferences that become input in a clustering process that determines clusters, i.e. groups of preferences among students. Based on these clusters we analyze their behavior in the other three dimensions and we provide a framework for the decision maker capable to provide significant feedback for the redesign process of the course.

In the next section we discuss in more detail the theoretical background of our approach. We also describe analytically the application of our approach in a real case study at Piraeus University of Applied Sciences. Finally, conclusions and feature research directions are provided in the last section.

26.4 Methodological Approach

The framework of our approach is student-centered and it is consisted of the following four dimensions: (1) students' learning preferences (2) students' learning behavior, (3) students' learning performance and (4) students' evaluation of the underlying learning effectiveness (feedback). The first dimension tackles the problem of how to identify groups of preferences among the students. Based on these groups of preferences, the second dimension examines their behavior in the learning environment. The third dimension examines the actual performance of the underlying groups of preferences while the fourth dimension takes under consideration quality issues of the offered learning activities and resources of the

course as perceived by students. The Model of our approach is depicted in figure 1. In this paper we present the way we have analyzed the students' learning preferences and the students' behavior in a real course at PUAS consisted of 149 students using the Moodle Learning Management System.

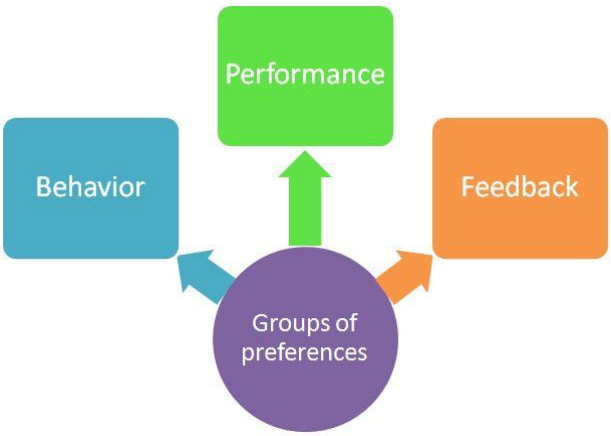


Figure 1: A Model for the Analysis of Students' Preferences

26.4.1 Identifying groups of preferences using WAP

In order to capture the students' preferences we asked them to rank the different types of learning activities that were offered in the course, by assigning a number from 1 to 5, with 1 being the first choice in the hierarchy of preferences. In the effort to hierarchically position the types of learning activities, each participant had the opportunity to define subsets of learning activities by assigning to more than one activity the same preference number, with the sole restriction that at least two subsets of activities should exist in the hierarchy (they could not rank all the different type of activities in the same position). With this process, each participant by completing the prioritization of learning activities identified his personal criteria-preferences in learning activities types (figure 2). Next, having prioritized the personalized criteria of learning activity types, each participant determined a preference range (figure 3), minimum and maximum value, which expressed the relative significance between two successive criteria (1st to 2nd, 2nd to 3rd, etc.).

Thus, having the preference range from a pair comparison of the individual criteria, we applied an indirect estimation method from the field of Decision Making, which is an enhancement of Simos and Revised Simos Methods (Simos, 1990a, 1990b, Figuera and Roy, 2002), the so called «criteria Weights Assessment through Prioritization (WAP)» (Spyridakos et al., 2016) in order to extract the weights of the preference criteria for each student.

WAP method presents improvements over other methods because instead of requiring the Decision Maker to specify the difficult to comprehend and quantify ratio z that expresses the relative significance of a pair comparison of successive criteria or subsets of criteria of equal importance, it requires to determine minimum and maximum values, that is intervals [zmax, zmin], for each pair of successive criteria or subsets (figure 3).

Figure 2 : Learning Activities/Resources Hierarchy

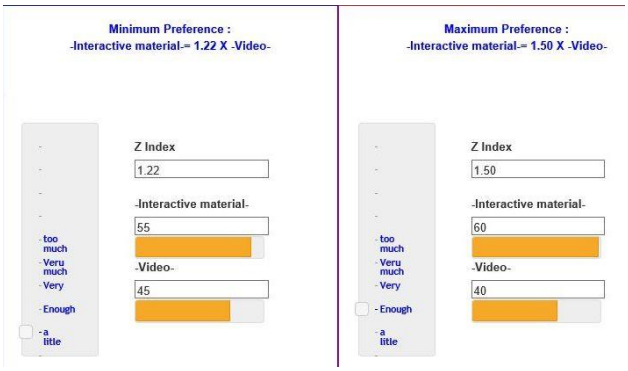


Figure 3 : Relative Importance of successive criteria

The range [zmax, zmin] from the pair comparison of the criteria determines the z ratio for each successive pair so that zminr ≤ zr ≤ zmaxr and pr= zr pr+1. Having thus identified the interval for the z ratio for each pair of successive criteria or subsets of criteria of equal importance, a linear problem is constructed and solved. In reality solving the linear problem leads to the identification of minimum and maximum values for the weights of the criteria, that include an infinite number of solutions, that is vectors of weights, that form a hyper-polyhedron (figure 4).

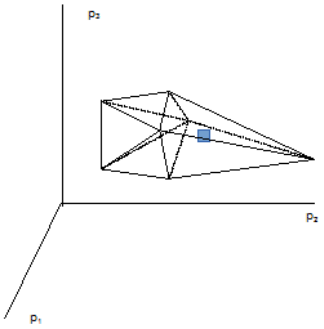


Figure 4 : hyper-polyhedron of solutions

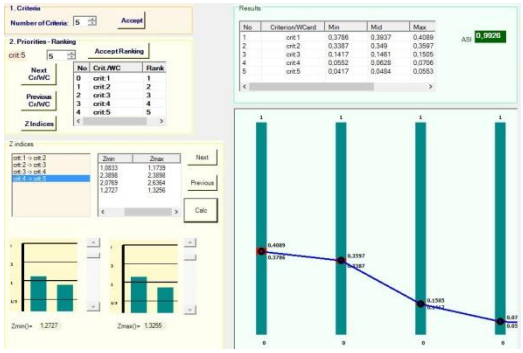


Figure 5 : Criteria Weights estimation

WAP ultimately results in determining the barycenter of the hyper-polyhedron reaching at a satisfactory degree of accuracy for the criteria weights and having high indicators for the robustness of the solution, such as the Average Stability Index (figure 5).
The analysis concludes by performing a Cluster Analysis in SPSS for the criteria weights which led us to the identification of groups of students according to their preferences of the types of learning activities that were offered in the course. The analysis revealed (tables 4, 5) 5 distinct groups with different preferences for the different types of learning activities offered in the course.

Table 4: Cluster Centers

	Cluster				
	1	**2**	**3**	**4**	**5**
Scorm	0.39	0.13	0.14	0.17	0.14
Video	0.25	0.14	0.22	0.17	0.12
SelfAssessment	0.14	0.15	0.39	0.20	0.15
LabExercises	0.13	0.17	0.15	0.25	0.46
Lectures	0.09	0.41	0.10	0.21	0.13

Table 5: Number of Cases in each Cluster

Number of Cases in each Cluster			
Cluster	1	49	33%
	2	23	15%
	3	25	17%
	4	17	11%
	5	35	23%
Valid		149	100%

The 1st group showed a preference clearly oriented to interactive material learning activities (39%) and a smaller preference to videos (25%), and consisted the 33% of target group of our research. The next in population group, 23% of the population, was the 5th group of the Cluster analysis which showed a particular preference in laboratory exercises. The 2nd group turned its preference towards face-to-face lectures and accounted for the 15% of the population. The 3rd group, in which we had a participation rate of 17% of the total population, indicated preferences towards laboratory exercises (39%) and Video-Lectures (22%). Finally, the 4th group, with the lowest population rate of 11% of the sample, presented an equal distribution regarding its preferences for the various types of learning activities in the course. A schematic representation of the five different students' groups of preferences is depicted in figure 6.

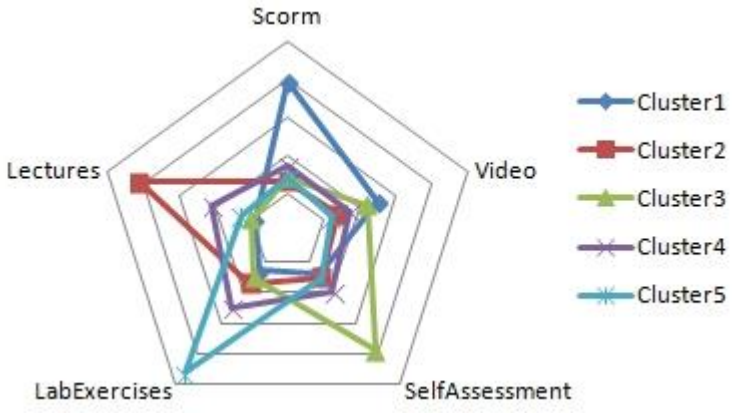


Figure 6: Illustration of preferences groups

26.4.2 Analyzing Students' Behavior

The identification of the groups of preferences in our approach is the keynote and the starting point of our analysis. After identifying groups of preferences we proceed to analyze their behavior in the three aforementioned dimensions. Each dimension constitutes a separate area and needs specific instruments and tools in order to support the decision maker. The first dimension that concerns the behavior of students in the e-learning environment needs tools and techniques from the Learning Analytics area (Larusson and White, 2014). Learning Management Systems could be the ideal platform for learning analytics because they can hold all these complex interactions between learner-learner, learner-content, and learner-educator during the instructional process (Psaromiligkos et al, 2011). In our case the e-learning environment was the Moodle Learning Management System and we have developed a specialized module (plugin) in Moodle that provides various reports (mostly visual) to the decision makers (Kytagias et al., 2015) in order to make them able to analyze the behavior of the groups of the students as they were formed in the previous dimension of our analysis. For the second dimension, in order to capture students' feedback we developed an on-line questionnaire about the quality of the learning activities that they were exposed (inside Moodle) and we asked the students to fill it in at the end of the course. Finally, for the dimension of the students' performance we analyzed the data collected from the final course marks of students.

More specifically, in our effort we created in Moodle the five groups of students that were formed in the previous analysis based on their profile of preference regarding the different types of learning activities and we executed various reports to compare the behavior of the groups in each type of activity (see next Figures).

Figure 7: Scorm Usage

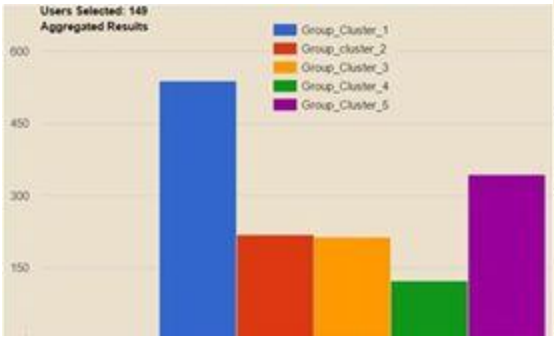


Figure 8: Video Usage

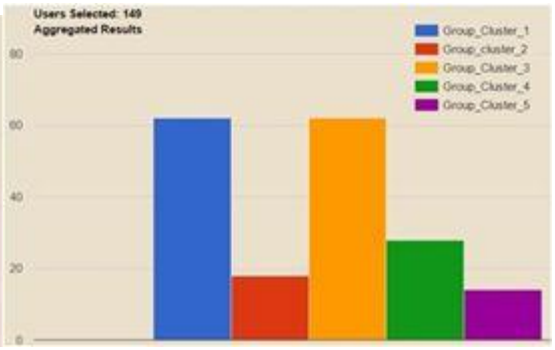


Figure 9: Self Assessments Exercises Usage

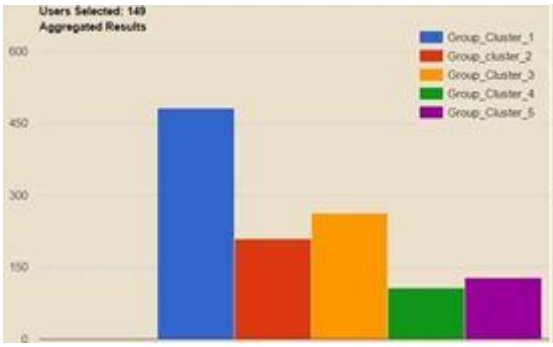
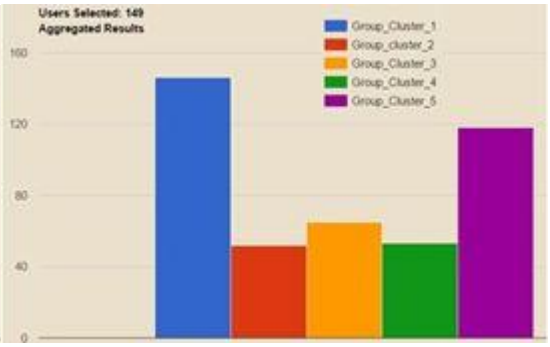


Figure 10: Lab Exercises Usage



From the underlying reports we are able to notice that the 1st group (blue color) of students, which showed the greatest preference in scorm activities (interaction material), was actually the most engaged in this type of activities. The 2nd group (red color) stated its preference in face-to-face activities that is activities in traditional lectures that are not recorded in the Learning Management System. The 3rd group (orange color), which was characterized by a strong preference for activity types of self-Assessment (39%) and at lesser degree for Video activities (22%), and showed to be more engaged in Video activities than in self-Assessment activities. Regarding the Video activities in the course we noticed that the groups that showed preference to this type of activity, ie. the 1st group with preference (25%) and the 3rd group with preference (22%) actually presented the highest usage in this type of activities. The 4th group (green color) showed an equal distribution regarding its engagement in the different types of activities, which is in agreement with its preferences. The 5th group (purple color) expressed a particular preference for the learning activity type of laboratory exercises which is consistent with the overall behavior of the group but we noticed that in laboratory exercises greater involvement presented the 1st group. If we analyze the completion rates as well as the time spent in the above activities we see a little different picture. The first three groups showed the highest completion rates while the last two groups (4th and 5th) showed the lowest. Completion means that the student had studied the whole learning object and not just visited the content. Completion rates we can have at SCORM activities or in activities of Moodle having enabled the "activity completion" attribute settings of the activity. We prefer the first option because it gives more accurate results through the use of specific SCORM attributes (completed, incomplete, not attempting, and so on).

Also, regarding the students' behavior in the e-learning system, the Video type activities presented the lowest number of visits and completion rates and by crosschecking the

feedback for this type of activities we also observed a lower rating in comparison with the rest type of activities (see figures 13-15). That footnote provided us with an indication that this type of activities needs improvement. By analyzing the feedback dimension and more specific the feedback taken from questionnaires we concluded that the packaging of the Video learning resources were too lengthy in time and it was not usable for the learners, who most of the times were looking for very specific information inside the video files.

As for the dimension of the students' performance, as we have mentioned, we analyzed the data collected from the final course marks of students. Having a close look at the achievements of the students we see that the 2nd group had the best average grade while the 4th group, the group that shows an almost equal preference in the various activity types, showed the lowest performance indicator (near the pass level). This situation allows us to characterize this group as the most risky for not successfully completing the course. Decision maker needs to analyze further this group by crosschecking the underlying learning behavior as well as the feedback gave on the activities. We can see that this group had in general low usage and completion rates (except videos' usage) as well as low feedback rates on the various activity types (except lab exercises). This means that this group faced various difficulties that need further analysis. For example, the group may include students that have difficulties because of lower background. This point partially confirmed since we found that several of the students of this group came from other universities (student transfers due to financial problems) with different background. This group found more attractive the lab exercises and it showed a relatively high traffic to video lectures that give us points of improvement. We could also enhance our assessment methods in order to give this group more engagement options in order to increase its performance achievement.

Providing an overall view regarding the feedback and performance dimensions we distinguish the 2nd group (with preference in Lectures) which shows the highest engagement and completion rates in almost all the activity types, except the video ones, and achieved the highest marks regarding its performance. This group seems to include the students which are most engaged, come to lectures, and in general they manage to perform best in all suggested activities.

Figure 11: Int. Material feedback

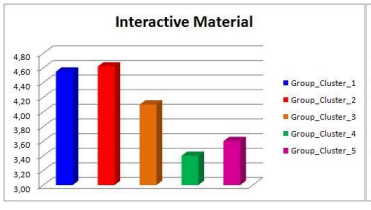


Figure 12: Video Lect. Feedback

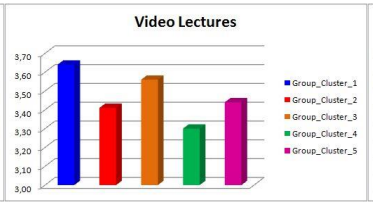


Figure 13: Self Assessment Feedback

Figure 14: Lab Exercises Feedback

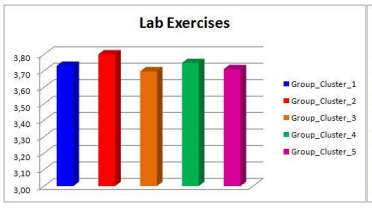


Figure 15: Lectures Feedback

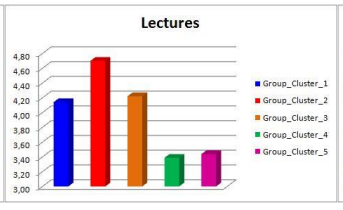


Figure 16: Final Performance

26.5 Conclusions – Future Directions

The redesign process of an e-learning course needs the evaluation of various alternatives and the decision maker needs sophisticated support and a well designed methodology. Learners' perception is central in such a process. In this paper a student centered approach was presented for redesigning e-learning courses through the analysis of students' preferential structures in the following three dimensions: (a) the dimension of students' learning behavior (b) the dimension of students' learning performance and (c) the dimension of students' feedback on the quality of the learning activities. Consistency of students' preferences with the dimensions of students' learning behavior, students' feedback, and students' final performance means to some extent successful implementation of the educational scenario. Any other inconsistency indicates a potential problem where a decision maker should analyze during the redesign process. The term "consistency" denotes a compatibility relationship between students' preferences and the other dimensions. For example, if a group with preference to Video type learning activities does not show a relative engagement in the video resources of the course may indicate a problem such as unattractiveness, not easy to use, and so on. The feedback dimension could explain some of the factors by giving more details on this specific activity. Moreover, the degree of correlation between the underlying activity and the final performance may reveal the importance (or weight) of this factor.

Our approach is based on a new method called WAP from the domain of Multicriteria Decision Making. The WAP method provides a valuable source material that includes weights of individuals' preferences that become input in a clustering process that determines (clusters) groups of preferences among students. The behavior of these groups is then analyzed in the other three dimensions. The dimension of students' learning behavior means to analyze a large volume of data captured by the underlying e-learning system. The new emerging field of Learning Analytics provides the necessary framework to answer questions related to the learning behavior of the underlying groups' preferences. Specific questionnaires could be used for the analysis of students' feedback on the quality of the learning activities. The questionnaires managed by the Quality Assurance System of each university could be used in order to capture the students' feedback and provide data for the analysis in this specific dimension. Finally, the analysis of students' performance in various graded activities as well as their final performance could give valuable feedback not only for the explanation of groups' learning behavior, but for the enhancement of the assessment instruments used as well.

The results of the initial application of our approach were presented in this paper from a real course at Piraeus University of Applied Science with promising results. Adapting education to a student-centered and personalized dimension of learning is not an easy task. Our framework gives a holistic and a fully student-centered approach to the redesign process of an e-learning system and it can be used in various levels such as a specific course, a complete curriculum or a whole educational organization.

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27 The social and economic impact of technology: 8 digital skills we must teach our children

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27.1 Abstract

The social and economic impact of technology is widespread and accelerating. The speed and volume of information have increased exponentially. Experts are predicting that 90% of the entire population will be connected to the internet within 10 years. With the internet of things, the digital and physical worlds will soon be merged. These changes herald exciting possibilities. But they also create uncertainty. And our kids are at the center of this dynamic change. Children are using digital technologies and media at increasingly younger ages and for longer periods of time. They spend an average of seven hours a day in front of screens – from televisions and computers, to mobile phones and various digital devices. This is more than the time children spend with their parents or in school. As such, it can have a significant impact on their health and well-being. What digital content they consume, who they meet online and how much time they spend onscreen – all these factors will greatly influence children's overall development. The digital world is a vast expanse of learning and entertainment. But it is in this digital world that kids are also exposed to many risks, such as cyberbullying, technology addiction, obscene and violent content, radicalization, scams and data theft. The problem lies in the fast and ever evolving nature of the digital world, where proper internet governance and policies for child protection are slow to catch up, rendering them ineffective. Moreover, there is the digital age gap. The way children use technology is very different from adults. This gap makes it difficult for parents and educators to fully

understand the risks and threats that children could face online. As a result, adults may feel unable to advise children on the safe and responsible use of digital technologies. Likewise, this gap gives rise to different perspectives of what is considered acceptable behavior. So how can we, as parents, educators and leaders, prepare our children for the digital age? Without a doubt, it is critical for us to equip them with digital intelligence. Digital intelligence or “DQ” is the set of social, emotional and cognitive abilities that enable individuals to face the challenges and adapt to the demands of digital life. Above all, the acquisition of these abilities should be rooted in desirable human values such as respect, empathy and prudence. These values facilitate the wise and responsible use of technology – an attribute which will mark the future leaders of tomorrow. Indeed, cultivating digital intelligence grounded in human values is essential for our kids to become masters of technology instead of being mastered by it.

27.2 Keywords:

digital identity, digital use and safety, digital emotional intelligence, digital literacy, digital rights.

28 Applying Inquiry Based Science Education & Modern Assessment Techniques in the Classroom: A Case Study in Primary School

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28.1 Abstract

In this paper we describe a case study in Primary Education that promotes students' inquiry skills in Physics. The case study was implemented in an authentic primary school class, the learning content is based on the 'Electricity' unit, and the underlying scenario was supported by AESOP's electronic platform. The main target of this study was to investigate effective educational techniques along with the different ways they can be used in order to develop inquiry skills in primary school students. The added value of the specific intervention derives from applying a combination of various modern assessment techniques that can be used to assess inquiry skills in depth as well as from leveraging the electronic platform "AESOP". Finally, this paper includes the evaluation findings of the pilot implementation carried out so as to scrutinize the degree of acceptability, effectiveness and efficiency of the inquiry based science education.

28.2 Keywords:

Inquiry Based Science Education, Inquiry Skills Assessment, Modern Assessment Techniques.

28.3 Introduction

Inquiry Based Science Education (IBSE) has been recognized as an educational priority, which is promoted by both European and international reports on the effectiveness and suitability to increase the motivation and students' engagement in science and officially

supported by many countries for the overall improvement of science education (Abd-el-Khalick et al., 2004; Rocard et al. 2007; Minner et al., 2010, Bolte et al., 2012; Wallace et al., 2003). In addition, it has already been established as one of the educational approaches that support several of the features that have been emerged as priorities in the teaching of science, such as developing complex and critical thinking, active learning and in-depth processing of information (Hu et al., 2008; Minner et al., 2010; Bolte et al., 2012; Kostelníková&Ožvoldová, 2013).

The implementation of IBSE in the classroom is related to findings which support the claim that a developmental hierarchy of skills and understanding underlies, and should be identified as an objective of inquiry learning (Kuhn, Black, Keselman, & Kaplan, 2000). The added value of developing inquiry skills is that the latter are directly linked to the so- called "Key Skills and Competences" identified by several frameworks and policy documents as important for 21st Century learners and citizens (Ananiadou& Claro, 2009; Binkley et al., 2010; Minner et al., 2010; PISA, 2010; P21, 2009).

However, there is interest in how education and society, more generally, cannot only advance but also measure the competency, skills and experiences needed by productive, creative students, workers and citizens (Griffin, McGaw, & Care, 2012). In both Greek and international bibliography there has been a significant number of Inquiry based learning scripts for Teaching Science in all levels of education.The main weakness lies in the fact that they do not include assessment methods and tools. In addition, while many projects have focused on the evaluation of conceptual understanding of science principles development, there is a clear need to evaluate other key learning outcomes, such as process and other self-directed learning skills, with the aim to foster the development of interest, social competences and openness for inquiry so as to prepare students for lifelong learning. For the teacher, assessing students' performance in Inquiry based learning scripts is a particularly difficult and challenging venture, as they will have to take into consideration, record and evaluate a variety of parameters (Darling-Hammond & Adamson, 2010). Evaluation of inquiry skills can be supported by modern assessment techniques, such as concept maps, rubrics, peer assessment, self-assessment, the work folder, etc. (Petropoulou, Kasimati, & Retalis, 2015).

The structure of this paper is as follows. In the next session a literature review on Inquiry Based ScienceEducation philosophy, instruction and implementation is presented. Next, we portray our proposed inquiry based learning scenario. Emphasis is given on the ***inquiryskills*** that the educators are expected to nurture their students as well as multiple ***modernassessmenttechniques*** that they utilize in order to assess these skills. The paper ends withconcluding remarks and plans for future work.

28.4LiteratureReview

According to Linn, Davis and Bell (2004) inquiry is *"the intentional process of diagnosing problems, critiquing experiments, anddistinguishing alternatives, planning investigations, researching conjectures, searching forinformation, constructing models, discussing with peers and forming coherent arguments."*

Originally, the term *inquiry* is addressed particularly in science education (scientific inquiry) and refers to at least three distinct categories of activities: a) what scientists do, b) how students learn and c) a pedagogical and teaching approach adopted by educators (Minner et al., 2009). Thus, the term Inquiry Based Science Education (IBSE) is used to assign this orientation and to declare an educational approach, which involves teaching and learning of

science and is conducted through the systematic and principled research process of pursuing and refining explanations for phenomena in the natural or material world.
Inquiry is presented as a scientific process of active exploration by which students use critical, logical, and creative thinking skills to raise and engage in questions of personal interests. Driven by their curiosity and wonder of observed phenomena, inquiry investigations usually involve generating a question or problem to be solved, choosing a course of action and carrying out the procedures of the investigation, as well as gathering and recording the data through observation and instrumentation to draw appropriate conclusions. As students communicate and share their explanations, inquiry helps them connect their prior understanding to new experiences, modify and accommodate their previously held beliefs and conceptual models, and construct new knowledge. In constructing newly formed knowledge, students are generally cycled back into the processes and pathways of inquiry with new questions and discrepancies to investigate (Llewellyn, 2002).
IBSE can be organized through various instructional models (such as the 5E model), which can be all considered as variations of the cycle described above and structure the inquiry-based lessons in science. However, they differ on the degree of teacher direction.
The priority on the use and implementation of IBSE is indicated as there have been several large scale projects funded under the European Seventh Framework program such as S-TEAM, ESTABLISH, Fibonacci, PRIMAS, Pathway and SAILS. Although, SAILS is the only one focused on the assessment of the inquiry skills by developing appropriate strategies and frameworks for the evaluation of IBSE skills and competencies. The project team has collaborated with local science teachers to publish a collection of 19 SAILS Inquiry and Assessment Units which showcase the benefits of adopting inquiry approaches in classroom practice, exemplify how assessment practices are embedded in inquiry lessons and illustrate the variety of assessment opportunities and processes available to science teachers (SAILS, 2012).
But how does one assess skills such as developing hypothesis, forming coherent arguments,working collaboratively or carrying out investigations? Evaluation of inquiry skills cannot be adequately supported by traditional assessment methods (teacher asking oral questions, tests etc.) as the use of classified criteria is required. On the other hand, a combination of modern assessment techniques is utilized in order to evaluate such skills. An assessment rubric, for instance, consists of special pre-established performance criteria and may include additional methods, such as peer assessment or self-assessment. However, these contemporary techniques demand great effort for teachers. Therefore, case studies are needed. In this context we developed our current work.

28.5 The case study

The particular case study was implemented by three educators and their fifth grade students (75 in number, mixed ability and gender) at “DE LaSalle” Primary School of Alimos in Greece. The implementation was supported by AESOP's electronic platform (http://aesop.iep.edu.gr/).

28.5.1 Description of the learning script

Students often seem to find difficulty in associating daily phenomena with scientific knowledge. In addition, some students strongly resist new knowledge by maintaining their

alternative conceptions of physical phenomena. The specific learning script refers to Physics in Primary Education and it pertains to the section of ‘Static Electricity’. The understanding of static electricity as a concept and as a phenomenon is a prerequisite for the subsequent study and investigation of other phenomena such as electricity and electromagnetism. Students should be able to make reasoning with abstract concepts, such as "current", "energy", "load" etc. However, some students find it difficult to distinguish these concepts. They often use the term "electricity" instead of an appropriate or a more specific term. Moreover, although students have experienced the phenomenon of static electricity in their daily life (lightning, hair electrification, got a jolt), they seem unable to explain this scientifically, which contributes to the maintenance of alternative concepts. It is still likely that many students assume that positive charges move over the negative ones, although the opposite is only valid.

The existence of students' primary ideas concerning physical phenomena like the one we presented bellow has led us to the selection of an "evolving research teaching model" of Schmidkunz & Lindemann (1992) which has been adopted in the curriculum of several primary schools (e.g. in Greece and Cyprus) (Sotiriou et al. 2010). The particular model includes four phases of teaching: (i) Introduction - Stimulus – Hypothesis Formulation, (ii) Experimental approach of the task, (iii) Inference, (iv) Consolidation – Generalization. The underlying learning script consists of four distinct phases, the implementation of which was completed in a six session (6x 45 min) lesson course. Students collaborated in groups of four throughout the procedure. Below are the details of the development and implementation phases.

Phase 1. Introduction - Stimulus – Hypothesis Formulation

The first phase was an introduction to the concept of static electricity and its derivatives (transfer of charge, attraction, repulsion, and grounding). Activity A(Introduction and stimulus) served as an opportunity for students to review prior knowledge and develop hypotheses. In this initial activity students were introduced to three examples of static electricity from everyday life-lightning, hair electrification and attraction between a balloon and a fur- by watching three related videos. Then group discussions were used to develop hypotheses, which they can investigate through experimentation. Groups posed their conjectures by completing two concept maps in Worksheet 1.

Phase 2. Experimental approach of the task

The second phase was about investigating experimentally the proposed hypotheses. The students *carried out investigations* (Activities B- C) in order to test the hypotheses they developed in the previous activity (Activity A).
In Activity B(Experimental), students implemented two scientific experiments in the laboratory to explore electrical charge of various materials by rubbing one with another, as well as the upcoming attraction or repulsion between them. Each student was given a specific role in their group –Director, Facilitator, Materials Manager or Technician (The science penguin, 2013).
Then, in Activity C (Simulations), students used the information they had just collected to explore the visualized movements of the negative charges over materials and how this transfer of the charge could make sparks fly.Subsequently,each groupwrote down their

observations and formulated their results using the scientific terminology suggested in their Worksheets (2& 3). When the experimental approach of the task was finished, each group used two holistic rubrics in order to assess themselves in working collaboratively and carrying out investigation skills.
The educators had provided the rubrics prior to the experiments and explained the assessment criteria.

Phase 3.Inference

In this phase Activity D (Everyday application), looked at the application of acquired knowledge in everyday life, enhancing students' *scientific literacy and reasoning* through understanding of real world applications of static electricity. In this phase gained knowledge was connected with everyday life. Each group answered some questions, which derived from two videos of static electricity in everyday life (Worksheet 4).Students used their worksheets to support their answers. The answers were peer-assessed through aholisticrubric, which evaluated the accuracy and entirety of students' answers. The educators provided the rubricin advance and explain ed the assess ment criteria and weight factor of each one. When groups finished this activity, there was a classdiscussion, guided by the educators, to facilitate the final correction of the answers.

Phase 4. Consolidation – Generalization

The final phase focused on drawing general conclusions and deliberating on the whole procedure. In Activity E (Conclusions and Hypotheses testing), students consolidated and interpreted their final results and related them to their initial hypotheses. During this phase, each group summarized through discussions their observations from the previous activities, drew conclusions based on the evidence they had collected and related them to their original hypotheses. The students returned back to their initial conjectures and made corrections by filling out anew the concept maps given in Activity Ausing Worksheet 5.
Afterwards each student assessed themselves in working collaboratively using a rating scale.

28.5.2 Skills to be assessed

There were five worksheets provided in each phase to collect evidence of both content knowledge and development of inquiry skills. Assessment opportunitiesincluded a set of modern assessment techniques. The following skills were assessed in this case study (Table 1).

	Skills	**Assessment methods**
Phase 1	Developing Hypothesis	Rubric
Phase 2	Carrying out investigation Working collaboratively	Intergroup assessment rubric
Phase 3	Forming coherent arguments	Peer- assessment rubric
Phase 4	Developing hypothesis Working collaboratively	Worksheet 5: Intergroup assessment- Hypotheses Testing Self- assessment rating scale

Table 1. Skills assessed and Assessment methods

Developing hypotheses

This skill was assessed by the educators using a holistic rubric when reviewing students' artefacts from Activity A and Activity E. Groups were judged on completing the concept maps and reasoning their initial and final conceptions.

Carrying out investigation

The assessment of this skill was carried out during the second Phase by using an intergroup assessment rubric for both Activities B and C.Each group put their final score after considering the assessment criteria, such as the level of completion and accuracy of their answers, the runtime management etc.

Forming coherent arguments

This skill was assessed by using a peer- assessment rubric when reviewing other group's artefacts in Activity D (Everyday application). Groups were judged on the level of completion, preciseness and reasoning of others.

Working Collaboratively

An intergroup assessment rubric and a self-assessment rating scale were used. Each group used a peer assessment rubric in Phase 2. A self- assessment rating scale had been also utilized so that each student could personally assess themselves and their working group. This scale was provided in Phase 4, when students had finished the majority of the activities. The assessment criteria included collaboration, time, function and material management.

28.6 Results

The results from three rubrics and a rating scale for educators and students making judgements of inquiry skills are presented below.
The score students were aspiring to achieve in each one of the assessment tools (rubrics and the rating scale) was 20 points.

28.6.1 Developing hypothesis

Educators used a rubric with 4- level criteria for making judgements of *developing hypotheses* skill and applied these criteria to written responses students handed in from Activities A and E. Results indicated that the majority of groups (15 out of 18) received over 15 points out of 20 as a final score.
Groups also evaluated their *developing hypotheses* skill by using Worksheets 1 and 5 while implementing Activity E: Conclusions and Hypotheses Testing. Examination of the records showed that 67% of the groups completed the hypotheses testing and managed to achieve a

higher level of performance. Also, 16 groups indicated that they had changed their initial ideas. All groups mentioned that they had improved whilst using scientific vocabulary and 14 groups identified some improvement in their scientific reasoning skill.

28.6.2 Carrying out investigation

Each group of students completed a rubric with a 4- level criteria for making judgments of *Carrying out investigation* skill. The assessment was based on group's recorded answers on the Activities B and C in the second phase. The intergroup evaluation showed that the final score for each group was over 17 points.

28.6.3 Forming coherent arguments

Each group of students, also completed a peer- assessment rubric with another 4- level criteria for estimating another group's performance in *forming coherent arguments* skills. From the results there was a variance in the final scores. Though, 67% of the groups were given over 15 points out of 20.

28.6.4 Working Collaboratively

Each group used an intergroup assessment rubric with a 4- level criteria in Phase 2. The intergroup evaluation showed that 100% of the groups' final scores were over 17 points.
Students, also, used a rating scale with another 4- level criteria in order to assess themselves in working collaboratively during the whole scientific process in Phase 4. From the results taken 77% of the students graded themselves over 15.

28.7 Conclusion

In this paper, a case study on assessing inquiry skills in classroom was attempted. The specific learning script follows the principle of IBSE and proposes the use of modern assessment techniques. The evaluation of the findings from the pilot implementation emphasizes on the activities, the aimed inquiry skills and the assessment methods and stresses the importance of achieving correlation between them when designing an IBSE unit. For instance, selecting the criteria while making a rubric is a demanding process. The latter had to match the content of the activities as well as the skills assessed.
In addition, IBSE is demonstrated as a challenge. Educators faced difficulties during the implementation of the scenario as they were not thoroughly used to IBSE and Assessment. So was for the students. Most of the contemporary assessment techniques (such as rubrics) were not familiar to them. As a consequence, considerable direction during the implementation was needed and much more time was spent than intended.
Nevertheless, both of them finally seemed to become acquainted with a novel process of learning and assessment, they accepted with sheer enthusiasm. The evaluation showed that all worksheets were fully completed by the majority of groups (72% on average) and this was rising during the implementation of the script. According to the findings, Inquiry Based Learning activities greatly improved the process of restructuring the students' primary ideas.

Educators, by implementing a combination of modern assessment techniques, evaluated with as much completeness as possible their students' performance. This case study verifies that multiple modern assessment techniques can support the evaluation of 21st century skills.
Our short term goal for the future is to design, develop and implement in our school further learning scripts around scientific concepts, as well as adapting new and enhanced assessment methods that should provide better understanding of skills that students develop during IBSE, in order to make the most of the added value of Inquiry Based Learning and Assessment in classroom.

28.8 Bibliography

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29 THE PROCESS OF EDUCATION IN DETERMINING THE ROLE THE INTERNET PLAYS IN SHOWCASING THE COUNTRY'S CULTURAL POLICIES. A field study

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29.1 Abstract

It is now accepted that healthy sectors, even that of the information society, with a focus on the Internet, are the most valuable asset for the sustainability of bodies and organizations, in every country in general and in our country in particular. In the current financially challenging climate and in relation to the economic crisis, everything favors "education", in the broad sense of the term, also in the sector of culture, through particular internet mechanisms. There is no doubt that the sector of culture needs the internet. In fact, it is through the internet that we can meet the needs of the information society, and its widespread use can promote culture, which is considered the "bread" of our country. We examined the subject on a theoretical basis, with the help of secondary sources of information, while we also conducted a field study, using an anonymous questionnaire which was distributed in various points of cultural interest in Athens. The purpose of the study essentially is to determine the field of application, and we hope that the statistical sample will allow us to establish the trends and attitudes in adopting – or not – internet applications, using best practices to make its use more efficient in the area in question.

29.2 Keywords:

Internet applications, sector of culture, information society, sustainability.

29.3 Introduction

The present study focuses on researching technological challenges in education, specifically internet-related. The internet and internet-based education are the main point of discussions, concerns, and studies of the various bodies and organizations which are influenced by, involved in, and create educational policies and their possible future developments. The

concept, principles, and organization of applying internet use and its benefits on educational activities, in a broad sense, are approached, so that Technical Professional Training, for instance, can contribute directly to shaping the society of the future.[12]

29.4 The development and convergence of new technologies

The rapid development and convergence of the new technologies of informatics and communication, through information highways / the internet / the worldwide web, have structured the information society and are already leading us to the knowledge society. The ability to create, distribute, access, and use information and knowledge is more important now than it has ever been, and it is often viewed as the main agent for the development and improvement of the quality of life. The European Union, by decision of the European Council in Lisbon in March 2000, set the strategic goal of education in the knowledge society. Education is adapted, extended, it evolves, and it seeks new goals and new roles, which is why its contribution to the enrichment of the knowledge society is an undeniable fact. The educational process reflects the way learning and teaching are interlaced with academics (scholarship) and research.[13]

29.5 Educational goal-setting

The objectives of education constitute norms which determine what is considered necessary, expected, and sought-after in a society regarding the present and future behaviors of the younger generations.
The goal is to systematize the transmitted knowledge and to accelerate the simulation practices. Education is thus required to serve society's needs, and today this is a global phenomenon which begins with the individual.[14]
Human beings are not just beings that can be trained and educated, but that can train and educate themselves. That is, they are conscious of the motives which push them towards a certain action. This consciousness comprises a sense of liberty and a sense of responsibility; these two ferment education into human nature and allow people to develop their creativity – in this case, the creation of new technologies and the internet in particular to approach the knowledge society. Therefore, human being are educated because they guide themselves, they are autonomous and not heteronomous. Education is essentially an act of liberty and responsibility, an act of consciousness and self-guidance.[15]
The same is the case with the information highways / the internet / the world-wide web, which constitute the information society. The model can be internalized through guidance, self-control, collaboration, or the association of concepts-processes in a reciprocating way (up-down, left-right) in order for the learners to reach a more rounded understanding.[16] Education in its current form can even lead to "transformative" learning. The basic requirement is that the learners participate in, determine, and agree on their educational needs, and that the

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12 Pamouktsoglou A. (2007). The theory, action, and evaluation of teaching. Technical-professional training, D.T.P. Introduction, p. 14. Ellinoekdotiki.

13 Vasilakis K., Kalogiannakis M. (2007). Approaches to distance learning in higher education. Educational Research in Higher Education in Greece and the Influence of New Technologies. P. 20.

14 Xochellis P. (2010). Pedagogy and Education today. Controversial subjects, crucial issues, suggested solutions. "Ekpaideutika" (Educational issues), Issue 99-100, p. 235. Ekdoseis Adelfon Kyriakidi, Thessaloniki.

15 Antoniou C. (2011). EDUCATORS AND EDUCATION IN GREECE. P. 20. Ekdoseis Pataki, Athens.

16 Salvaras G., Salvara M. (2007). Teaching Models and Strategies, Making and Using Teaching "Tools". P. 227. Ekdoseis ATRAPOS.

educational organizations have the applications which meet both their educational and their organizational needs.[17]
The result of educational *goal-setting* in the sector of culture will be to equip people with methods of approaching reality by understanding the development and convergence of the new technologies of informatics and communications with the creation of the information highways / the internet / the world-wide web. Therefore, those who administrate culture could cultivate their sensibilities and knowledge, in order to safely orientate the general public.[18]

29.6 Culture

For the past few years there has been increased interest in television programs which have to do with history and culture. The increased circulation of equivalent magazines and books is impressive, as are the visits to internet pages regarding these subjects. This data reveals the trends in the interests of an ever-growing percentage of the population, but it also leads to significant changes in the way history and culture are addressed.
The passive approach to monuments and works of art is no longer satisfactory. Contemporary cultural visitors are not like the ones we had been used to: they will not visit a museum to see works of art and simply read the accompanying signs (usually badly written and in very small letters); they will not visit an archaeological site as part of a group, barely listening to the guide's trite words; they will not settle for just some names and dates; they already know far more before they even visit. Contemporary cultural visitors want to really get to know a place; they want to feel the history of their chosen destination; they want to feel part of the culture; they want to experience a cultural "adventure"; they want to be able to compare today to yesterday and understand the reasons behind and processes of change and progress.
There are many cultural organizations which use internet services to inform and educate travelers through their offices. Other cultural heritage organizations take advantage of mobile technology to improve and innovate. Various efforts are currently being made by cultural organizations to create smartphone applications which inform travelers even while they are en route to their chosen destination. In March 2010, National Trust allowed visitors to download information on the place they were visiting through an iPhone application. It should be noted that numerous travel guides can be found online and are available on mobile phones, while there are also videos on a variety of cultural destinations.[19]

29.7 Cultural policies and the internet

With the help of the internet, cultural policies should be available to all citizens, allowing them to be active participants in every cultural activity instead of simple spectators. All this, with the added contribution of the media, should help protect local cultures.[20] The general opinion on culture is that at its base there are traditional culture, artistic creations, which are

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17 Kontoni A. (2010). Educating Adults: Theoretical Approaches and Application Techniques. First edition, p. 17. Ellinoekdotiki, Athens.

18 Xochellis P. (2008). Pedagogy and Education. Introduction to Pedagogy. Fundamental Problems of the Science of Education. P. 57. Ekdoseis Adelfon Kyriakidi, Thessaloniki.

19 Karampatsou E. (2011). Story – Editing, "Touristiki Agora" (Tourist Market) Magazine, The magazine on the business of tourism, April Issue.

20 Leonardo. Cultural Policy: the Study and Data of Cultural Policy Vol. 3, pp. 359-373. Pergamon Press 1970, Printed in Great Britain No. 1 of series. Unesco, Paris, 1969. 49 pp. Reviewed by: S. K. Ghaswala

supported by a wide range of cultural exchanges and new programs[21], and of course the internet / world-wide web, which constitute the base of the information society.
Strong "cultural development" and the coexistence of different cultural models form an a priori new culture, with multiple cultural, social, consumerist, and psychological mixtures, so that, in just a short time since their appearance and development, local cultures can be showcased and promoted via the internet. The cultural part of the national image of a place cannot be copied nor transferred, because it contains unique cultural characteristics that are linked to cultural entities. It connects past and present, is associated with non-commercial activities, highlights the intellectual and immaterial values of a country's residents and cultural bodies and organizations.[22] It should be pointed out that no place can be absent from the formation of this new cultural landscape, taking seriously into consideration the structure of the information society.
It is not incidental that the historic city of Liège was the city chosen to host the first "MOSAIKA", where culture and tourism collaborate with other forces to build a new Europe.[23] The cultural tourism program is also open to common actions with UNESCO and the European Council, provided that the financial contributions are common and that the regulations of each organization are respected. Each proposal for common action is submitted directly to the European Commission, along with the call for the submission of proposals. Submissions concern exclusively plans for initiatives which aim to showcase the common European cultural heritage. "Experimental, innovative, or special actions" have been prioritized, in the context of the perspective and dynamics of the Community initiative "Europe, information society for all".[24]

29.7.1 The internet today

The internet as we know it has its roots in 1960s USA, at the height of the Cold War. The need for as secure as possible a telecommunications system lead to the idea of connecting computers that were spread all around the country and developing the corresponding application of communication between them. Initially funded and used by the Department of Defense of the USA, the internet started as a network connecting the systems of various state agencies and some big universities, under the name APRANET (Advanced Research Project Agency Network). More institutions kept being added to the network, so the internet developed into an important communication tool of the scientific community. This development resulted in a change of the body which managed the network: management

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21 Charles C. Mark. Μια μελέτη της πολιτιστικής πολιτικής στις Η. Π. Α, No. 2 of series. Unesco, Paris, 1969. Reviewed by: Gabriel P. Weisberg (Jstor Terms and Conditions), pp. 43

22 Anholt S. (2007) Competitive Identity – The New Brand Management for Nations, Cities and Regions. P. 99. Hampshire: Palgrave Macmillan.

23 Vom 29. Mai bis zum 2. Juni in Luttlick» Mosaica «: Kulturtourismus fur das 21. Jahrhundert Luttich – Unter dem Motto »Mosaica 1999« wird das Lutticher Kongresszentrum vom 29. Mai bis zum 2. Juni Schauplatz des ersten internationale Treffens des Europaischen Kulturtourismus sein. Die unter der Schirmherrschaft der Unesco und der Europaischen Union stehende Veranstaltung wird sowohl von der Wallonischen Region als auch von der Welt – Tourismusorganisation (WTO) bezuschusst.Die Touristikbranche hat sich mittlerweile langst zu einem der fuhrenden Zweige der Weltwirschaft entwickelt.In Europa gilt heute der Kulturtourismus als ihre treibende Kraft: Immerhin macht er bereits 37 Prozent des Gesamtreiseaufkommens aus. Die WTO zechnet mit jahrichen Zuwachsraten von 15 Prozent. Europaische Identitat. Dass die geschichtstrachtige Stadt Luttich als Austragungsort der ersten Mosaica auserwahlt wurde, kommt nicht von ungefahr. Sie ist das wirtschaftlich Zentrum der Wallonie und eine Drehscheibe zwischen Belgien, Deutschland, und der Niederlanden. Mit ihrer tausendjahrigen Geschichte, ihren reichen architektonischen Bauten und Hochschulerbe ist die Stadt ein Spiegelbild europaischer Identitat

24 The most important information on this initiative can be found at the following web address: http://europa.eu.int/comm/information_society/Europe.

moved from ARPA to the NSF (National Science Foundation). The concept of central management was gone when the internet was globalized. Now there are bodies which record and publish the characteristics of various sites within their geographical jurisdiction (site addresses, communication protocols used, etc.) on a national level.
To sum it up, the internet today is defined as a global network of computer systems and interconnected local and wide area networks. With the help of the proper software applications, internet users can communicate with each other, have access to information within any internet site, and transfer files between interconnected computers. The various uses of the internet, also realized through the respective applications, are defined as internet services.
The development of the internet and the width of services it provides is truly impressive. The internet population in 1994 consisted of 80 countries, 25.000.000 users, 16.500 networks, and 3.000.000 interconnected computers, while today there is internet access in 175 countries, 16.000.000 interconnected computers, and 50.000.000 users, with a strongly upward trend.
As previously noted, the main purpose of the internet is the fast exchange of information and unencumbered access to it, rapidly and without geographical limitations. In light of this purpose, the first user services were created. In order to create a service that can be used by any user, the following are usually required:

- Any particular service has to have been engineered (with the proper software) at a central computer internet site, to which the user has access. The service administrator has to have allowed any particular user to use it.

- The user needs to have the proper software (in the computer they use to connect to the internet, specifically a central computer), through which they can use the service.[25]

The principles and regulations of a contemporary sustainable cultural policy, as postulated by international organizations and put into action in the most successful examples globally (away from nationalistic outbursts, obsessions, statism, romanticizing of the past, corporate logic, unilateral imposition of the market or top-to-bottom elitist culture) can be valuable components of a new framework of putting a cultural policy and development in action, such as books, paintings, galleries, museums, university foundations, etc. It is also a responsibility to protect the precious capital of the contemporary cultural field and its creative forces from collapse, unconditional surrender, and destruction for the sake of old partisan clientele routine.[26]

29.7.2 Facilitated by the Internet

The spread of internet use changed the tourist business dramatically. Clients, having this powerful tool in their hands, managed to upend a traditional market in a very short amount of time. Given the opportunity by the internet to have any information available on their screens at any moment, their demands changed and their behavior as consumers was upgraded. The internet allowed potential consumers of services to have direct access to service

25 Micheloudakis K. High Technology & Tourism: The effects of high technology on the tourist circuit. Thesis, p. 42. Technical Educational Institute of Crete – Department of Tourism and Hospitality Management.

26 Zormpa M. (May 31st – June 1st 2013). The politics of culture during the Greek crisis: The terms and conditions of a paradigm change. Records of the two-day conference "Managing Cultural Organizations in Times of Crisis", p. 16.

processes, compare prices, as well as form their own visit schedules. At the same time, they can look for information and prices via the existing search engines, take part in auctions in search of bargains, and share their experiences through for a and C2C communities.
Thus, the current profiles of the clients of the services industry are significantly different to those from the past decade. Specifically, they actively seek more and fuller information on their chosen destinations; they are more mobile and less "loyal":[27] www.go-online.gr

During times of economic crisis, such as the current one, the management adequacy of a cultural organization focused on a sustainable cultural policy is limited or, in the worst case scenario, is nullified. This is mostly due to the fact that, in a period of recession or even bankruptcy, the state can obviously not prioritize the funding of culture, when the civil and cultural needs are exceptionally pressing.

29.7.3 The Conducted Quantitative Field Study

The characteristics of the conducted quantitative field study:

- Time period during which the study took place: December 2016
- Methodology: Primary quantitative field study via anonymous questionnaire
- Sample: 314 individuals

The study was conducted at the Acropolis, at the Temple of the Olympian Zeus, and at Syntagma Square in Athens, by handing out personal questionnaires to individuals who had been established to be internet users. The Simple Random Sample method had been chosen, and the sample consisted of Greek nationals of varying ages.
The questionnaire consists of standardized (closed) questions, simple and multiple choice. Standardization is necessary for the statistical processing of the data and to be able to generalize the sample to the general population.

29.7.3.1 Findings – Comments

The majority of the sample was male, with men being represented with a percentage of 57,4% while women formed the remaining 42.6% of the sample. This difference indicates that men were more willing to participate and give their answers than women. Regarding age, the largest percentage were 27 years of age – 29.6% – followed by 18 years of age with 23% and 36 years of age with 19.7%. The conclusion we may draw is that people are more familiar with studies and questionnaires at the age of 27.
The majority of the participants were independent professionals – 29.6% – followed by students with 23% and civil servants with 19.7%. Private sector employees and the unemployed are further down on the list. Again, we may surmise that independent professionals are more familiar with studies and the process of answering questionnaires.
On to the answers given to the questionnaire, the data is as follows:
Regarding the question "In your opinion, what are the main goals of cultural policies?", the majority answered that it is to create a new sociocultural paradigm, while a smaller

[27] www.go-online.gr

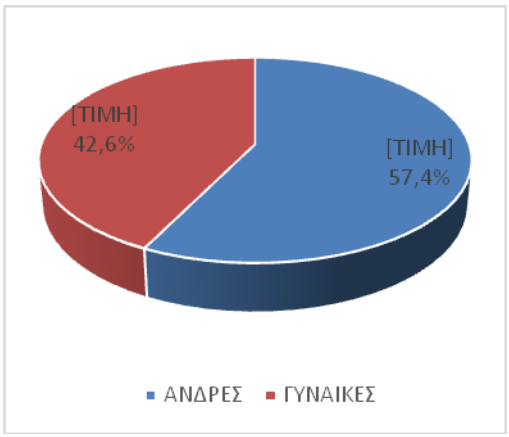
percentage thought that it was to cultivate humanist values. This shows that in people's minds, cultural policy is inextricably linked to sociocultural life and humanist values.
Regarding the question "In your opinion, which medium is more effective in helping people understand cultural policies?", the majority responded with the media, followed by the internet – therefore, people seem to trust traditional media more than the more contemporary internet.
Regarding the question "Do you consider cultural policies to be an investment on the country?", most individuals answered that they did, which is quite positive and hopeful, since it indicates that people have understood the value of cultural policies and how important they are to our country.
When asked "Do you believe that the internet promotes our country's archaeological treasures?", the vast majority gave a negative response. This is quite problematic, since we know that nowadays the internet is the main source of information and entertainment, and those in charge ought to make full use of the opportunities offered by the internet to showcase and promote cultural spaces – actually confirmed by our sample through their answers to question 5, where they recognized the internet as an important factor in the promotion of cultural policy.
According to the sample, internet use was deemed more effective when guiding visitors to cultural spaces, with a high percentage of 62,3%. At the second spot, with a significantly lower percentage (17,2%), came internet use on the architecture and aesthetics of cultural spaces. At the same time, the sample believes that the internet should be used to showcase and promote the country's full cultural reserve – expressing it clearly with a percentage of 97% through their answers to question 11.
Regarding question 6, and as an extension to the above, the vast majority answered that our country would have a better cultural image today by making good use of the internet, using it more efficiently and appropriately. So our sample believes that our country could create a positive and attractive cultural image on both a European and an international level; everyone acknowledges the potential and power of the internet, which is why they ought to make good use of it in order to showcase our country and promote our culture.
Regarding the question "Which internet practices do you consider most effective in promoting cultural policies?", the majority chose reports on the institution of special cultural programs by the state with a percentage of 38%, followed by reports on volunteer cultural promotion with 25% and reports on the number of museum visits with 17%. Therefore, according to the sample, it is the state which has to exercise and implement internet practices. Specifically, creating special cultural programs which will be carried out online and whose purpose will be to promote and further Greek culture is recommended. On a second level, internet practices could contribute to and promote volunteering practices at cultural organizations and units. This aspect of volunteering, unfortunately not widely known, could be publicized and promoted. As concerns the third most popular response, museums constitute the most popular cultural units in our country, and a significant number of museums can be found all around the country and not just in Athens. Internet use could make our country's museums even more popular both to Greek people and to foreigners, and it could contribute to a significant increase in the number of visitors each year.
Finally, our last question reveals our sample's good knowledge and accurate perception of the internet and cultural policies. The vast majority agrees that, when there is talk of cultural policy on the internet, it includes and combines the concepts of environmental sensibility, social well-being, and – above all – cultural sustainability. These findings are really encouraging, since they reveal a clear understanding of the term "cultural policy", in general and online.

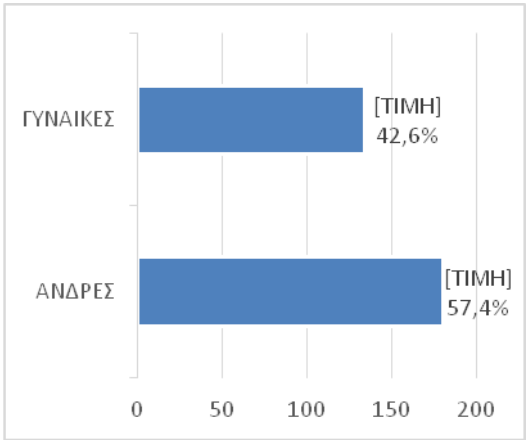
29.8 ANONYMOUS QUESTIONNAIRE

DEMOGRAPHICS OF THE PARTICIPANTS

Gender

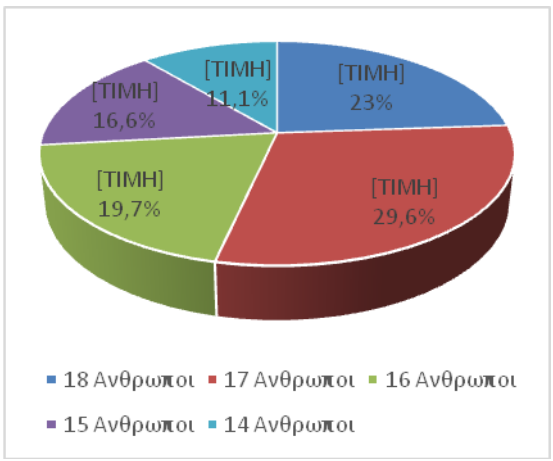
SAMPLE POPULATION		
GREEK NATIONALS	NUMBER	PERCENTAGE
MEN	180	57,4%
WOMEN	134	42,6%

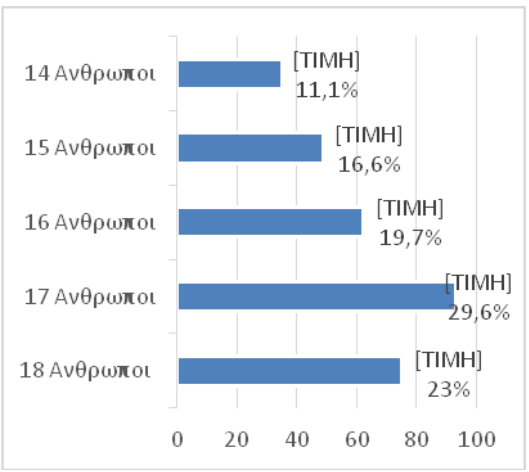




Age

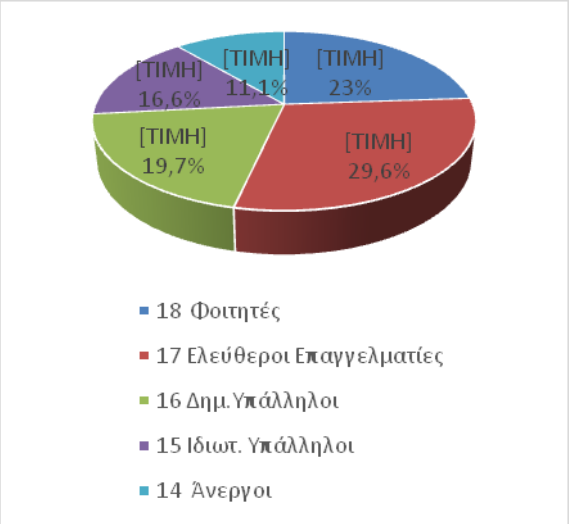
SAMPLE AGES		
AGE	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
18	75	23%
27	93	29,6%
36	62	19,7%
45	49	16,6%
54	35	11,1%
TOTAL	314	100

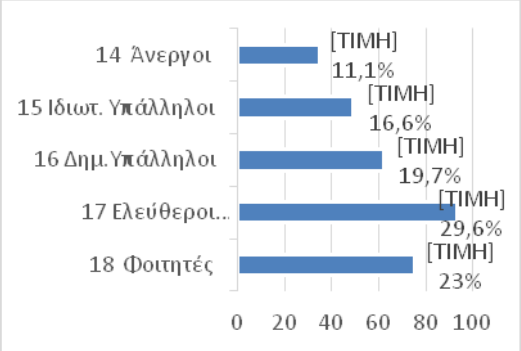




Profession

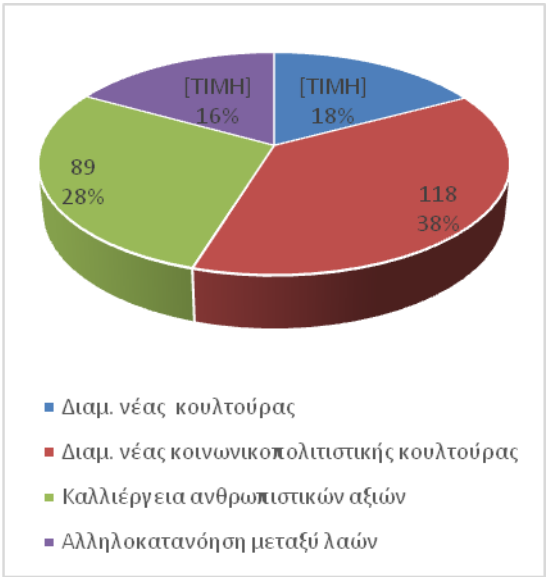
PROFESSIONAL STATUS		
	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
18 Students	75	23%
17 Independent Professionals	93	29,6%
16 Civil Servants	62	19,7%
15 Private Sector Employees	49	16,6%
14 Unemployed	35	11,1%
TOTAL	314	100

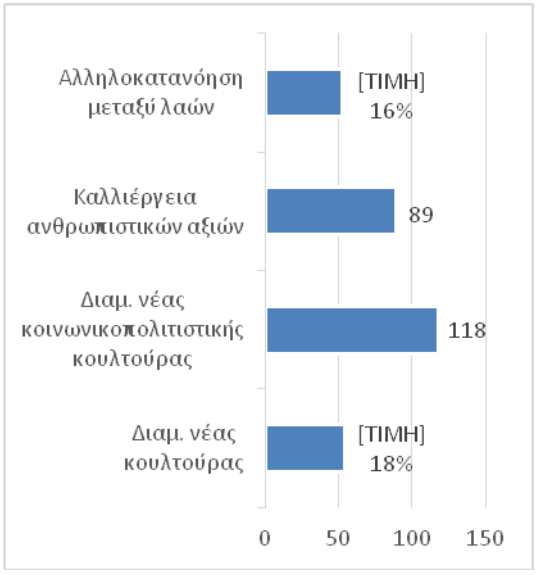




1. Question: In your opinion, what are the main goals of cultural policies?
To create a new sociocultural paradigm. □ To cultivate humanist values. □ To transmit cultural information. □ The mutual understanding between nations and cultures. □ To create a new culture. □

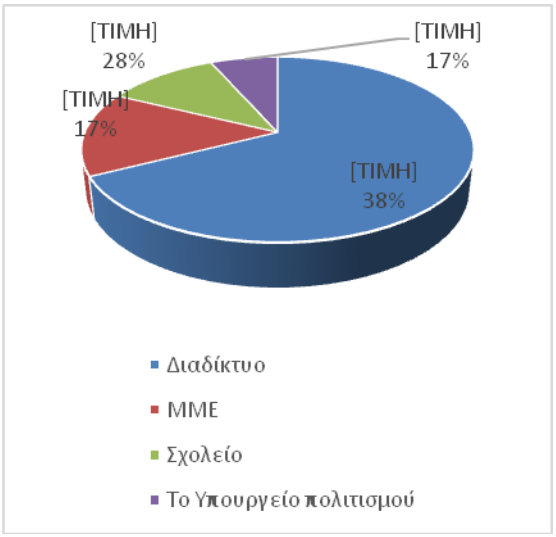
GOALS OF CULTURAL POLICIES		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
To create a new culture.	54	18%
To create a new sociocultural paradigm.	118	38%
To cultivate humanist values.	89	28%
The mutual understanding between nations and cultures.	53	16%
TOTAL	314	100,0

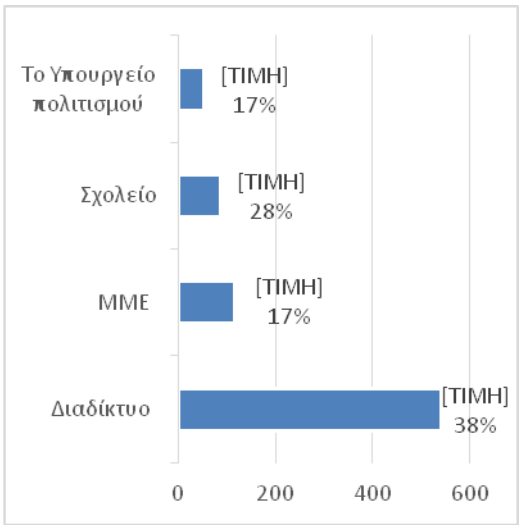




2. In your opinion, which medium is more effective in helping people understand cultural policies? School □ The media □ The internet □ The Ministry of Culture □

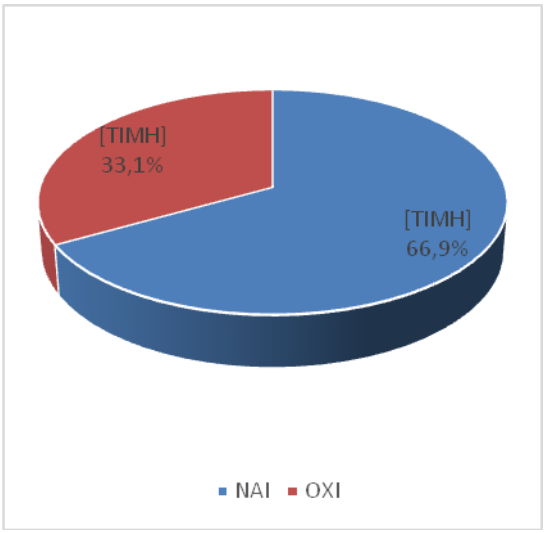
MOST EFFECTIVE MEDIUM		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
The internet	540	38%
The media	118	17%
School	89	28%
The Ministry of Culture	53	17%
TOTAL	314	100,00

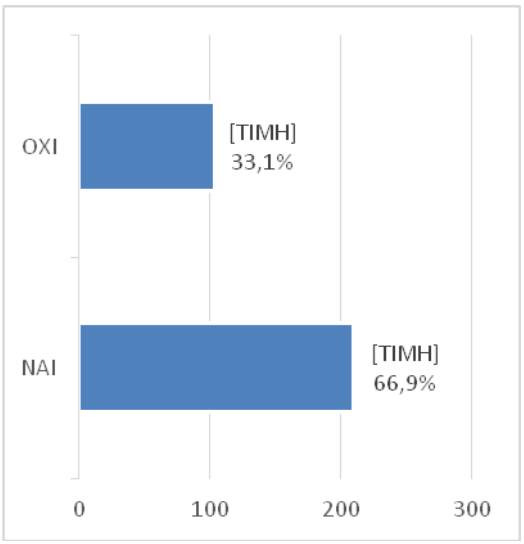




3. Do you consider cultural policies to be an investment on the country?
Yes □ No □

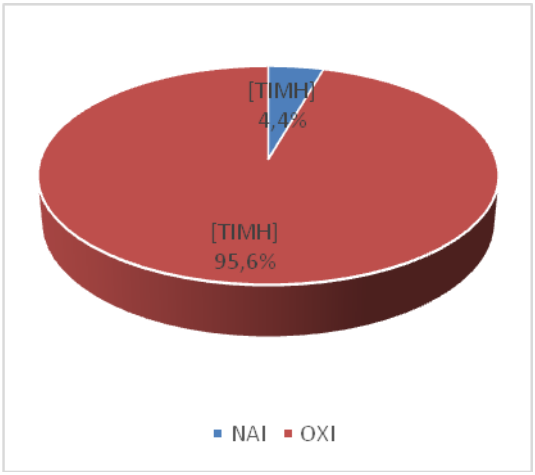
CULTURAL POLICE IS AN INVESTEMENT		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
YES	210	66,9%
NO	104	33,1%
TOTAL	314	100,0

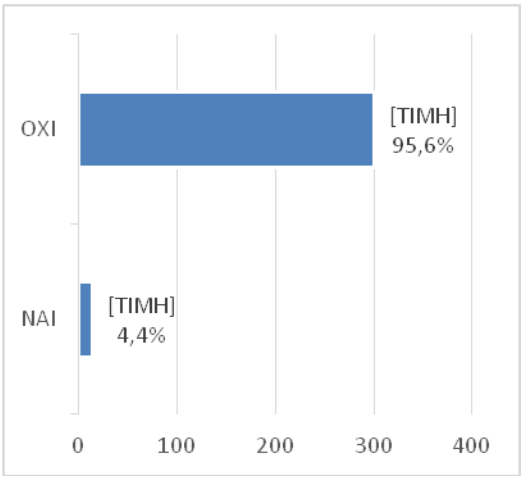




4. Question: Do you believe that the internet promotes our country's archaeological treasures?
Yes □ No □

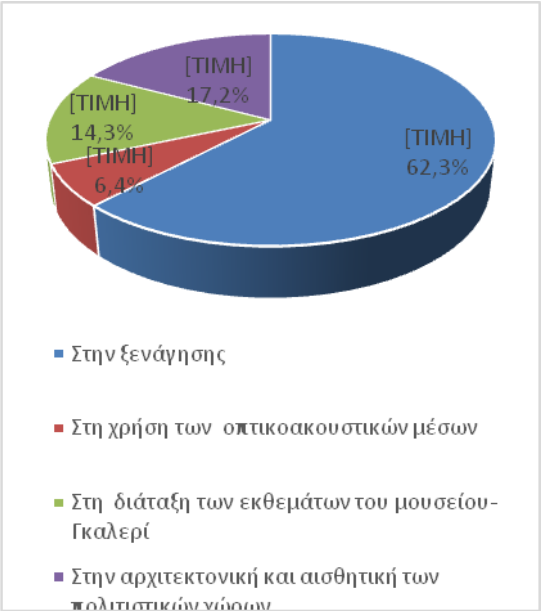
THE PROMOTION OF ARCHAEOLOGICAL TREASURES VIA THE INTERNET		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
YES	14	4,4%
NO	300	95,6%
TOTAL	314	100,0

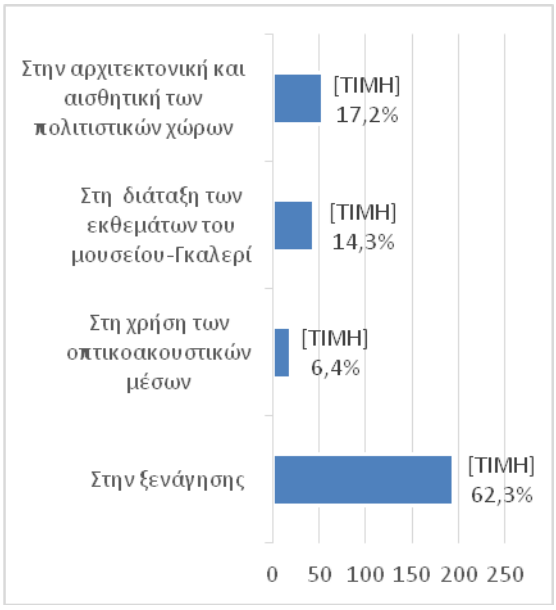




5. Question: Where do you think that the internet would be most effective?
In guided visits. □ In using audiovisual media. □ In arranging museum/gallery exhibits. □ In the architecture and aesthetics of cultural spaces. □

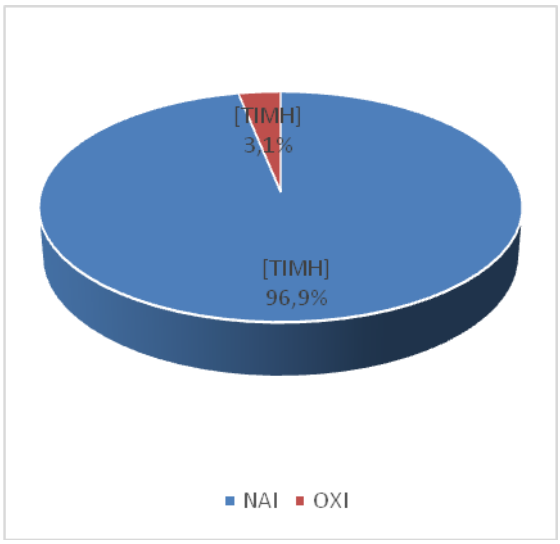
MOST EFFECTIVE INTERNET USE		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
In guided visits	195	62,3%
In using audiovisual media	20	6,4%
In arranging museum/gallery exhibits	45	14,3%
In the architecture and aesthetics of cultural spaces	54	17,2%
TOTAL	314	100,0

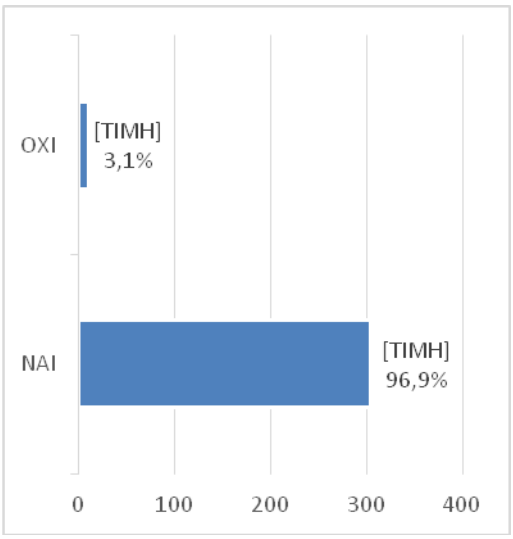




6. Question: Do you believe that the current cultural image of our country would be better through an effective internet use?
Yes □ No □

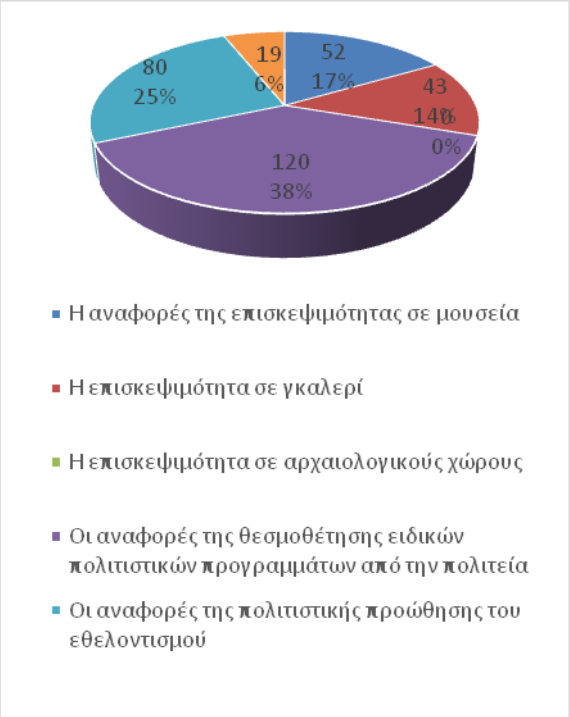
BETTER CULTURAL IMAGE THROUGH EFFECTIVE INTERNET USE		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
YES	304	96,9%
NO	10	3,1%
TOTAL	314	100,0

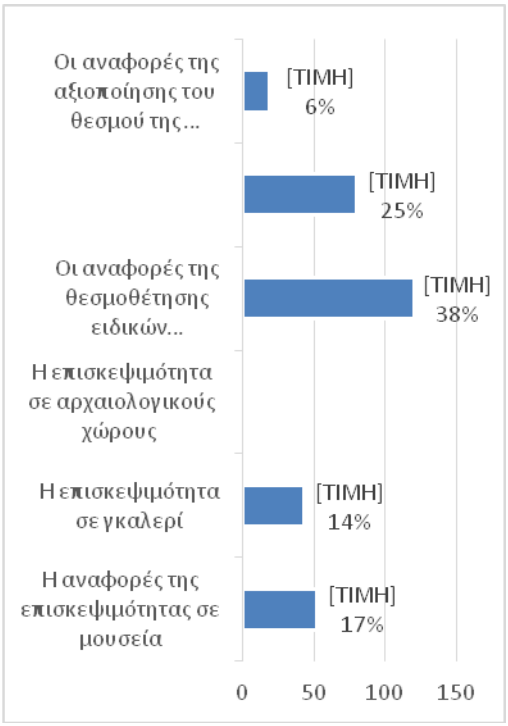




7. Question: Which internet practices do you consider most effective in promoting cultural policies? Reports on the number of museum visits. □ Reports on the number of gallery visits. □ Reports on the number of visits to archaeological sites. □ Reports on the institution of special cultural programs by the state. □ Reports on volunteer cultural promotion. □ Reports on foundations and private citizens making good use of the institution of sponsorship. □

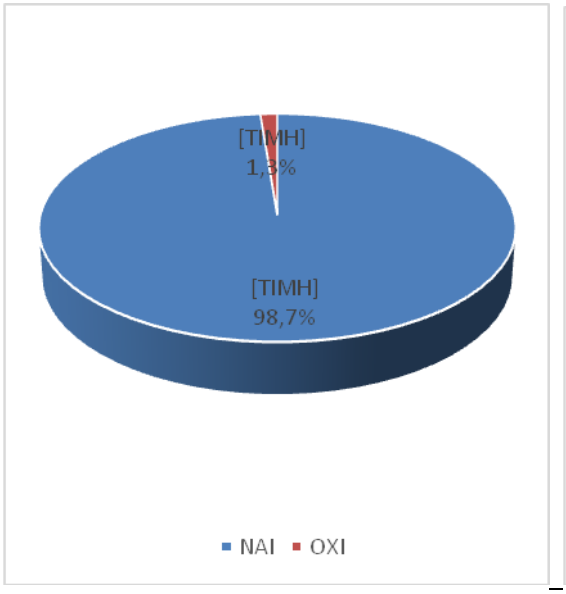
REPORT PRACTICES VIA THE INTERNET		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
Reports on the number of museum visits	52	17%
Reports on the number of gallery visits	43	14%
Reports on the number of visits to archaeological sites	0	0%
Reports on the institution of special cultural programs by the state	120	38%
Reports on volunteer cultural promotion	80	25%
Reports on foundations and private citizens making good use of the institution of sponsorship	19	6%
TOTAL	314	100,0





Question 8: When "cultural policy" is mentioned online, do you believe that it includes the successful combination of environmental sensibility, social well-being, and cultural sustainability?
Yes □ No □

CULTURAL POLICY ONLINE WITH THE COMBINATION OF ENVIRONMENTAL SENSIBILITY, SOCIAL WELL-BEING & CULTURAL SUSTAINABILITY		
ANSWERS	NUMBER OF PARTICIPANTS	PERCENTAGE (%)
YES	310	98,7%
NO	4	1,3%
TOTAL	314	100,0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NAI
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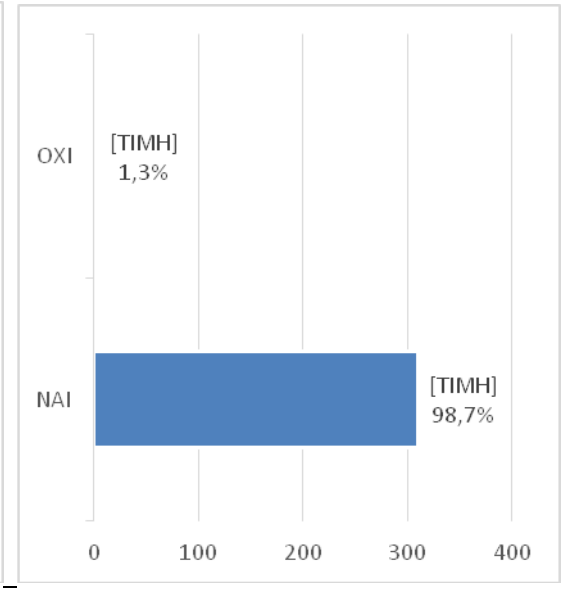
OXI
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NAI
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98,7%
0
100
200
300
400

30 What Can Technology do for Tomorrow's Children?

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30.1 Abstract

School looks different today than it did even a handful of years ago. Teaching and learning is changing—in exciting ways—because the world is changing. We now live in a global economy with a knowledge-based marketplace, where the ultimate measure of our success is becoming less about what we know, but more about what we do with what we know, and learning new skills to fit a rapidly changing world. Technology has helped to accelerate this pace of change, retooling nearly every aspect of our daily life, from how we communicate, to how we shop, to how we receive medical care. Schools—many of which have been slow to embrace innovation—are beginning to engage in this digital revolution.
However, technology can just as easily widen the lead for those who already have every advantage. If the technology revolution only happens for families that already have money and education, then it's not really a revolution. Classrooms across the country are marrying hands-on, inquiry-driven learning with digital technologies. They are blending traditional instruction with computer-based activities.
Innovation in education isn't about the latest gadget or app, or about how adept a student is at using a smartphone to consume the latest Internet meme.
Efforts to further educational innovation must not only help students to develop skills for modern lives and careers. They also must help prepare students to be captains of their future and creators of a better world in ways in which my generation, likely yours, and others before us never dreamed possible. One danger of educational technology is that digital-

learning tools and innovation could miss their potential to close persistent opportunity gaps and instead disproportionately benefit students who already have the most advantages.

Technology is enhancing the crucial relationship between educators and learners, helping teachers to use their time and talents more effectively to personalize learning for students—tailoring the pace, approach, and context of the learning experience to students' individual needs and interests.

Educators frequently share that teaching is the most difficult job anyone can have—and also the most rewarding. Teachers can literally shape the way young people see themselves and the world. Unfortunately, their efforts are too often not fully appreciated, supported, or immediately rewarded.

Technology can help by ensuring that professional development for teachers is just as personalized and meaningful as the education we expect them to provide to their students. We also need tools and platforms that provide customized feedback to teachers so they can deepen the quality of their practice precisely in the ways—and at precisely the times—they need. We need tools that ease the administrative burdens of the job to free teachers to spend more time engaging with their students.

Everyone has an essential role to play in elevating and supporting the teaching profession. Teachers must be willing to explore new ways of supporting and challenging themselves and their students. Students must assume more responsibility for their own learning. Principals must create school climates that honor innovation and experimentation. Elected officials and policymakers must be willing to incentivize policies and programs that lift up the profession—through more resources, support, and funding.

30.2 Keywords:

innovation, professional development, equity in education, digital revolution.

31 Identifying Risks Factors of Students' Failure in e-Learning Courses

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31.1 Abstract

The radical changes that 21th century has brought about in the territory of education have increased the requirements of the underlying stakeholders for smarter tools capable to provide continuous and sophisticated feedback of the educational process.
Decision Makers in this area need to make decisions at various points as well as at multiple levels during the life cycle of the educational system. Learning Management Systems (LMS) can provide decision support services which can be used to increase the learning effectiveness of the new mode of learning as well as the efficient organization of the institutional resources. Identifying students at risk is a major problem. In this paper we provide a framework and detailed case studies for identifying risks factors of students' failure in e-Learning courses and a proposal of how an LMS can be transformed into a Warning System and provide decision support service to Decision Makers.

31.2 Key words:

e-learning courses, risk identification, risk factors, learning management systems.

31.3 Introduction

Identifying students at risk is a major problem in e-learning courses and there are already various approaches and methods in the literature that analyze various issues such as issues

from a sociological standpoint (see Seidman (2005) and Tinto (2012)) or issues from academic performance, demographics, and engagement (see DeBerard et al. (2004), Zhang et. al. (2004), (Aguiar et. al., 2014)). In this paper we provide a framework and case studies with promising results in order to identify risks factors of students' failure in e-Learning courses and a proposal of how an LMS can be transformed into a Warning System and provide decision support services to Decision Makers. Considering the large amount of e-learning courses delivered today in various forms (e.g. MOOCs) we believe that there is great necessity for decision makers to conduct a risk analysis process in order to identify the risk factors of students' failure in these courses and to enhance the effectiveness in this de facto trend in e-learning.
Our framework is described in section 2. Section 3 describes analytically the application of our approach in two real case studies at Piraeus University of Applied Sciences. Finally, conclusions and future research directions are provided in the last section.

31.4 Identifying Risks factors in e-learning courses

31.4.1 Our methodology

Our methodology combines and adapts steps from the risk management process. As it is depicted by the below figure, we propose four phases:

1. Preparation Phase
2. Risk Analysis
3. Warning System Generation
4. Risk Control

The first phase constitutes a preparatory phase before the risk analysis. At this phase decision maker defines the problem. Risk analyst, in cooperation with decision maker models the risk problem, defining risk, the area of risk, the adverse effects of risk, the target group which is affected by the risk and the risk management options, creating a plan of how the specific risk could be controlled. After the risk definition, the decision maker along with the risk analyst review the available data and record new data needed for the management of the risk problem from the learning environment (for example from the log files of a Learning Management System). In the Risk Analysis phase, the risk analyst uses the preparation phase outcome to come up with a model for risks factors identification and prioritization. In the Warning System Generation phase, the risk analyst uses the risks factors identification model to generate a model for prediction purposes. The prediction model determines the requirements for the generation of the warning system. Finally, in the Risk Control phase, the risk analyst delivers the warning system product to the decision maker who puts the warning system into action in order to validate it. After that, risk analyst in cooperation with decision maker check whether risk is controlled through the utilization of the warning system. On the occasion that risk is not controlled, the entire process will be reviewed (see figure 2). In any other occasion, decision maker has managed to control the underlying risk and can provide reports of the improvement of the learning process.

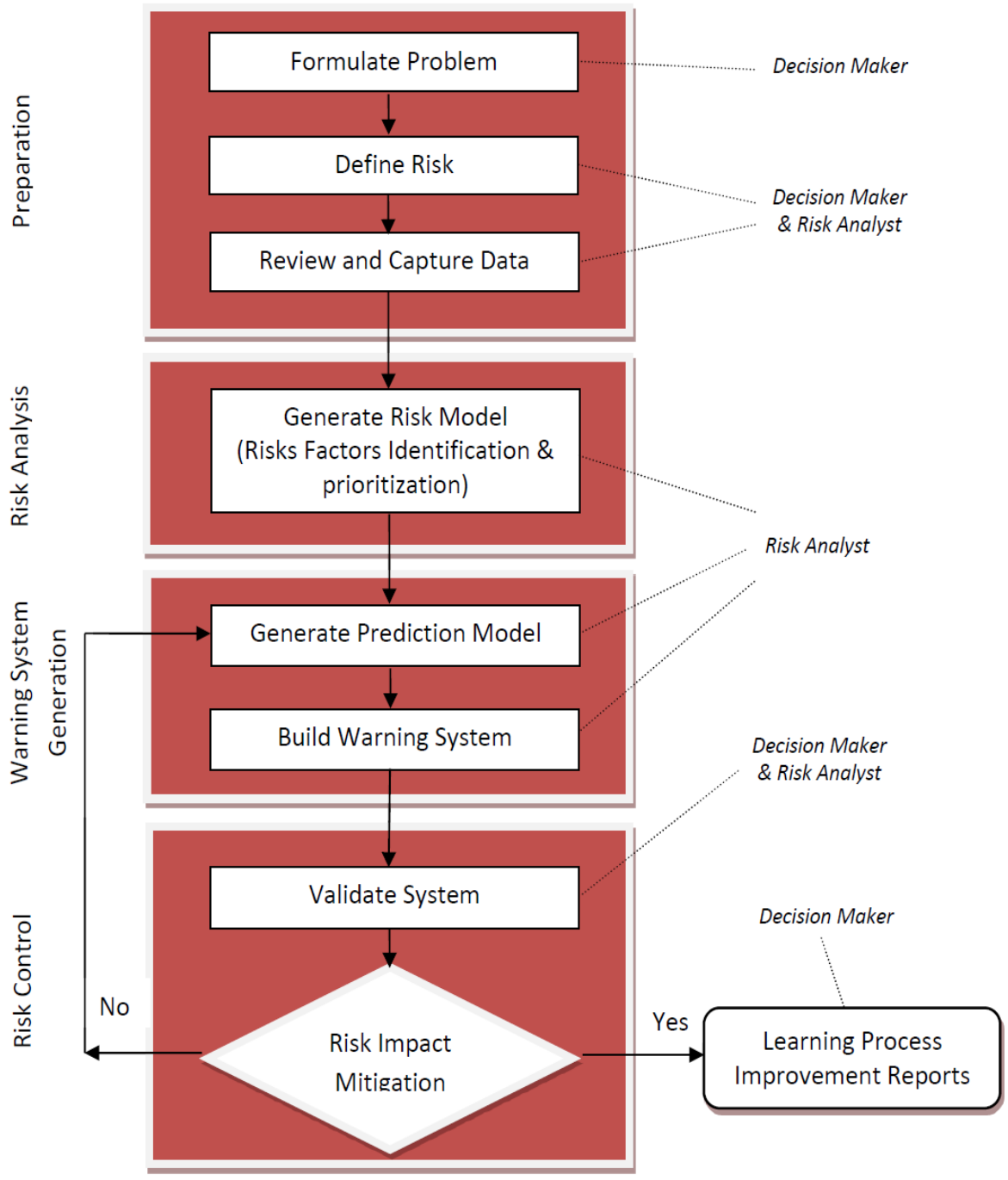


Figure 2. Our methodology

31.5 Applying our methodology to e-learning courses

31.5.1.1 *Case-study 1 Description*

In this section we describe an application of our methodology through a case study that concerns a specific e-learning course offered by Business Administration Department at Piraeus University of Applied Sciences. The course consists of a set of activities distributed in nine (9) sections. The activity types included in each section of the course were: Interactive multimedia learning material developed by the use of the authoring tool "Articulate Storyline 2" (Articulate, 2016), being implemented as a SCORM activity with the SCORM reporting options of "completed", "incomplete" and "not attempted", Video recorded lecture material which had been uploaded to YouTube but it was packaged in Moodle as a single SCORM learning object in order to have the previous mentioned reporting options as well as the total time spent each student in the activity and Self-assessment questions developed by the use of the authoring tool "Articulate Storyline 2" (Articulate, 2016). The underlying activity used the grading method of “High Score”. A student was granted with 3 trials and the final grade was determined by the maximum grade of the trials in a percentile form. Additionally, the students were provided with feedback and support through a forum which was designed to give students the opportunity to pose questions that could be answered not only by the educator but also by their colleagues. A student was considered to have been adequately participated into the forum only on the ground that he/she had made at least two posts. Thereby, in order to complete the course, a student was expected to study the interactive multimedia material included in the nine sections, watch the videos with the recorded lectures, attempt to answer the self-assessment questions and participate into the forum. The students’ performance was controlled through a final online test. Thereby, students could culminate the course successfully only in the case that they had achieved a final grade (in the final online test) greater or equal to 5.

31.5.1.2 *Case Study 2 Description*

The second case study was referred to an e-learning course having the same structure with the e-learning course described in the first case study, having also being designed in the same way. Nevertheless, it is important to stress on the fact that in the second e-learning course interactive material, self-assessment exercises and videos were divided into 12 sections, instead of 9 (see case study 1). Moreover, the number of students that had been enrolled into the second e-learning course was 234, slightly greater in comparison to the corresponding number of the first e-learning course. The methodology was applied to both e-learning courses in the same way, since it’s a generic methodology, applicable to any e-learning course. The results of both case studies are presented into section 3.3.

31.5.1.3 *Methodology Application*

During the preparation phase of the proposed risk management methodology the decision maker needs to formulate the problem and identify the risks. In our case, the educational problem is the improvement of the underlying course through the improvement of students’ performance and more specifically through the control of students' failure. Thereby, in our case, the risk is the students’ failure. The risk factors identification area is the students’

engagement on the ground that students' engagement has proved to positively correlate to performance. In a more elaborate detail our research has been focused on the students' behavioral engagement denoting the way students behave in terms of an e-learning course (Fredricks, 2004), owing to the fact that an LMS can provide us with such meaningful data in the territory of students' behavioral engagement. These data are shown in the table 1. Appropriate reports of the above data were produced in order to perform some visualization analysis before proceeding to the risk analysis phase. In this case, the technique for the reports generation was based on a special plugin we have developed under the Moodle system (Kytagias et al., 2015).

Table 1: Data captured

Percentage of interactive material parts studied (completed)
Percentage of self-assessment exercises parts completed
Percentage of videos parts watched (completed)
Total number of activities completed
Total number of activities started
Total posts in forum (new posts and follow- up posts)
Total discussions viewed in forum
Time spent on interactive material completion
Time spent on self-assessment exercises' completion
Time spent on videos watch (completion)
Time spent on forum
Total time spent on system
Total logins into the system

During the risk analysis phase we decided to use a binary logistic regression method in order to identify and prioritize risk factors. We have modeled the dependent variable "strisk" (Leah P. Macfadyen, Shane Dawson. (2009)) as the variable that describes the students who are about to phase the risk of not completing the course successfully. There are 2 values ordained in regard to two states: The state "0" denotes students who are not about to face the previously cited risk, whereas the state "1" denotes students who are about to face the referred risk. The state "1" holds true in the case where students' final grade is below the numeric threshold of 5. The state "0" holds true in any other occasion. Detailed results of the application of the binary logistic regression method are presented in the next section. We used the outcome of the risk factors identification process to generate a model to predict students' bad performance. In our case, this step was completed by carrying out a discriminant analysis where we came up with the students' classification into two groups: students who are about to fail the course and students who are about to pass the course. The scores of the discriminant functions were used during the course period to predict whether a student is about to face the risk of not completing the course successfully. That verification process had been completed for the prediction models in terms of both case studies. The warning system could be generated after picking the most suitable prediction model out of the alternative prediction models of both case studies. The verification of the alternative prediction models and the final selection of the prediction model are presented into section 3.4. The outcome from the discriminant analysis could be used to generate a "warning system". That could be achieved only on the ground that the prediction model (see discriminant analysis) having been verified. The verification of the alternate prediction models for both case studies is presented into section 3.4. We believe that learning management systems such as Moodle LMS should provide such a service. In our case, a

special plugin is needed that will perform the necessary calculations according to the prediction model for each student and generate suitable messages to students at risks (London et al., 1999; Smith & Ragan, 2005). We are at the process to integrate these calculations to our new plugin we mentioned before for two reasons: (a) the underlying plugin already captures all relevant students' data presented in Table 1 and (b) a plugin inside Moodle fits very well to the purpose of an LMS and provides an easy, one-stop maintenance and reusability of resources. The objective of a warning system generation is the control of the risk.

31.6 Results

31.6.1 Case Study 1 Outcome

Binary logistics regression

The variables determined in Table 1 were used to carry out a binary logistics regression in order to come up with a model for the identification of risks factors. The variables of Table 1 were candidates to constitute risks factors. The regression model will decide which of them should be deemed as risks factors. Table 2 shows the variables participating into the model significantly.

	B	Sig	Exp(B)
Percentage of interactive material parts studied (completed)	-19.974	0.000	0.000
Percentage of self-assessment exercises parts completed	-4.608	0.012	0.010

Table 2: Variables participating into the model significantly

Column Sig, explains that the variables participating into the model significantly are: percentage of interactive material parts studied and percentage of self-assessment exercises parts completed. The generated model enables us not only to identify the risks factors but also to come up with risk factors prioritization. That process is being carried out by calculating the contribution of risks factors to the risk. That contribution is being calculated through the contribution of risks factors to the probability of risk occurrence. Column B of table 2 indicates that one unit increase in the percentage of interactive material parts studied leads to 19.974 units decrease in the logarithm of probabilities. In parallel manner, one unit increase in the percentage of parts of self-assessment exercises parts completed leads to 4.608 units decrease in the logarithm of probabilities. Hence, through the risks factors contribution to the probability of risk occurrence, the cardinal risk factor is the insufficient study of multimedia material (not all sections of the SCORM multimedia material studied). Another risk factor but with slighter contribution to risk occurrence is the insufficient completion of self-assessment exercises (not all sections of self-assessment exercises completed).

Discriminant Analysis

After a discriminant analysis having been conducted, a prediction model of students' critical performance has been generated leading into the generation of two functions, one for

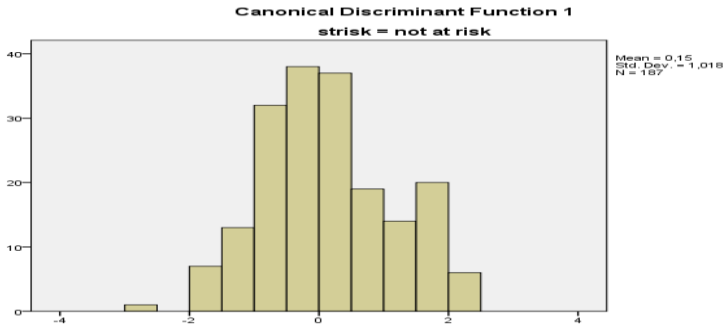
students who might not face the underlying risk and one for students who might face the underlying risk. Table 3 gives the discriminant functions coefficients.

Classification Function Coefficients

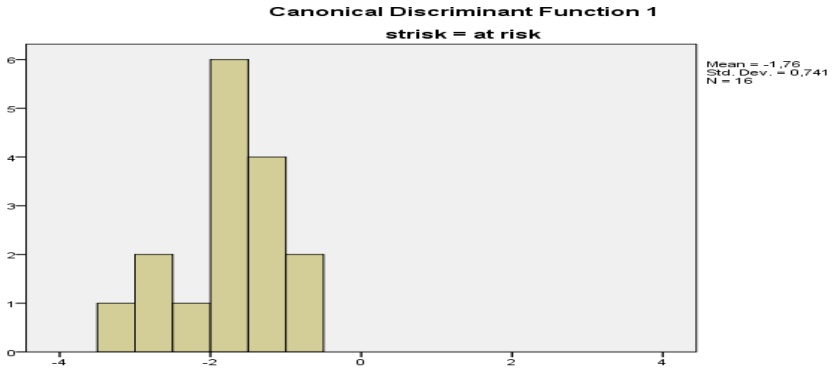
	strisk	
	not at risk	at risk
Percentage of interactive material parts studied (completed)	30,331	19,588
Percentage of self-assessment exercises parts completed	21,187	16,403
(Constant)	-19,871	-10,194

Table 3: Discriminant Functions coefficients

The values of the discriminant functions are well indicated into the below graphs:



Graph 1: Classification function for students not being at risk



Graph 2: Classification function for students being at risk

Classification Results[a]

		strisk	Predicted Group Membership		Total
			not at risk	at risk	
Original	Count	not at risk	161	26	187
		at risk	1	15	16
	%	not at risk	86,1	13,9	100,0
		at risk	6,3	93,8	100,0

a. 86,7% of original grouped cases correctly classified.

Table 4: Correct classification percentage

It is important to highlight that as it is shown into the table 4, the correct classification percentage reaches the amount of 86.7, denoting that discriminant functions achieve great classification.

31.6.2 Case Study 2 Outcome

Binary logistics regression

The variables determined in Table 1 were used to carry out a binary logistics regression in order to come up with a model for the identification of risks factors. The variables of Table 1 were candidates to constitute risks factors. The regression model will decide which of them should be deemed as risks factors. Table 5 shows the variables participating into the model significantly.

	B	Sig	Exp(B)
Percentage of interactive material parts studied (completed)	-10.177	0.000	0.000
Percentage of self-assessments parts completed	-4.759	0.007	0.009

Table 5: Variables participating into the model significantly

Column Sig, explains that the variables participating into the model significantly are: percentage of interactive material parts studied and percentage of self-assessment exercises parts completed. The generated model enables us not only to identify the risks factors but also to come up with risk factors prioritization. That process is being carried out by calculating the contribution of risks factors to the risk. That contribution is being calculated through the contribution of risks factors to the probability of risk occurrence. Column B of table 5 indicates that one unit increase in the percentage of interactive material parts studied leads to 10.177 units decrease in the logarithm of probabilities. In parallel manner, one unit increase in the percentage of parts of self-assessment exercises parts completed leads to 4.759 units decrease in the logarithm of probabilities. Hence, through the risks factors contribution to the probability of risk occurrence, the cardinal risk factor is the insufficient study of multimedia material (not all sections of the SCORM multimedia material studied). Another risk factor but with slighter contribution to risk occurrence is the insufficient completion of self-assessment exercises (not all sections of self-assessment exercises completed)

Discriminant Analysis

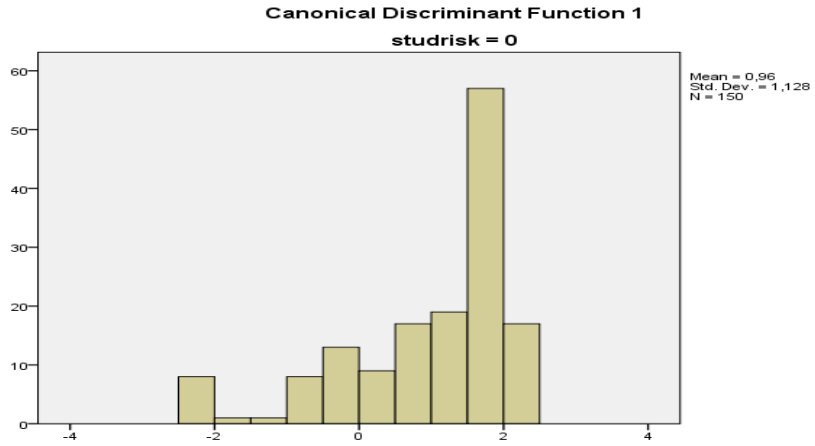
After a discriminant analysis having been conducted, a prediction model of students' critical performance has been generated leading into the generation of two functions, one for students who might not face the underlying risk and one for students who might face the underlying risk. Table 6 gives the discriminant functions coefficients.

Classification Function Coefficients

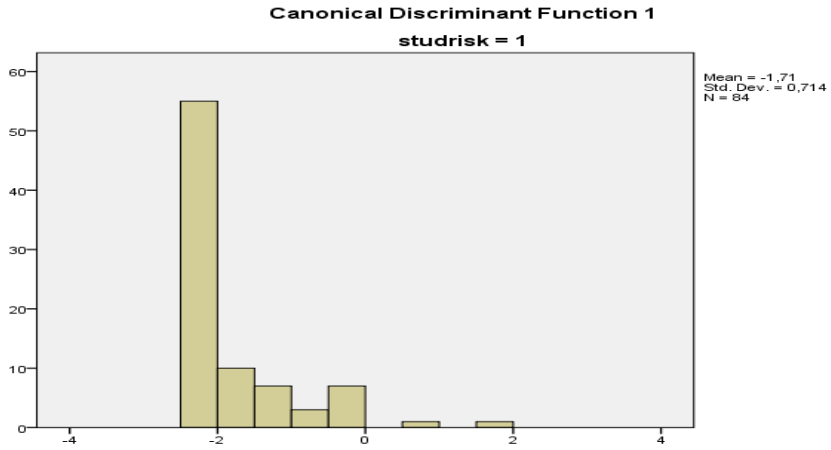
	studrisk	
	,00	1,00
Percentage of interactive material parts studied	11.803	-0,233
Percentage of self-assessment exercises parts completed	13.385	3,381
(Constant)	-5,343	-0,788

Table 6: Discriminant Functions coefficients

The values of the discriminant functions are well indicated into the below graphs:



Graph 3: Classification function for students not being at risk



Graph 4: Classification function for students being at risk

Classification Results[a]

		studrisk	Predicted Group Membership		Total
			,00	1,00	
Original	Count	,00	126	24	150
		1,00	5	79	84
	%	,00	84,0	16,0	100,0
		1,00	6,0	94,0	100,0

a. 87,6% of original grouped cases correctly classified.

Table 7: Correct classification percentage

It is important to highlight that as it is shown into the table 7, the correct classification percentage reaches the amount of 87.6, denoting that discriminant functions achieve great classification.

31.6.3 Towards a Warning System

31.6.3.1 *Selecting the Suitable Prediction Model*

The alternative prediction models of both case studies were verified in terms of their correct prediction percentage. In a more elaborate detail, the scores of the discriminant functions of both prediction models were calculated during the period of another specific common course, before the final examination. The classification results of the discriminant functions were compared to the classification of students after their final examination's grade. The first prediction model achieved a 74% correct classification percentage whereas the second prediction model achieved a 92 % correct classification percentage. Thereby, the second prediction model should be selected to constitute the base of a warning system generation.

31.7 Conclusions

The outcome of the binary logistics regression for both case studies has proved that the measurable risks factors for courses with that specific design, having contribution to risk occurrence are: insufficient study of interactive material and insufficient completion of self-assessment exercises. It is important to stress on the fact that factors associating with time data was not proved to be decisive factors that could affect students' performance critically on the ground that variables related to time had insignificant participation into the regression model. Similar results have been reported in the literature. In this paper we described a risk management framework in order to identify risks factors of students' failure in e-Learning courses. We applied this framework on two case studies where the data captured by an LMS (Moodle) gave promising results to the identification process of students at risk. Our implementation framework gave also promising results of how an LMS could be transformed into a Warning System in order to provide decision support services to Decision Makers. The underlying framework can be applied to any e-learning course for identifying and prioritizing the risk factors of the students' failure. Decision Makers can use the underlying framework not only to identify risk factors of students' failure in their courses but also to redesign their

courses by analyzing the above factors in other dimensions such as the dimension of students' learning preferences.

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32 Quality Analysis of the External Evaluation Reports for PUAS

Sigala M.

Tseles D.

SOCIAL IMPACT

33 Aristotelian Fundamentals of the Practice of Knowledge and Information

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Aristotle's theory of knowledge is best understood by examining the treatises called the Organon. The treatises in question were called the Organon because Logic was thought to be a method or discipline useful as a tool in all inquiries, whatever their subject matter. This is why in the traditional ordering of the Aristotelian corpus the Organon comes first.
Within the Organon the Categories and De Interpretatione come first followed by the Analytics. This is because the Categories deals with terms, the constituents of propositions, the De Interpretatione deals with propositions, the constituents of syllogisms, and the Analytics deals with syllogisms. The first two books of the Analytics, the Prior Analytics, study the conditions of valid deduction and in particular the syllogism. The last two books, the Posterior Analytics, study a special type of syllogism, the demonstrative syllogism, which is the form in which the sciences would ideally be expressed.
In the Prior Analytics Aristotle is concerned to develop a system to serve as a tool for science, not to theorize about that system. In the Prior Analytics Aristotle is doing logic rather than philosophy of logic. In the Posterior Analytics, on the other hand, Aristotle is not doing science but philosophy of science. The aim of the work is to analyze the concepts and the structure of the sciences. Book I is about demonstration and the demonstrative syllogism, that is, the kind of proof or explanation that conveys scientific knowledge or understanding. Book II deals with problems about definitions, their nature, their role in demonstration, and how they are to be established.
The remainder of the Organon consists of the Topics and the Sophistici Elenchi. The Topics is an exhaustive examination of dialectical arguments. A great range of both formal and informal arguments are considered and systematized. The brief Sophistici Elenchi is the source of most of the names still used for logical fallacies.

The Posterior Analytics undertakes to analyze what science is, and how to use language, logos, as an instrument, an organon, to formulate and express it. In the Posterior Analytics Aristotle thus answers the question raised in the Theatetus: What is επιστήμη, science? Aristotle's answer is we have genuine science, επιστήμη, when we can state in precise language not only that things are so, ότι, but also why they are as they are, διότι, and why they have to be that way. We possess science when we can prove and demonstrate statements about things and states of affairs by relating those statements to other statements of which they are the necessary consequences.
Science is thus for Aristotle a knowledge of the why, the διότι, the reasons for true statements. It is a knowledge of the dependence of true statements on more fundamental truths, on "first things", τα πρώτα, or causes, αιτίαι. Science, then, is like geometry in which theorems are demonstrated from initial axioms and theorems. Science is thus for Aristotle not the mere observation of facts, of the fact that, το ότι: it is not mere observation or sensing. In observing the fact that something is the case, we sense or observe, this here thing, here and now, τοδε τι. Science brushes aside what is irrelevant, extraneous and

incidental—what is “accidental” –about the particular instances observed, and states what is “essential” to being that “kind” of thing or event. Science thus states its reason why, its διότι; it states what that kind of thing really is.
Science is thus demonstration, απόδειξης. As in geometry it demonstrates the reasons why, τα διότι, things are as they are observed to be, and why they must be so, and it demonstrates these reasons why from “first things”, τα πρώτα. It demonstrates them from things that come before the conclusions, and are hence logically prior to those conclusions. It demonstrates them consequently, as stated in Latin, “a priori”. It demonstrates its conclusions from the beginnings of demonstration and of explanation, from αρχαί of demonstration. Αρχή in Greek here means “beginning” and the αρχαί of demonstration and science appeared in Latin as “principia’, or principles—the Latin term for “beginnings”. In English they mean the beginnings of understanding and intelligibility.
Hence for Aristotle every science comprises three factors:

1. that “about which” it establishes some theorem or conclusion, its περί ω: the particular and determinate subject matter about which that particular science proves conclusions. In each case that subject matter is a certain kind of thing, about which it demonstrates the properties and causes. A science contains also
2. “what it establishes as conclusions: the causes and properties of that particular kind of thing. And it exhibits
3. that from which it demonstrates its conclusions, its εξ ων: namely, its first things, or αρχαί, its principles.

The common method of proof they all have is the syllogism which Aristotle treats in the Prior Analytics. This examination is “prior” to the treatment of demonstration in the Posterior Analytics, because as Aristotle puts it:”The syllogism is the more general. The demonstration is a kind of syllogism, but not every syllogism is a demonstration.”
The proper αρχαί peculiar to a single subject matter, mark off the distinctive subject matters of the different sciences. These are distinguished in terms of their own αρχαί or principles. Thus the αρχή of nature or φύσις sets off natural things as the subject matter of Natural Philosophy or Physics, the αρχή of life or psyche sets off animate things or έμψυχα as the subject matter of biology, the αρχή of welfare or to ευ ζειν sets off the subject matter of Ethics, the αρχή of the polis sets off the subject matter of Politics, etc. Each kind of thing, natural motions, living processes, living well, the city, has αρχαί appropriate to it in terms of which it can be understood, reasons why it displays the properties and characteristics it does.
Aristotle distinguishes three different kinds of reasoning or syllogism, the dialectical, the eristic, and the demonstrative or scientific. These three different kinds of reasoning do not differ in their form; the difference between them lies in the character of the premises from which they proceed. And when Aristotle discovered the principle of the syllogism, and worked out the first three figures of the now standard four, he included all three kinds of syllogism in his formal analysis of reasoning in general, in the Prior Analytics. But he seems to have begun with dialectical reasoning, in his earliest of his three treatments of reasoning, in the Topics, or “places» for finding arguments. The Topics has been shown to be clearly earlier than the other two treatments, in the Prior and the Posterior Analytics. It was written before he discovered the principle of the syllogism.
Dialectical reasoning is the reasoning of conversation and argument, το διαλέγεσθαι, in which the participants try to agree on premises. It is the reasoning of discussion, of the Sophists, of Socrates, of the Socratic dialogues, of that whole Greek world of talk and discussion and political argument. In the Topics Aristotle conceives “dialectic” as the science

of what happens, not when we are thinking by ourselves, but when we are talking with others, and trying to convince one another. Its problem is to find good arguments to support our position. That is, its problem, like that of Socrates, is to find the premises your opponent will agree to, from which you can force him to admit the conclusion you want. Aristotle defines the syllogism: “A syllogism is an argument, in which certain things having been assumed, something other than these follows by necessity by virtue of the things being assumed. “ [Prior Analytics I, ch I: 24b 18-19] In dialectical arguments the things assumed must be “opinions that are generally accepted, ένδοξα, accepted by all, or the majority, or by the most notable and illustrious of them. [Topics I ch I: 100b 23, 24] to which you can get your opponent or the court to agree.

Dialectical arguments of this sort, clearly growing out of Socrates’ way of questioning and arguing orally, probably played an important part in instruction in Plato’s Academy. What Aristotle added to this educational practice was a systematic introduction to “dialectic” or argument in the Topics. That treatise describes its subject as “useful for intellectual training and for arguing with men on the basis of their own opinions.”[Topics I ch. 2 101a 27-33]

The problem with such dialectical reasoning is clear. The conclusion to be admitted by your opponent is there to begin with, το εν αρχή. What is sought is the question to ask, the propositions, the προτάσεις, to get him to admit. The questioner has to think backwards to the premises that will prove his point. Hence Aristotle’s first conception of what we call “logic”, in the Topics, was the dialectical syllogism that arises in conversation and argument. This conception dominates his notion of the λογικός or διαλεκτικός, as contrasted say with the φυσικός, the investigator of natural processes.

In the Topics, then, Aristotle has not yet found any general principle of valid reasoning. He gives a fourfold classification of arguments in the Topics with a large variety of forms. They all aim at the search for possible premises, starting from a conclusion desired and given. They do not seek for the conclusions that will follow from the given premises. This central problem of the dialectical syllogism is generalized in Aristotle’s treatment of reasoning or the syllogism in general, in the Prior Analytics, and is carried over into the problem of scientific reasoning, or demonstration, αποδείξεις, in the Posterior Analytics.

The demonstrative syllogism, απόδειξης, which produces genuine knowledge, science or επιστήμη, does not aim to lead from premises to a conclusion up to then unknown. On the contrary, in the demonstrative syllogism, also, the conclusion is an observed fact previously known. The scientific explanation, the reason why, the διότι, or “cause”, will when found form the premise from which that observed fact can be demonstrated as a conclusion. Thus the scientific syllogism derives facts already known through observation, from reasons why, or αρχαί. It is not a logic of the discovery of new facts, but a logic of proof, of formalizing or systematizing facts already known.

Now, if demonstration is to produce genuine knowledge, επιστήμη , certain conditions are necessary. The first things, the αρχαί, the premises of the demonstrative syllogism, or απόδειξης must be true. It is the truth of the premises or αρχαί that is what distinguishes demonstration and science from mere dialectic, in which the αρχαί are only probable and “accepted”—that is, which are what we call mere ‘postulates’. In demonstration the αρχαί must also be “prior”, in the sense that the facts in the conclusion can be logically derived from them. They must be better known and more certain than the facts being demonstrated. They must themselves be “undemonstrated” and immediate, not mediate, not themselves links in a chain of proof, but genuine starting points. And they must be causes of the facts in the conclusion, in any of Aristotle’s four senses of cause, if they are to give genuine explanations or reasons why. That is the αρχαί must possess all these characters in the

statement of a completed science, in complete proof or απόδειξης, in a formalized science like Euclidean geometry, which is Aristotle's model.
The point is that for Aristotle the syllogism is in no sense a method of investigation, but a method of proof. In our actual method and procedure of inquiry, the αρχαί of proof are not starting points at all. The establishment of just what are the αρχαί of demonstration and proof is the last step in inquiry. When found they then become the logical starting point of understanding and proof. They are logically but not methodologically prior.
In Aristotle's actual investigations his αρχαί always function very much as what we would call "hypotheses". They are relative to their subject matter and to their primary function of making it intelligible. The task of science and demonstration is to fit these observed facts into a system of knowledge. It is to formalize our observations. The αρχαί or principles emerge in this process of systematizing as the unproved premises of proof.
From where are these αρχαί derived? How do we arrive at them? Aristotle's answer to this question, obviously fundamental for his whole conception of science is that we learn them from observation of facts, of particular instances, by επαγωγή, which is usually translated into Latin as "induction". That is by experience of facts, by repeated observations, we become aware of the αρχή, the universal that is implicit in them. For Aristotle we recognize the universal the αρχή, by νους, by an intellectual seeing. Aristotle's formulation was taken over by the great scientific pioneers of the 17th century, from Galileo and Newton on. The scientist grasps the truth by νους, by intellectual intuition, by insight. Νους working with experienced facts is more certain than deductive proof, than demonstration. Science, επιστήμη, is systematized, formalized reasoning.. It is demonstration, απόδειξης from αρχαί. But those αρχαί themselves are established and validated as αρχαί, not by reasoning or demonstration, but by νους: by seeing that it is so, that this is the way in which the facts can be understood. So Aristotle concludes: "It is not science, but νους that is the αρχή of science itself." Hence science or demonstration and νους are the two necessary components of what Aristotle calls theoretical wisdom, σοφία

34 Greek Patent Protection System and the impact on Information Technology Industry

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34.1 ABSTRACT

Our era can be characterized as the era of knowledge proliferation and bountifulness. That has marked our era as the era following the pace of the Information Society Development. Information Society has also brought about a remarkable IT development pace over countries. Thereby, it is greatly important all that raw knowledge to become mind figments, ideas and even inventions and innovations. It is also essential to highlight that such a beneficial process will ensure the continuity of the IT development. The only way to achieve that goal is to find a way to secure all that aforementioned knowledge which is in essence an intellectual property. That has made countries to set up a patent system with appropriate legislative and regulative system. That paper sheds light upon the European patent system in comparison with the patent system of Greece and provides a proposal for ameliorating the Greek patent system taking into account some useful economic indicators.

34.2 Introduction

An invention can be characterized as a more effective composition, device, or process. A pre-existing model or a brain figment can lead to an invention. Each brain figment will be deemed as an invention only whether its application brings about an important breakthrough. In the same respect, discoveries, scientific theories or mathematical methods are not classified as inventions. The same holds true for aesthetic creations and any presentation of an item of information. An invention will be viewed as new (reaching innovation) only if it does not form part of the state of the art meaning that its outcome is not been propagated to the public. The following section summarizes the theoretical framework of modern competitive relationship with the knowledge and innovation . The next section focuses on the determinants of technological absorption and innovation, and the patent protection system in Information technology Industrial. Here the correlation factors with structural-functional-sectoral and institutional characteristics of the business environment to evaluate the contribution of the respective conditions in the technological and economic performance. Finally, in light of the conclusions of the analysis highlights the need to adopt institutional and structural reforms for competitive growth advantages of knowledge and innovation by firms and national - regional innovation systems.

Intellectual property refers to the mind figments with “no physical” property elements. In essence, such figments are ideas with incorporated knowledge. As with any property that

knowledge should be secured in a way that anyone from using that knowledge for commercial purposes without the endorsement and approval of the owner of the idea.

The legal aspect of an invention is cardinal in the legislative sector known as “patent law”. Thereby, it is important to scrutinize the term invention analogically to the term patent. The term patent refers to the set of exclusive rights that is granted to inventors by a State. Each country has set up a specific legislative and regulative system concerning patents. That system includes requirements, national laws and international treaties. In some cases, the term patent can move forward to include the parallel term intellectual property rights. The role of a patent is remarkable since it facilitates the bountifulness of the technological evolution. Such a system is not only national but also global. Therefore, the appropriateness of a patent system is a key to success in the section of Information Society and the parallel sector of IT development. The Patent is a title that recognizes the legitimate copyright an invention or discovery and ensures the inventor or applicant, a temporary monopoly on the exploitation of the invention to which the patent. Provided by such national or international agencies patents. The invention is a creation of thought that is often confused with innovation (Innovation), namely, successful use and application of this knowledge practice. The invention become a technical innovation only when it leads to a new product or service that can be exploited commercially and sold to consumers. That is, it draws an important part of its value from entrepreneurship.

34.3 The Legislative System

34.3.1 Generic overview of the Greek patent system

The Key figure in the Greek patent system is the Hellenic Industrial Property Organization (HIPO). This organization aims to promote the IT development of Greece by handling the country’s patents. (Law 1733/87), concept of law:

1. Patents are granted for new fabrications that are susceptible of industrial application and contain inventive activity. The invention may refer to a product, method or an industrial application.
2. No inventions are considered within the meaning of paragraph 1:
3. An invention is considered as new if it doesn’t belong to the state of art. As state of art is considered everything that is known by written or oral description or with any other way, before the date of filing the patents or the priority date.
4. An inventions contains inventive activity if, during a specialist’s judgment, it isn’t apparent with an obvious way to an already existing state of the art.
5. An invention considered susceptible of industrial application if its subject cannot be produced or used in any sector of industrial activity.

34.3.2 European patent policy implications

A balanced score card is often used to evaluate the overall performance of the business and its progress towards objectives. Recent studies and leading management theorists have advocated that strategy needs to start with stakeholders expectations and use a modified balanced scorecard that includes all stakeholders.

The patent strength affects innovators by giving limited incentive on the ground that they cannot assess the value of their innovation; therefore, weak patents create an environment in which competitive firms are not well aware of the capabilities of their competitors. These patents are included in one of several categories. Patents that is legally questionable and subject to litigation by competitors. Patents based on “first impression” that can lead to a ubiquity of private information. Weak patents increase the cost of disclosing knowledge. Weak patents force firms to rely on secrecy and augment the cost of secrecy dependence. The lack of strength in a patent can bring in imitation of the “naked idea” or “raw figment”. Weak property rights reduce the prize available to a patent holder; Patent damage awards have become an increasingly important feature of business strategy in the USA over the past 20 years. While jury awards in excess of $100 million were relatively rare before 1990, they are now quite common. These large awards usually arise when damages have been calculated using a lost profits approach. Increased competition from an infringer can cause a patent holder to lose profits in several ways. By far the most important source of lost profits is the sales that the patent holder lost to the infringer. Absent the infringement (often termed the ‘but-for’ world), the patent holder would have made some or all of the sales that the infringer made. The damages associated with these lost sales are the incremental profits that the patent holder would have made on the sales.

A second important source of lost profits is what is often called ‘price erosion’. Intellectual property rights are exclusive rights, often temporary, granted by the state for the exploitation of intellectual creations. Intellectual property rights fall into two categories: rights relating to industrial property (invention patents, industrial designs and models, trademarks and geographical indications) and those relating to literary and artistic property (copyright). The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) covers the main categories of intellectual property law. In an unsteady patent protection environment, revealing of innovation can cause the buyer to freely expropriate the invention. The lack of strength in a patent can increase the cost of infringement (not the one paid by the infringer but the one aggravating the inventor). The company may also have an unfair advantage over competitors whose paper products do reflect the cost of installing pollution control equipment. A strong patent system doubles up the benefit of an employee for remaining silent without disclosing the information regarding the innovation before its implementation with no “shop rights” established an employer can freely expropriate an employee liable invention. The extent of the incentive given to innovators the range of liable litigation of an innovation and the extent of private information ubiquity depend from the cost of disclosing knowledge. Knowledge disclosure plays a central role in models of economic growth. In this paper, we provide a theoretical model that evaluates the conditions supporting disclosures of privately funded knowledge through scientific publication, patenting, or both. Our analysis is grounded in the conflicting incentives facing researchers and their funders: scientists have incentives to disclose discoveries through scientific publication while firms have incentives to protect their ideas through patenting or secrecy. We focus on the strategic interaction between researchers and firms bargaining over whether (and how) knowledge will be disclosed. We evaluate four different disclosure strategies: secrecy, commercial science (patenting), open science (scientific publication) and patent-paper pairs (disclosure along both dimensions).

Our model then derives the conditions under which each of these outcomes emerges and offers insights into the determinants of the disclosure strategy of a firm. Importantly, we find that patents and publications are complementary instruments in facilitating the disclosure of scientific knowledge; thereby providing a microeconomic unpinning of assumptions commonly made in endogenous growth models as well as a framework for understanding the impact of patent protection on the openness of science. The cost of secrecy

dependence. The cost of infringement. Patent infringement in the commission of a prohibited act with respect to a patented invention without permission from the patent holder Permission may typically be granted in the form of a license. The definition of patent infringement may vary by jurisdiction, but it typically includes using or selling the patented invention. In many countries, a use is required to be commercial (or to have a commercial purpose) to constitute patent infringement. The benefit of an employee remaining silent.
The extent to which patent policy system affects the inter-organizational structure; the patent strength affects innovators by giving limited incentive on the grounds they cannot assess the value of their innovation; the extent of the incentive which given to innovators creates an environment where in competitive firms are unaware of the capabilities of their competitors; the range of liable litigation of an innovation. Within the general framework for the support measures designed to improve the patent system, we have the promotion of intellectual property rights (IPR), especially the promotion of the intellectual property rights of patents which is a part of the framework of the Lisbon strategy for growth and employment as it uses innovation as the driving force for European growth. In 2008, a separate and complete announcement regarding the intellectual procedure rights is predicted. This announcement complements the current one and raises the main issues with a non-legislative and horizontal character in all fields of intellectual property.

34.3.3 Effects

Patents can have a positive impact on competition “when they enhance the entrance to the market and the creation of companies, and to enhance the technology spillovers”. Patenting is the equivalent of revealing inventions that an inventor otherwise, would have kept secret. Industrial research shows that the reluctance of companies to (enshrine) their inventions with patents mainly stems from the fear of giving information to their competitors. The research by OECD/BIAC in 2003 into the perception of patents in companies confirms this fact. Patents can also ease the transactions on markets with technology products.
They can be bought and sold as title deeds or even be subject to licensing agreements that allow the owner of the license to use the patented invention in exchange for a reward (Arora Fosfuri & Gambardella 2001). Finally, the enhancement of technology spillovers is the goal to give them with licenses to the companies which will develop them further and commercialize them. During the last two decades, most patent offices have faced a great increase in patent application. New technologies incited the greatest rate of increase and to some extent, the economies that currently have an important position in the international technology landscape like Korea and Taiwan. The legal aspect of a patent does not refer to the prerogative given to the inventor to make use of its invention. On the other hand, patent is a mean of excluding others (except the pioneer) from manipulating the invention. In the same respect, patent is a governmental entitlement given to inventors to disseminate the outcomes of their invention among the public. There are three principal ways to obtain a patent:

- **Selling:** the owner sells all exclusive rights for the manipulation of the invention
- **License providence:** the owner endorses or approve the manipulation of his/her invention at a specific time under specific circumstances.
- **Technicity transfer contract:** the technicity owner propagates technicity over an individual or institution.

34.4 Model

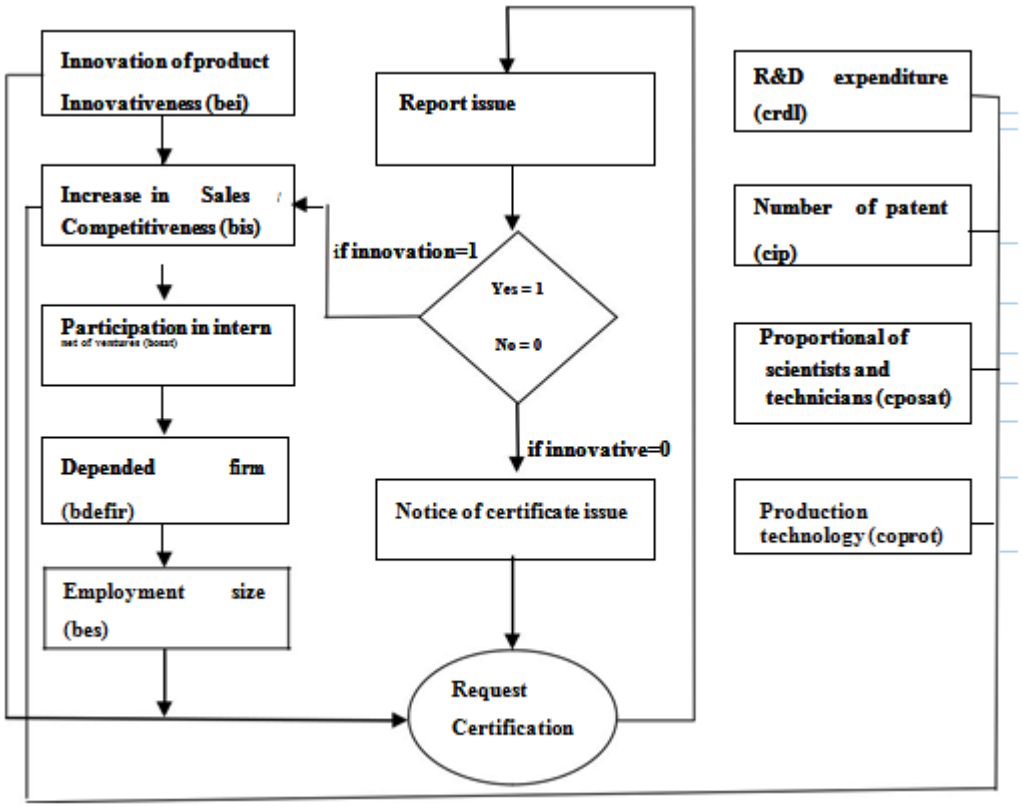

Figure 6. The model

Calculating the Variables (bei) and (bis), takes values between 1 = innovation 0 = not innovative for to see when: Increase in Sales / Competiveness (bis), and Innovation of product Innovativeness (bei). In this model we can see that the expenditures from innovation / innovativeness function of ICT patent confirm that both endogenous as well as and exogenous factors can affected positively the innovative capacity of business to a significance level of 99%, however in this model we can see also that indigenous technological effort has a significant effect on the external input technology innovativeness of the company.
Estimate the innovation / innovativeness in the function of cost of Information Technology Patent.

Formulating

bis: increase in sales / competitiveness

This variable determines the technological capacity and economic performance of enterprises in modern conditions of the new economy and international competition.

bei: innovation of product innovativeness

Analyzing the innovation capacity of firms, we focus the importance and interaction of exogenous and endogenous factors. The results show that the efforts of businesses to

develop endogenous technology are important for innovativeness by exogenous technological licensees

bosat: participation in international networks of ventures

This access and business involvement in local and international networks technological cooperation and its potential in the size and type of operation. Demonstrated that the greater of business involvement in such networks, giving more opportunities for technological upgrading and innovation

bdefir: depended firm

The economic performance and competitiveness of companies examined in light of innovative capabilities in consideration of dependent structural and functional-institutional conditions environment in which they operate.

bes: employment size

For the role of firm characteristics such as size and operational status (independent or subsidiary) in innovative and competitive ability, the empirical evidence relevant research show that small firms grow technology differently than large ones. The small size restricts investments in technology and R & D and access to information and technological developments. The developing access to external resources and partners are crucial to overcome the obstacles posed by small business size.

crdl: cost of R & D expenditure

The existence of strong statutory base R & D plays a key role in adoption of advanced knowledge and advanced technology

cip: number of patent

Identify entrepreneurial innovativeness and exogenous factors that primarily consist of technological inputs from outside to the company sources. These inflows recorded predominantly in patents and licenses technology that the company purchases and implements

cposat: proportional of scientists and technicians

The endogenous technology requires regular in-house activity R & D, high proportion of scientists at all staff, and utilization of personnel in technological process development

coprot: production technology

Upgrading production systems by skilled low-cost production, technological dependency rates modernization market.
On the basis of the conceptual framework developed in this section presents the aggregated results of data analysis of the research study on innovativeness and protection from a

potential legal framework to safeguard intellectual property rights of high-tech low-u Member States to the European Union. In primary research on SMEs in Europe, the statistically documented direct and indirect correlations between factors innovativeness and competitiveness of business specified in the following econometric system of simultaneous formulas:

The formulas are defined as:

$$bis_{(i)} = \alpha_1 + \beta_1 bosat_i + \gamma_1 bei_i + \delta_1 bdefir_i + \mu_1 bes_i + \lambda_{1i} \qquad [1.1]$$

$$bei_{(i)} = \alpha_2 + \beta_2 crdl_i + \gamma_2 cip_i + \delta_2 cposat_i + \mu_2 coprat_i + \lambda_{2i} \qquad [1.2]$$

(i)=thefirm,

$$\lambda_{1i} \text{ and } \lambda_{2i} \Rightarrow \text{non} - \text{interpreted part of the functions}$$

Business sectors compared (High Technology) and (Low Technology) of information technology Systems as below :

a) Increase in Sales / Competiveness (bis),

b) Innovation of product Innovativeness (bei)

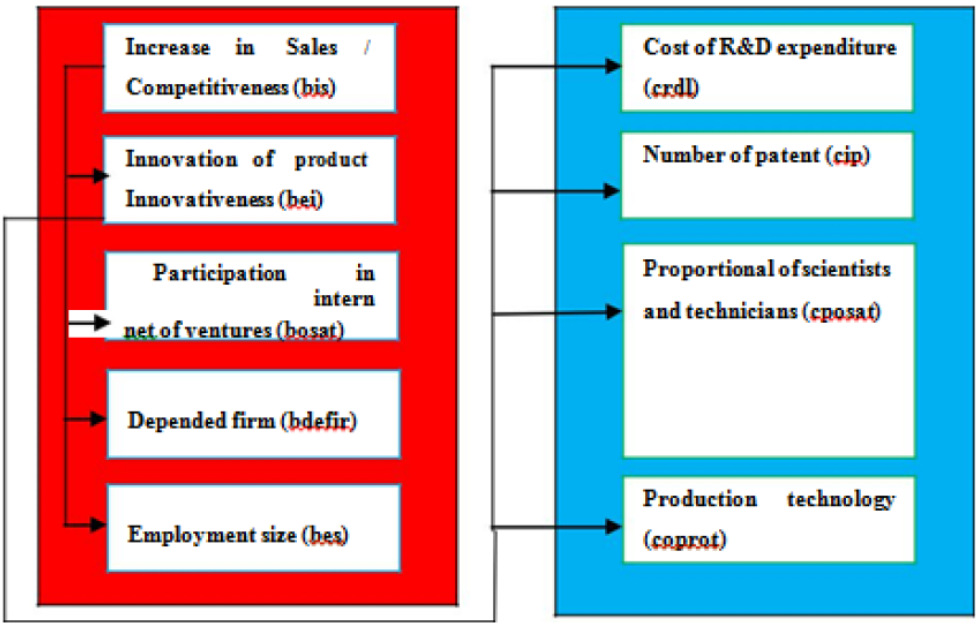

Figure 7. Business sectors compared (HighTechnology) and (LowTechnology)

35 Results

Examining statistics applying, the difference in competitiveness and innovativeness increase in sales the competiveness (bei) between business sectors high (High-Tech) and low (Low-Tech) technological intensity, see how companies in other sectors working poor technology is less dynamic in economic and technological conditions of businesses intensive high tech industries.

bei	High Tech ICT Sector	Low Tech Sector	High Tech / Low Tech
GREECE	0.58	0.24	2.41
TOTAL	0.77	0.46	1.67

Table 2. Innovation of product innovativeness (bei)

Variable (bei) takes values between 1 = innovation 0 = not innovative

In Table 2. the corresponding results for businesses in Greece and throughout the countries of our survey show that in each case (ICT / NICT) the innovativeness of high-tech firms are statistically different and greater than that of low-tech firms. The result for the whole country was confirmed in 95% significance level.

bis	High Tech ICT Sector	Low Tech Sector	High Tech / Low Tech
GREECE	1,83	0.99	1,85
TOTAL	2,68	1,35	1,98

Table 2.1. Increase in sales / competitiveness (bis)

Also, Table 2.1, the ANOVA results show that high-tech companies have better financial performance than low-tech companies, both across countries examining our research and Greece in particular. The result for all countries confirmed at significance level 99.

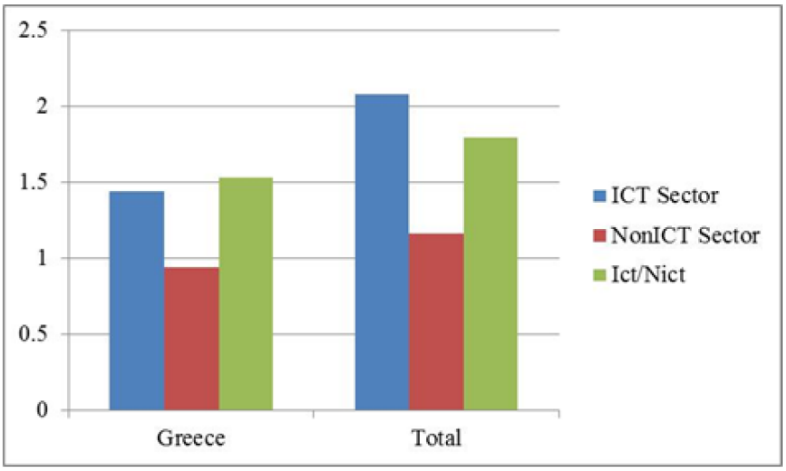

Figure 8. Increase in sales / competitiveness (bis)

In a further step, the creation and appreciation of simple econometric relations, the role of endogenous effort of the company for technology development, compared with the contribution of exogenous technological inputs, the innovativeness and competitiveness. In econometric our model equation 1.2 the system of equations, the innovativeness of the company (bis) is estimated as a function of endogenous technological effort (In_house R & D = crdl + cposat) and exogenous technological inputs (registered patents-cip and informal adoption of production technologies - coprot).

Estimate Innovation / innovativeness in the function of ICT patent		
bei	0.310 cip (Patent)	0.365 R&D expenditure

Table 2.2. R&D Expenditures from innovation / innovativeness function of ICT patent

In the Table 2.2 confirm that both endogenous and exogenous factors affect positively the innovative capacity of business to a significance level of 99% however it seems also that indigenous technological effort has a significant effect on the external input technology innovativeness of the company.

Estimate the innovation / innovativeness in the function of cost of Information Technology Patent	
bei	0.325 bosat

Table 2.3. Proportion of scientists and technicians (posat)

Remarkable in our econometric analysis is the assessment of importance of participation in international business (Posat) network of technology partnerships for the innovativeness and competitiveness. The results in the Table 2.3 show that the positive contribution of international networking is static significant at 95%.

As shown by statistical analysis tis variance (ANOVA) results show that the efforts of companies to develop endogenous technology are important for innovativeness by exogenous technological inputs (licensees etc.)

35.1 Conclusion

In conclusion, we note that the association of competitiveness with innovation activity is reflected in the increasing adoption of registered patents (patents) in production, the ability to absorb technology and innovation are essential for the competitiveness of economies and firms operating in them. The innovative capacity of business consists primarily of the endogenous development of knowledge and technology, achieved through the involvement of skilled personnel and investment in R&D. Exogenous technological inputs are also important, but require a similar-company effort to use.

The density and quality of networking among actors (businesses, educational institutions, investment funds of a production system is crucial for the transfer, absorption and diffusion of knowledge. In particular, the participation of enterprises in international networks of knowledge and information exchange gives real impetus to innovativeness. Consequently, political planning should aim at strengthening the infrastructure and networks that support the cooperation of local businesses with international suppliers of technology and knowledge. They must also facilitate the internationalization of the product of innovative local companies. The condition for establishing international relations technological cooperation s to improve the efforts of business for endogenous technological development (technology investments with incentives, R&D costs of training staff, etc.). In this direction is crucial to address the deficiencies in training and human resource skills, by extension, the national / regional knowledge base and technology. Also required is an upgrade production systems characterized by specialization in low-cost production, techno logical dependence and slow modernization of the market In other words, institutional and structural reforms are equally necessary to overcome the difficulties of technological development and competitiveness that most face sized enterprises sayings. The patent strength affects innovators by giving limited incentive on the ground that they cannot assess the value of their innovation, the patents create an environment in which competitive firms are not well aware of the capabilities of their competitors.

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36 E-Government initiatives in taxation field and the protection of personal data

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36.1 Abstract

As a result of the economic crisis, greek government introduced initiatives, using Information and Communication Technologies (ICT), in order to combat tax evasion, limit public expenditures, increase the economic growth and enhance transparency in public administrative operations. The main initiatives, among others, in that field, are the import of the eGovernment Act, the mandatory upload of administrative acts, the publication of taxpayers data on the internet and finally the use of tax card. The implementation of these e-government practices raise concerns as to whether appropriate safeguards are in place. The protection of personal data is guaranteed as a fundamental right in the european and greek law and the imposed limitations on the exercise of the right should be justified as long as are subject to the principle of proportionality, in the sense that they are necessary to the aim pursued. This paper aims at presenting the state of e-government in Greece through the main legal framework that protects the individual against abuses, which may accompany the collection and processing of personal data, and data leak to illegitimate destinations.
Keywords: Information and Communication Technologies (ICT), e-government, taxation, protection of personal data, the principle of proportionality.

37 Collaborating University and Business Networks Fostering Rapid Value Creation

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Regional development, regional impact and knowledge transfer are main key words when the value creation of HEIs in Europe. This paper deals some models which are also carried out in practice or are just under progress concentrating in enterprises and enterprise clusters. Different phases and steps of knowledge transfer and value creation are analysed.
At first in setting up the enterprise cluster is that the enterprises in the cluster have long and fruitful co-operation history with the university identified so called “strategic partnership”. This is needed to invite suitable enterprises into the cluster e.g. the enterprises acting at different fields but owning almost the same market area. University cluster/network is building up the necessary knowledge transfer concept and is also responsible necessary project management actions. This also requires just like in the case of enterprises that the universities identify their key knowledge and have long experience of mutual applied research projects.
There are several other necessary parameters, actions and partners which are needed to fulfil the goals of above type knowledge transfer service process e.g. EU, national and regional programs of industry and commerce to guarantee also the necessary funding. Although the case studies of the enterprise clusters are in the main focus of the present paper also the several cases of different types of co-operation and knowledge transfer processes with fruitful experiences based on a long history will be discussed.
The main implications followed from this study that value creation in the case of enterprises needs that universities combine and build their knowledge for the service process to make real co-operation business with enterprise clusters. Additionally, the real identification skills from universities are needed to fulfil enterprise needs which is realistic following the present study only in the case of long time co-operation between universities and enterprises at the level of strategic partnership.
One of the key results of the present paper is that the rapid value creation of the applied model of knowledge transfer from university network to business enterprise clusters. The other one is that in the present model of the enterprise cluster is also giving additional business to enterprise member in the cluster also giving deeper, more realistic and business oriented focus for the applied research of universities. The present study also shows that the co-operation with enterprises in the narrow niche field of the university is rarely fostering the value creation anyway in short terms.

37.1 Keywords

Knowledge transfer, value creation, enterprise cluster, HEI cluster, strategic partnership

37.2 Introduction

The Finnish Universities of applied sciences(UAS) got their updated law by the government where stated that universities are doing research which is specially serving regional needs of surrounding business and public sector, also giving additional value for university teaching. UAS´s in Finland started with temporary pilots 1992 and from the early begin applied research was one of main profiles although UAS´s have all the time searching their main research profile and also several committees have been sitting to study the profile. Finnish universities have been also very active in this profile discussion.
Last signals from ministry of education and culture are supporting research work in powerful networks and clusters. UAS's have been very active in international networks but national networks have had lower activity because internationality has been a governmental guideline for Universities.

Universities including UAS´s and traditional ones (first university in Finland started already 1640 in Turku) have large amounts of projects where enterprises are invited as partners, which is very natural because it is the demand of governmental and EU funding authorities. In this connection, the real client demands and needs of businesses are getting severe attention. This means that in many cases business is not the active partner of the project and that´s why bigger and bigger attention should be paid to study the real needs of business users. That fosters partners' activity in innovation actions during the projects. Active business partnerships will also create many new ideas for successful start-ups of knowledge intensive enterprises.

There is 15% effect of applied research in the new funding model of UAS´s which in a way adds research activities although it is still significantly lower compared to traditional universities.

The focuses of applied research are defined by EU, national and regional strategies as well as by business guideline of separate municipalities. That´s why roles of identification of business' needs by universities are more and more necessary that the funding strategies are coincide with real needs.

UAS´s are active with business co-operation and they have important role and tools to identify real needs of R&D and organise necessary knowledge transfer processes to fulfil customer updated needs also. Some tested models of clustering and knowledge transfer are studied in the next chapter.

37.3 Case models value creation and knowledge transfer

Present cases consist of different co-operation and strategic models including enterprise clusters, university and city networks concentrating on South-West region in Finland.

Many years ago, Satakunta UAS and Turku UAS started their organised co-operation in the first phase. Before that co-operation has happened in separate fields e.g. entrepreneurship, physiotherapy and multifield research projects. Organised co-operation based on two UAS' strategical focuses and their combination is clearly stronger in the case of challenging R&D projects.
The official collaboration focuses were defined as follows; entrepreneurship, energy and environment, welfare, and intelligent networks. Cooperation has now reached also organisational levels where two universities have signed a Strategic Federation Agreement. The purpose of the Agreement is to describe and define the main idea, goals and modus operandi of the Southwest Finland's Universities of Applied Sciences, CoastAL. Furthermore, the Agreement defines the main principles concerning the operations and management, the right of decision of the jointly agreed bodies, and the grounds for this right of decision. Following the Alliance agreement also the main research focuses are slightly changed.
At southwest the maritime industry is dominating in four cities, Pori, Rauma, Uusikaupunki and Turku. These cities organised a special project LOURA to foster maritime industry especially in the fields of research and education. The main purpose was to build up an active innovation platform and all the themes for knowledge development were; maritime, energy, environment, innovations, tourism and future education. Loura coordination model is presented in Fig. 1.

Figure 1: Strategic research collaboration model (LOURA presentation material ppt)

Ministry of employment and the economy (previous Ministry of trade and industry) has organised Finnish development by 13 Centres of Expertise Program (OSKE). One of these programs is Maritime Cluster Program. Under that program the model of Meridiem was established. Meridiem's operational model strengthens the long-term development activities of the maritime sector and promotes networking at all levels (local, regional, national and international). Collaboration, networks, alliances and partnerships offer valuable opportunities to gain more visibility and momentum by working together. A shared pool of resources enables different actors to place more collective effort into supporting maritime-related competences and expertise, in order to address global challenges and opportunities. Special feature of Meridiem was that it includes 4 traditional universities and 2 UAS and remarkable amount of SME´s and the main idea is to organise fluent innovation actions through research cooperation between universities and SME´s. Networks of LOURA innovation platform are presented in Figure 2.

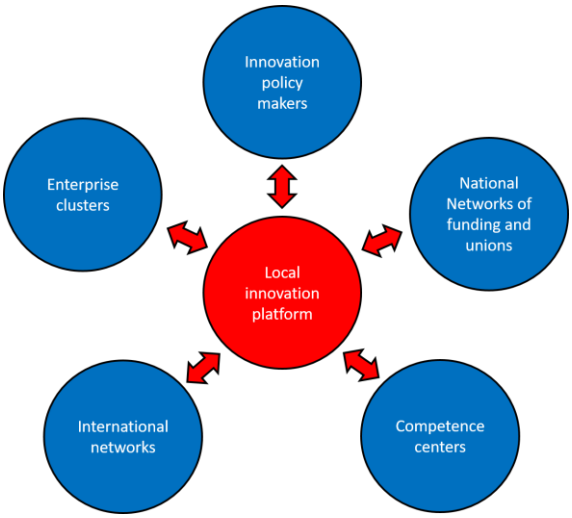

Figure 2: Networks of local innovation platform (LOURA presentation material ppt)

In the second case is also connected to marine in industry with the title PARTICIPATORY R&D (PRD). Partners were Satakunta UAS (SUAS) and industry. Industry enterprises had long time contract based strategical partnership with SUAS. SUAS and enterprises together defined updated needs of R&D getting the list of three most important topics in near future. Also Tampere University of Technology was engaged with the project. The three top topics were Lifecycle Business, Prototype Productization and PRD. After the analysis discussions PRD was selected the most important and current one for active processing.

> PRD means the process of R&D where enterprises which their own businesses are coinciding with the same client or client group. Partners together are searching and defining common R&D steps with the HEI network.

In both cases the co-operation between universities and enterprises is not at all straightforward. It is not normally familiar situation at the university to really identify updated needs of business. Even in the case that identifying is working, still the problem is to work with knowledge transfer and knowledge applications. The situation is getting harder when more than one university is acting together with other university or other universities.

Some guaranteed guidelines are needed to get success:

- Strategical partnerships are important because there is a long-term co-operation experience between university and enterprise. Following the long-term co-operation university is deep in the business of partner. Then, the university is able to follow ideas of R&D from enterprise point of view and it can even make suggestions for the needs of enterprise R&D.
- When several universities are working together it needs strong project management that universities identify their real substance how they are serving enterprise R&D project needs. Not only that but it is even much more difficult to identify how the university is serving partner university knowledge especially in the case that the university cannot directly serve the enterprise needs. When two universities have a long tradition in co-operation the fulfilling of each other's knowledge is possible and is even a fluent process.
- When public sector and municipal funding is engaged in the case of enterprise clusters and university networks the interests of different partners usually differ very

strongly. Therefore, the need of discussions and negotiations are never overexaggerated. That is the only way to find common interests for co-operation project and reach fostering success in R&D.

Elements of successful collaboration are shown above in figure 3.

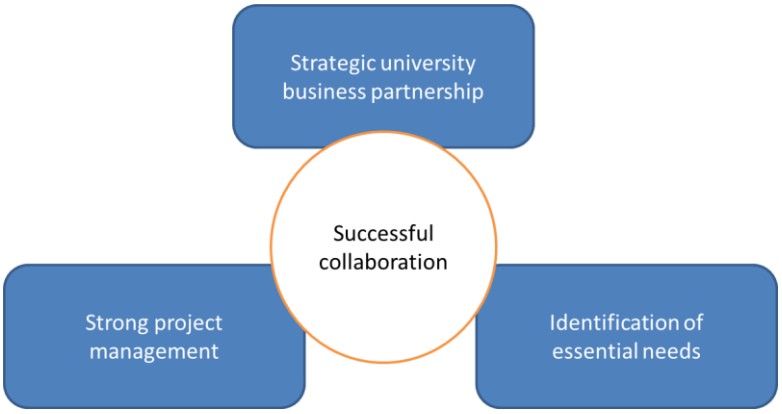

Figure 3: Elements of successful collaboration

37.4 Conclusions and recommendations

The main implications followed from this study is that value creation in the case of enterprises needs that universities combine and build their knowledge for the service process or even service product to make real co-operation business with enterprise clusters. Additionally, the real identification skills from universities are needed to fulfil enterprise needs. This is realistic following the present study only in the case of long time co-operation between universities and between universities and enterprises at the level of strategic partnership.
The applied model of knowledge transfer presented in this paper ensures rapid speed of value creation and transfer from university network to multi business enterprise clusters. The present model of the enterprise cluster ensures also additional businesses to enterprise members in the cluster also giving deeper, more realistic and business oriented focus for the applied research of universities. The present study also shows that the co-operation with enterprises in the research niche fields of the university is rarely fostering the value creation anyway in short terms.

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38 Evaluation of Greek penal provisions on hacking (survey data of 2013) - The opinion of hackers and jurists which led to the change of the cybercrime laws in Greece

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39 Aristotle at the Googleplex: On the Virtuous Use of eScience

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39.1 Preamble

As a student of philosophy, it has been my privilege to come to know the works of both the classic thinkers and more contemporary intellectuals. This education has brought me into contact with, among other things, the tradition of moral philosophy. This tradition provides us with a rich resource for making sense of the world around us, and for investigating both our own and others' assumptions about right action. Again and again, I find myself returning to the insights of Aristotle, Kant and Bentham in grappling with contemporary problems of living. Therefore, I am immensely excited and grateful to be participating in a conference celebrating and interrogating the intellectual inheritance of the immense body of work associated with Aristotle. In this short speech, I hope to outline some of my own thinking on the application of Aristotle's moral philosophy to issues surrounding the use of eScience, highlighting some places where he is useful to us, and where the value of his contribution is more limited.

However, I should first say a few more words to introduce myself, as I am sure that many of you might be wondering, at least, where my accent is from. I am a South African Master's student, pursuing an MSc in Higher Education Research and Management. I came to this topic via my past experience as a lecturer and tutor at Stellenbosch University. Over the course of my engagement with topics in philosophy, it has been my pleasure to introduce this long history of thought to students at the philosophy department at Stellenbosch. However, the educational and administrative responsibilities accompanying my work ultimately led me away from the exclusive study of philosophy, and towards the curious phenomenon of higher education itself. In the pursuit of developing this interest in higher education, I applied for the Erasmus Mundus Joint Master in Research and Innovation in Higher Education, hosted by a consortium of universities in Austria, Finland, Germany and Beijing. Being accepted on scholarship in 2016, in my first semester of studies I was introduced to Professor Johan Günther, a member of the IAFeS board. It is through this connection that I came to apply to IAFeS as student member, seeking to engage with academics who are working in this pioneering and highly influential field that has so much relevance for the study of higher education. However, I believe that is enough about me for now, as it is time to begin the task of sharing with you my take on the application of virtue theory in relation to the field of eScience.

39.2 Introduction

The title of this speech takes it's leave from Rebecca Goldstein's 2014 book 'Plato at the Googleplex: Why Philosophy Won't Go Away'. Placing my own thinking in relation to Goldstein's affords me the opportunity to, like her, place an ancient philosopher in conversation with the contemporary world. Where Goldstein took Plato all across America, I

am taking Aristotle to the domain of eSience. In doing so, I draw on Aristotle's particular emphasis on the connection between ethics and politics, in order to tease out the implication thereof for our use of eScience.
First, I show how the question of 'how to live well' is answered at this intersection between the ethical and the political. Second, I explore how Aristotle's focus on this question, at this intersection, makes him such a rich resource for thinking through modern problems that occur at the forefront of technological innovation. In this, I outline the two kinds of questions which his ethical-political perspective allows us to ask in evaluating the value and appropriate use of tools and technology available to us today. Third, I focus in on the nature of eScience, and situate it in relation to ethical-political life. Here I take up an Aristotelian perspective a specific instance of the application of eScience with political implications; targeted advertising and big data. The purpose of this specificity is to show at what level Aristotelian ethics may help us to consider eScience applications.

39.3 Aristotle's ethical polis

Aristotle opens the 'Nicomachean Ethics' by framing it as a work of political philosophy (Crisp, 2000, p.3-5). This opening might be easily overlooked for the rich content which follows, but I think that it is fruitful to pause here and take this framing seriously. An implication which might be drawn from this is that in describing the ethical life, one cannot but make statements about political life.
However, while individual ethical actions play out at the intersubjective, political level, we may take this as more than just a practical point about the effects of human actions at the level of society. In fact, this view about the necessary interdependence of ethics and politics derives from Aristotle's conception of human nature; that we are political and social animals. In the Politics, he writes;

> [M]an is by nature a political animal. And who by nature and not by mere accident is without a state, is either a bad man or above humanity (Jowett, 1984, p. 5)

Aristotle believes that it is essential to honour this unique nature of humans in our ethical and political activities.
In distinguishing what it is that constitutes a good life, Aristotle looks explicitly for a definition which captures what it is about humans and human lives that is distinct from other animals. For him, the highest good must be consistent with the maximization of our faculties as human beings. Thus, in framing 'the good' in this way, he excludes from the purpose of a good life the mere pursuit of pleasure. He sees this as an animalistic drive, one which is not peculiar to humans. However, when he turns to the distinctly human activity of the pursuit of honour, he also dismisses this as an inappropriate highest good. This is because honour has much more to do with how one is perceived by others than it has bearing on one's individual character. Lastly, Aristotle considers the accumulation of wealth as a possible good that humans might direct their lives towards, but he dismisses it on the basis that wealth is only a tool or a resource for achieving other ends/goals. It is interesting to note that he does not reject the pursuit of wealth on the basis that it is particularly morally corrupt to accumulate wealth. Rather, the pursuit of wealth cannot be the purpose of human life, because it is only a means to our other goals.
Instead, Aristotle locates the purpose of human life in the pursuit of happiness. This is because there is no further purpose for which we seek to be happy than happiness itself. It is something which we seek for its own sake. This kind of thinking, which locates the ethical by

means of finding a kind of original and irreducible “cause” for human activity, has its foundations Aristotle’s thinking in the area of epistemology and causation. For our purposes, it is sufficient to note this point and move on, as what is of concern here is not whether Aristotle’s reasoning on this matter is correct, but rather what the implications of this reasoning might be.

Returning to ‘happiness’, the highest good for human beings. It is crucial to emphasize that happiness should not be seen as related to our previously rejected notion of ‘pleasure’. This is because, as you no doubt know, the classical Greek word for happiness - eudaimonia - is far richer than its English counterpart, and contains connotations of blessedness and flourishing. Thus, for Aristotle, “happiness consists in living a life that is blessed” (Adamson, 2014, p. 247). This condition of eudaimonia is not something which comes about easily, rather it takes practice. With practice, one might achieve arête, or excellence, which would support you in the fulfillment of your uniquely human potential to flourish or be ‘eudaimonious’.

Excellence is tied, again, to what it is about humans that is unique, namely the ability to reason. Living a good, eudaimonious life involves practice in spending time in intellectual contemplation and learning, considering both abstract principles and involving oneself in intellectual and/or scientific experimentation. This theoretical and practical reasoning would develop in us the intellectual virtues, helping us to become wise. However, being wise does not just consist in being learned or clever, it also consists in having a good character. While the intellectual virtues are developed through learning, character virtues are developed through life experience.

Furthermore, this ability to achieve eudaimonia through reasoning and experience or habituation is not a purely individual or subjective responsibility. For Aristotle, humans are rather poor judges of what will make them happy, as well as poor judges of their own character and of what is good for them (Adamson, 2014, p. 247). For this reason, we must define and carve out our lives in relation to an external measure. This measure is what Aristotle provides in his ‘Ethics’, namely the doctrine of virtue and the golden mean, which outlines at least 12 core virtues, of which a few are courage, temperance, liberality, wit, modesty, truthfulness, being properly proud and friendliness. Ethical or virtuous action consists in expertly judging, in a case by case manner, which behaviour in a particular situation is consistent with these virtues. This involves choosing the mean or middle-point between either weak or excessive behaviour.

Now let us place this ethical doctrine in relation to Aristotle’s political philosophy, emphasizing the point made at the outset of this speech about the intimate connection between these two spheres of human concern. According to Aristotle, the two main categories of virtues (i.e. the intellectual and character virtues, of which the specific virtues form a part) are developed through inculcation (education) and practice, so that acting virtuously becomes a habit. The activities of education and practice, however, require social and political circumstances which support them. Thus, a certain level of political organization is necessary so that citizens are encouraged and guided in the development of virtue, towards the achievement of eudaimonia.

For Aristotle, the ideal political organization for the maximization of human flourishing is the city or ‘polis’. The size of what we would today define as a small city is, according to him, an ideal setting which can be engineered to support human development. Crucially, participation in this public life is something unique to humans, as we are ‘political animals’. Thus, “the proper goal of the city is closely related to the proper goal of the individual” (Adamson, 2014, p. 265). Where the Ethics outlined how eudaimonia might be achieved through living a life of learning and practice, the Politics is concerned with how to organize

collective life to facilitate this. In other words, “the point of political affairs is to promote the good life of all its citizens” (Adamson, 2014, p. 265).

39.4 Applying Aristotelian thinking to issues in modern life

While the world today is markedly different from the context in which Aristotle’s thinking was shaped, we may synthesize what an Aristotelian perspective might allow us to grasp about contemporary issues, as other intellectual figures such as the economist Amartya Sen, the philosopher Martha Nussbaum, and the biologist Conrad Waddington have done.
From the summary above, an outline of Aristotle’s notion of virtue for individuals and the role of political organization in developing virtuous individuals has emerged. If we take these ideas seriously, we may use them to interrogate phenomena in our modern environment. Two strategies for this interrogation emerge clearly from Aristotle’s ethical-political philosophy.
On the one hand, we may use his insights to ask how a phenomenon hinders and/or supports individuals in becoming more virtuous. On the other hand, we may use his insights to tease out how a phenomenon impacts on the political sphere and collective life. In this second case, we would ask whether it helps or hinders the general promotion of conditions which support citizens in trying to live virtuous lives. This question has relevance at the level of the state and local government, but also has a more general relevance for phenomena with a social impact.
In the following section, we will be asking these two kinds of questions in relation to an application of the work of eScience. This involves firstly giving a brief take on the nature of eScience and how it is applied, and then connecting this to targeted advertising and big data. Thereafter, we look at how Aristotelian thinking may be used to evaluate this phenomenon.

39.5 An Aristotelian perspective on eSience

As a philosopher, my passion for definitions dictates that we kick off this section with clear language, which will do much to simplify our discussion of increasingly complex phenomena. Below I put forth a succinct definition of eScience, before looking at the particular application thereof in advertising and its ethical implications.
Various platforms have put forth a definition of eScience – what I present here is a synthesis of three different sources’ framing of eScience, namely that of; (1) Plan-E, the Platform of National eScience Centers in Europe, (2) the IEEE International Conference on eScience, and (3) Prof. Martin Hilbert of the University of California and the Information Society Program of the United Nations Secretariat for Latin America and the Caribbean.
According to these sources, eScience is the response of science to the digitization of data. The main activities of eScience lie in developing methods to support scientific research in its engagement with the vast amounts of data that is now available through digitization – also called Big Data. This support takes the form of the creation of computational tools and infrastructures that can process immense amounts of information. However, it also takes the form of specific technical support as characterized by either individual or large teams of eScientists who aid other scientists, from other fields, that are trying to engage with this data. eScientists’ work ranges from data technicians who develop and maintain massive e-infrastructures, to the work of helping scientists to visualize and analyze their data. In short, eScience applies computer technology to modern scientific inquiry.

While this work of eScience might appear rather innocuous at first glance, the power which eScience bestows on those with access to it may be cause for concern. This becomes apparent when we turn to the area of government, or to the domain of multinational corporations (MNCs) and targeted advertising.

39.5.1 Aristotelian virtue, targeted advertising and big data

The phenomenon of targeted advertising would be impossible without both the massive digitization of consumer data and the application of eScience to this data, so as to sort, filter and use it to target individual consumers. This targeting is sophisticated in that it is almost invisible – it manifests as 'naturally occurring' items in the landscape of one's online experience (Lynch, 2016).
Much has been written about the (im)morality of advertising. In the past, before massive digitization, "advertising has been charged with a number of ethical breaches, most of which focus on its apparent lack of societal responsibility" (Treise, et. al., 1994, p. 59). Recently, those working within the advertising industry have become concerned about the ethics around 'new' media and targeted advertising (Drumwright & Murphy, 2009). What would Aristotle have to add to this discussion?

Firstly, we should turn to the core issue of virtues, and their opposing vices. Here there is an obvious and worrying connection to advertising, as advertising appeals to the worst and most insecure parts of ourselves in the attempt to convince us to consume in certain ways. Thus, advertising actively thwarts our efforts at virtuosity in the interest of profit. But what might the added, modern feature of targeting advertisements to consumers through collecting massive amounts of data about their preferences mean in an Aristotelian perspective?

Here, an Aristotelian view has some limitations, as the discourse of autonomy and privacy which is implicated in the phenomenon of targeted advertising is not available to us. Thus, at the level of individual virtue, the problem of targeted advertising is simply the same as the older problem with 'traditional' advertising – it encourages people to give in to their vices. However, if we take this problem to scale – that is, if we zoom out to the level of social and political impact – we may look at the problems with manipulating citizen's free choice and the problems with decreased individual privacy as political issues. From this perspective, Aristotle allows us to claim that the use of eScience in the pursuit of targeted advertising creates structural conditions which make it progressively more difficult for citizens to practice virtue. In essence, the culture of consumerism becomes so all-pervasive that it traps citizens in a situation which thwarts their ethical education and growth. The implication of this is that states and local governments have an obligation to curtail the use of eScience in the service of advertising generally and targeted advertising specifically.

39.6 Conclusion

What this analysis has shown is that Aristotle's ideas about ethical-political life help us to evaluate modern scientific and technological applications of data. It does this by offering us two useful questions to pose when encountering a phenomenon which touches the lives of citizens, namely 'how does this impact on an individual's ability to practice a virtuous life?', and 'what are the implications of this phenomenon if scaled to the level of social, cultural and

political life?' Having looked at the specific phenomenon of targeted advertising, we may note here that there are a whole host of eScience applications which touch the lives of citizens, such as, for example, state surveillance technology, or open access sources. For these phenomena, Aristotle offers us a lens which centers the individual's well-being. This a very useful heuristic tool to employ when considering the development and application of technology in the service of human activity. For Aristotle, any technology which can thwart the development of virtue, or distort the socio-political conditions which enable citizens to develop virtue, is suspect.

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40 Hospitality Industry and Innovative technology for People with disabilities: the case of the island of Rhodes, Greece

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40.1 Abstract

Tourism is a rapidly growing industry in the world and people with disabilities are becoming a rowing group of consumers of travel in recent years.
Disability is a complex and multidimensional phenomenon. The medical approach stated that “disability associated with the loss, damage or deviation from the “normal”, psychological, motor and biological functions of the human body”.
However, the physical environment that related to the hotel services for disabled customers is still limited and undeveloped either in the design, research and proper implementation.
Although the number of consumers who would benefit from accessible facilities and services are on the increment, most hotel managers have still not yet recognized the importance of taking action on this issue. The innovation technology and service design will develop to assist hospitality operations management skills, necessary to operate the hotel staff, communication, architectural facilities and customers. There are certain things that people with disabilities simply cannot do for themselves. But, if they can use an innovation app, they have a high degree of independence on their holidays.
This paper focuses on a) the analysis of the innovation technology and service design in hotel industry, b) the capability of the installation of the innovative technology in hotels and c) the enrichment of tourism product by adopting innovation technology for disabled customers. The primary research and the data collection was implementing in Rhodes, Greece in several hotel enterprises. Structured questionnaires were distributed to hotel managers and organizations for disabled people.
In conclusion, the innovation technology for disabled people in hotels must be a priority. In fact, tourism is a social right for people with disabilities.

40.2 Keywords:

Tourism, hotel industry, innovative technology, accessible facilities, disabled customers.

40.3 Introduction

The development of technology is rapidly evolving, shaping a specific context in the operation and dynamics of hotels. New machines and innovations provide customer service and upgrading travel experience.

The use of new technologies that record information, combine, process and combine it, is an appropriate tool for many actions, and in particular for an economically profitable, globalized and flowing economy such as tourism. New sales concepts are being created, new markets are opened and new products are marketed, pricing policies are changing and consumer needs are constantly increasing (Buhalis, Costa, 2006:137).

The development of technology and, in particular, the speed of dissemination of information and communications, led to a revolution of information and the elimination of space and time. The material and digital world traditionally compete and try to avoid the disadvantages or imitate the advantages of the opponent. As a result, a digital animated environment, composed of cultural influences from around the globe, emerges.

The increased interaction of cultures through increased travel, tourism and the development of media allow the tourist to get to know and absorb new ideas and experiences from a variety of sources in various fields such as music, food, fashion, sports, Literature and cinema. In return, these cultural interactions encourage the diffusion of national borders and change perceptions such as space and time.

According to Erdly & Kesterson (2003), the two forces shaping changes in the tourism industry are globalization and technology. Firstly, globalization characterized by the internationalization of economies, the abolition of borders and the democratization of culture and information, allows and inspires more people to travel to places with services that have previously been inconceivable. Secondly, technological achievements, absolute access to information, the convenient and almost instantaneous nature of telecommunications, as well as advances in science and medicine, fuel economic growth and allow hotel enterprises to cope with the tourist demand of their consumers.

The conceptual approach of the term "technology" refers to two specific cases. The first case describes the process of creating the object, while the second case refers to high technology, how far a product can be technologically advanced. Therefore, technology can be considered both a computer and a corkscrew.

Essentially, there are two types of technology, finding and discovering. The “find” word refers to the creation of a new object, while the word “discovery” refers to finding something that existed before.

The areas in which technology is divided are countless, the main ones being Engineering, Industry, Information and Communication, Applied Sciences, Military Technology, Health and Safety, Transport and the latest technology is Domestic.

A key factor in the evolution of technology is man. Wanting to simplify his everyday life, he gave boost to the realization of technological discoveries and inventions that led him to technological development. The main incentives on which it relied are as follows:

- The exploitation of natural resources and raw materials to the maximum, thus creating new sources of energy, for example water, gas and oil.
- Freedom of communication, creating both the telephone and the internet.

- The use of production equipment to facilitate the workplace, but also the creation of larger and more complex machines, e.g. modern machines at the hotel's production and dining areas.

The first appearance of technological innovation in hotels took place in 1970 with the introduction of refrigerators and ice maker machines in the guest rooms for personal use.
In 1972, telephone sets were added to the room service via a central telephone system and a separate device in each room.
In 1975, color televisions and air-conditioning in the bedrooms make their appearance, creating a space that is more intimate for visitors and more relaxing.
In 1982, satellite TV was installed. The first satellite TV broadcasting in a hotel room is now a fact, enabling the customer to have daily global updates.
In 1986, the first satellite film directories are displayed in the hotels as well as the messaging service directly to each room's voicemail, thus making the customer aware of any messages instantly and quickly. In the same year, electronic locks and electronic key cards appeared in the hotel rooms.
1990 the wake-up call system and the safety box to protect customers' personal items were launched.
Three years later, the first electronic systems - check-in and check-out procedures - are created to help employees in the reception area, thus gradually eliminating the handwritten process of day-to-day operations.
The year 1995 stands out as a landmark year for the development of technology in hotels as well as in general. The greatest achievement in technology is now a reality with the emergence of the internet. The start is initially made with wired internet sites, and then Installing and maintaining a hotel-wide wireless network.
In the coming decades, technology has made tremendous leaps, facilitating people's everyday life, focusing on maximizing leisure time and more specifically in the hotel sector, relaxing customers, and automating all the tasks involved in achieving goals and objectives.

40.4 Installation and application of Innovative Technology in hotels

The high cost of purchasing new technologies for the hotel is a hindrance to many hoteliers. However, the rapid growth of technology "forces" de facto hotels to spend more money on the purchase of modern technology products. This has been instrumental in increasing customer requirements.

The main reasons for making this investment on the side of hoteliers are:

- Reducing production time. New technology applications greatly reduce the time required to achieve a particular job, provide service to more people at the same time.
- Reducing labor costs. The emerging "replacement" of living potential with technologies that offer time savings, reduce the cost of the hotel. In many cases reducing labor cost offers more revenue.

Main advantages of using new-innovative technology in hotels:

- Easy access to information. The internet and modern hotel software - applications, helps customer quickly search for information on any subject, providing better customer service.
- Simplify customer communication. With new-innovative technologies, communication between the hotel and the customer is increasingly simplified. With the continuous development and creation of new communication tools, customer contact with the hotel is handled in minutes even if the distance between the two participants is enormous.
- The speed of service. The new hotel software systems, with fast-check-in procedures - applications or hotel-based applications, etc., provide quick information and solutions to the problems faced by each customer, facilitating the employee's work and reducing service time (www.smallbusiness.chron.com).

There are also disadvantages that emerge - arising from the use of new-innovative technology and are as follows:

- High installation costs. New-innovative technology requires in some cases a high installation cost. New technologies can serve and simplify an employee's work more and more, but on the other hand, the cost of purchasing the equipment or the product is constantly increasing. It should be stressed that the main factor of pricing a product is its importance as well as its demand from the customers.

- Maintenance cost. High cost technology products require continuous scheduled maintenance. Also, depending on the cost of purchasing each machine, there are spare parts for replacing any damaged or poorly maintained parts of the machine. Modern systems require constant updating of their software or even any extensions to improve their performance. Therefore, they may need to be shut down for proper installation of their updates for some time, from a few hours to days. This results in the difficulty of carrying out the work of the department by part of the employees.

- Reducing staff. The rapid increase in the use of machinery in the workplace has resulted in a dramatic reduction in the number of staff in a hotel. Several hotels are increasingly replacing their staff with developed technology mechanisms and personal customer service is greatly reduced (www.utahsip.org).

40.5 Disabled modern Traveler profile

Globalization of markets and the international economy is indissolubly linked to the rapid growth of technology and changes in the provision of tourist services to people with disabilities are remarkable.
Undoubtedly, the proliferation of internet use has caused dramatic global changes in the tourism industry. The ability that has been given over the internet to everyone can always have on screen any available information; change its requirements and behavior. Thus potential candidates - potential disabled tourists have the opportunity to find their own tourist destination, to shape their holiday schedule as they wish, based on their personal desires and interests, and to compare prices from different possible websites (Mills, J.E., Han, J-H. and Clay, J.M., 2008:28-41).
It has been shown that detailed information and images on touristic websites play a key role in the customer's view of product quality. A disabled traveler due to technological

developments now has access to more information. Only by pressing a button can easily navigate the disabled modern traveler to different destinations, compare prices and provide services, plan even on vacation. In fact there are 5 stages of the "travel cycle" through the search engine “Google”, describing the profile of "modern disabled traveler" (UNWTO, 2011:7-8):

- Dreaming
- Researching
- Booking
- Experiencing
- Sharing

The internet has emerged today from the mainstream media, inspiration and search for tourism information. So instead of "word of mouth" information being pumped, they are pumped from the mouth to mouth or word-of-click (Ray, N.M. and Ryder, M.E., 2003:57-72).
In the first phase of the travel cycle, potential disabled tourists search for information for tourism destinations, read blogs, and descriptions of others who have already visited a destination, also watch videos of tourist content and search for or follow a variety of other sources and information.
When the consumer is ready to go through the dream at the stage of researching, he has come up with specific choices and at this stage he carries out detailed and meticulous searches around his choices and spends several hours searching, comparing and rejecting. This is one of the most intense steps in the cycle, as the number of websites explored before a reservation is particularly high. At the same time, the use of mobile phones has increased rapidly and their presence is strong at this stage.
The next step after the thorough search is to make the reservation of the final consumer choice. Internet and mobile phone booking of airline, hotel and all kinds of tourist services are on the increase. Particularly in mobile phone bookings, a major and crucial factor in making a reservation is the new "click to call" application.
The stage of experience is the result of the dream chain, searches and reservations. During the trip, the disabled tourist does not stop searching and booking for excursions, restaurants and car rental. With the help of new technology and in particular of personal mobile computers, mobile phones and tablets, he searches and makes reservations for all sorts of tourist services. The ability of the tourist of an all-rounder and personal local informant is invaluable and easy with the integration of modern technology.
At the end of his journey and his cycle, the person shares his experiences with the rest of the world by communicating them to the internet. But the dreams of someone else are inspired through these notifications, so the travel cycle continues therefore tourism.

40.6 Providing hospitality services to the Disabled Traveler

Disability is a complex and multidimensional phenomenon. The medical approach, which until a few years ago was the predominant one, stipulated that "disability is related to the loss, damage or deviation from the" physiological ", psychological, kinetic and biological functions of the human body. In reality, however, disability has to do with the gap between the individual's capacities and the demands of society; the gap in the needs of disability and the structures of society, whose design did not predict the potential and needs of this social group (Bi, Card, Cole, 2007:205-216). The more severe the form of disability is, the greater

the "inaccessibility" and therefore the social exclusion experienced by the disabled person (Simon, D., Pheroza, S. (1999:41-47).
In the context of the global tourism industry, the design and adaptation of the premises of most accommodation for disabled customers is a priority and one of the basic prerequisites for tourism development. In fact, tourism is a social right of all people with disabilities.
According to the Eurostat (2012), the number of people with disabilities in Europe is 50.000.000, which at least 50% travel with an average of 1,56 people, increasing the number to 89.000.000 people. There is also many people with disabilities who are not on holiday due to their disability, which is considered the main obstacle to access to many of the existing tourism services (ec.europa.eu/eurostat).
According to Eurostat data, the percentage of people with disabilities in the countries of E.U. are as follows:

Table 1. Percentage distribution of People with Disabilities by country in the EU

Rank	Country	Percentage distribution of people %
1	Denmark	18,2%
2	Grade Britain	17,8%
3	Hungary	17,0%
4	Germany	16,9%
5	Netherlands	16,2%
22	Greece	9,1%
27	Czech Republic	7,6%
28	Italy	6,1%

Source: Eurostat (2012).

40.7 Innovative applications tailored to the needs of People with Disabilities

Achieving the goals of effectively serving people with disabilities depends to a large extent on the use of new innovative applications where they facilitate their daily stay in the hotel. Some of the new innovative applications for people with disabilities are as follows:

40.7.1 Electronic Obstruction Detector for Visually Impaired Persons

The Obstacle Detector uses the new technology to help visually impaired people. It is an advanced rattan technology that can be used by visually impaired people. It includes a mechanism that consists of a sensor that detects high obstacles and alerts the user through a buzzer for an obstacle, as well as a pulse motor that alerts the user if the environment in which it is moving has noise (ekinisilab-sev.gr/omades-ekinisilab/).
The comparative advantage over the visually impaired is that the obstacle detector can detect high obstacles, something that is in need, but there is no solution so far.

40.7.2 Smart Home for People with Disabilities

This feature refers to homes, hospitals and hotels that have devices that can communicate with each other and controlled by remote control or PC from anywhere in the room, at home or even in the world, using the internet or the mobile phone.

Abroad, and especially in the Scandinavian countries, the state is particularly sensitized about people who have difficulties or a disability. It should be noted that there are state funding to hoteliers who want to adapt their rooms to their individual needs. Smart Home is appearing in many foreign hotels, helping people with disabilities to cope better with their daily lives while offering more relaxing vacations.

However, there is neither information nor state benefits in Greece to support some people's diversity. Small units as well as Greek hotel owners will hardly concentrate on something similar. The only exception is the Holiday Inn Athens Hotel, member of the Holiday Inn hotel chain.

More specifically, all electrical devices can operate and operate by telephone (by sending a message to lock a door, to turn the lights on to the hotel room, to adjust the room temperature, etc.), a remote control even with voice commands. Also, the system can work independently, for example, if there is air in the room through open windows, the system will close the curtains or windows automatically. When a window is left open or an unlocked door the audible alarm system informs the people.

For hearing impaired people, the room is equipped with bright lights, informing them about problems in the room, for example if someone knocks the door lights a white light if the phone rings green light while if a door is unlocked unlocking lights up red light.

As far as people with limited vision or blindness are concerned, the system's control system has the Braille system as well as the voice commands already mentioned (www.blog.appleworldhellas.com).

40.7.3 “Handimap” Application for People with Disabilities

"Handimap" application aims to map cities in France to easily locate areas with disability-friendly infrastructure. With the mobile app that comes with them, the maps allow users to accurately locate the city's parking spots, relax in open spaces such as parks and visit museums and other tourist spots with access to people with disabilities.

Platforms also identify pavements that are accessible to people with a wheelchair. So far, Handimaps are available for the Rennes and Montpellier regions, and others will follow.

This innovative service was presented in the international exhibition “ITB Innovators: Platform for the tourism trends of tomorrow” (Tourism with people with disabilities).

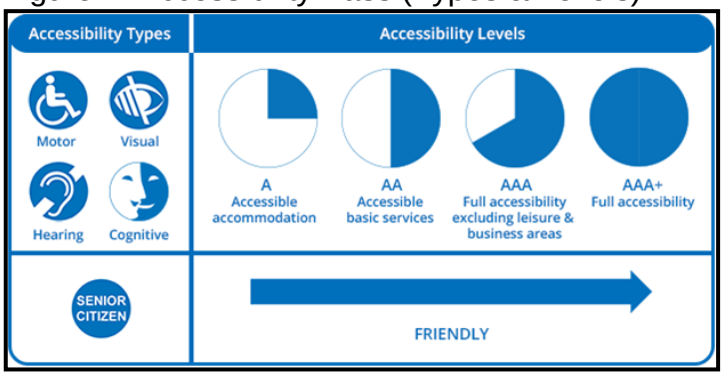
40.7.4 The international accessibility certification "Hotel Accessibility Pass"

Several hotels want to assess the level of services they provide to disabled customers. Therefore, they must independently carry out an independent assessment of their installations by specialists.

Undoubtedly, knowledge and understanding of the needs faced by these customers will be highly appreciated by themselves, which in many cases will become direct advertisers of the

hotel in their special clubs and communities as well as in their wider social circle; Which will pave the way for a market with enormous dynamics.
Accessibility Pass is an international certification of hotel infrastructure and services for accessibility of all categories of disabled people (separate accessibility marks for people with motor, visual, acoustic or mental disabilities, for the elderly, etc.) as well as the skills of the human resources (Figure 1).

Figure 1. Accessibility Pass (Types & Levels)



Source: lh5.ggpht.com

It is a Greek innovation, with composition, but by evaluations and criteria of 18 organizations from 9 countries. Its goal is to provide useful and reliable information on the accessibility of certified hotels so that people with accessibility needs can easily choose a hotel that caters to their own personal needs (Figure 2). Therefore, an extensive list of criteria is used to determine the accessibility level of a hotel for people with mobility, sight, hearing, and mental illness, and for the elderly.
More specifically, real data on infrastructure, services and staff skills are collected, hotels are ranked according to their accessibility, certified accessibility labels for accessible hotels are published, and information on hotel accessibility is published to internet. The classification of hotels by Accessibility Pass is objective, thanks to the use of common criteria for all hotels in the world and the mapping of hotels by Approved Inspectors - not based on hotel self-declaration. Staff skills are developed through the formal education program and are secured through tests that lead to employee certification.
The Accessibility Pass certification scheme has been developed by CERTH (Centre for Research & Technology Hellas) / HIT (Hellenic Institute of Transport), through collaborations with international accessibility experts and the cooperation of senior citizens. It is also controlled and supported by the ACCESSIBILITY PASS Executive Council, which is composed of Experts, Scientists and Researchers from the international community. Accessibility Pass has the approval and support of agencies and organizations internationally, who are specialists in accessibility issues and are members of the European Network for Accessible Tourism (ENAT).

Figure 2. Accessibility Pass Certification Scheme


ACCESSIBILITY PASS

This is to certify that

_____ HOTEL

is approved to the **ACCESSIBILITY PASS** Certification Scheme and granted the following labels

A A

Certification Levels

A Accessible accommodation
AA Accessible basic services
AAA Full accessibility excluding leisure & business areas
AAA+ Full accessibility

GR0010000013	9 Jan 2014	9 Jan 2015
Certificate Number	Issue Date	Valid until

Panorea Theleriti
PEOPLECERT Group Certification Qualifier

Constantinos Kesentes
PEOPLECERT Group General Manager

PEOPLECERT

Source: www.peoplecert.org

The adoption of new innovative applications by several hotel enterprises is crucial for increasing the benefits and revenues of these companies. The following statistics reinforce this position:

- At 1.000.000.000, based on international surveys (World Health Organization and O.E.C.D.), people with disabilities, that is, 15% of the world's population, are estimated.
- 800.000.000 people are estimated, over 60 years old, which is 12% of the world's population.
- If their escorts are included, this number increases significantly, reaching 2.200.000.000, which is 33% of the world's population.

A general assessment is that approximately 780 million travels bring to the European economy 400 billion euro's per year. If the tourism destinations and hotels were fully accessible (infrastructure + staff) we would have an increase of 35% of tourist revenue. So, an additional of 140 billion euro's per year in the European economy.

40.8 Research Methodology

The survey took place from 05/10/2016 to 20/10/2016, on the island of Rhodes, Greece, and took part in hotel managers as well as people with disabilities of local organizations.
As a data collection tool, the questionnaire with structured questions was selected, while stratified disproportionate sampling was used.
A total of 97 questionnaires were collected from 276 hotels five stars (5 *) (39 Hotels), four star hotels (4 *) (107 hotels) and three star hotels (3 *) (130 Hotels) and 63 questionnaires from 372 people with disabilities (232 men and 140 women) of local organizations in Rhodes. The sample is representative of the research population. More specifically, the distribution of the survey sample is as follows (Table 2):

Table 2. Research data

Data	Description	Total hotels (Reference population)	Hotels (Sample)	Percentage distribution Sample %
Hotels	5* Hotel	39	26	26,80%
	4* Hotel	107	43	44,33%
	3* Hotel	130	28	28,87%
	Total	**276**	**97**	**100%**
People with Disabilities	**Description**	**Total Disabled (Reference population)**	**People with Disabilities (Sample)**	**Percentage distribution Sample %**
	Man	232	51	80,95%
	Woman	140	12	19,05%
	Total	**372**	**63**	**100%**

The specific characteristics of people with disabilities in the sample of research are as follows:

- In terms of sex, 80,95% of people with disabilities are men, while 19,05% are women.
- 31,75% of the sample is 40-49 years old, 28,57% are 30-39 years old, 17,46% are 50 years of age or older, 15,87% are 18-29 years old, while only 6,35% of the sample is under 18 years old.
- The main disability categories are 73,01% of physical disability, 19,0% of sensory impairment and 7,94% refers to non-visible disabilities.
- Regarding to the marital status, 52,38% of the disabled people in the sample are married, while 47,62% are single.
- 68,25% are graduates of secondary education, 20,64% are graduates of tertiary education, 11,11% have completed postgraduate studies.

40.9 Case Study: Rhodes Island

Rhodes is one of the most popular travel destinations for a summer holidays in Greece, since it has a large number of hotels. On the island there are many hotels of all categories (Table 3), seaside hotel resorts located in the most beautiful seaside areas as well as a large number of tourist accommodation enterprises (approximately 800 hotels, apartments, etc.).
The seaside hotels as well as the other hotels in Rhodes are generally at the most popular holiday spots such us Rhodes Town, Faliraki, Kolympia, Archangelos, Lindos, Pefki, Ixia, etc. They are located mainly on the east coast and provide very good amenities and excellent service.

	5*	4*	3*	2*	1*	Total
Hotels	39	107	130	157	45	478
Rooms	9.895	18.702	7.911	6.559	890	43.957
Beds	20.450	36.078	15.229	12.382	1.717	85.856

Table 3. Hotels in Rhodes (2016)
Source: Hellenic Chamber of Hotels (2016)

40.10 Results

The results of the survey are divided into those that emerged from the responses of the hotel managers as well as those that emerged from the responses of the disabled people of local organizations on the island.

40.10.1 Survey results (Hotels of Rhodes)

This section presents the results of research related to hotels of Rhodes. More specifically, table 4 below refers to hotels of the research that are accessible to people with disabilities.

Hotel Category	Accessible Hotels for People with Disabilities		Non Accessible Hotels for People with Disabilities	
	Frequency (Hotels)	Percentage distribution %	Frequency (Hotels)	Percentage distribution %
5*	26	26,80%	0	0%
4*	39	40,21%	4	4,12%
3*	20	20,62%	8	8,25%
Total	**85**	**87,63%**	**12**	**12,37%**

Table 4. Accessible Hotels for People with Disabilities

Specifically, in Table 4 we note that 87,63% of our sample hotels are accessible to the Disabled and only 12,37% of all sample hotels are not accessible to the Disabled. It is worth mentioning that all hotels of the sample are resort hotels with vast areas of accommodation and dining.
Table 5 below shows the number of appropriately configured rooms for the disabled.

Rooms per Hotel	Frequency (Hotels)	Percentage distribution %	Total Rooms for People with Disabilities
4	10	10,31%	40
3	32	32,99%	96
2	35	36,08%	70
1	8	8,25%	8
0	12	12,37%	0
Total	**97**	**100%**	**214**

Table 5. Rooms for People with Disabilities per hotel

More specifically, we note that 36,08% of the hotel sample features 2 rooms for people with disabilities, while 32.99% of the sample features 3 rooms. Of the 4 rooms for people with disabilities, 10,31% of the hotel sample, while only one room features 8,25% of the hotels. A general estimation of the capacity of these hotels in relation to the availability of rooms for

people with disabilities is that the number of rooms available is considered satisfactory (214 hotel rooms) although it could have been larger in order to cover increased needs during the high season.
Table 6 below shows services for disabled people available from hotels in the sample. More specifically, 87,63% of the sample hotels provide disabled rooms as well as accessible public areas. 80.41% provide Braille elevators signage for visually impaired customers, while 59.79% of the sample provides audiovisual material in rooms for the disabled. Also, 35.05% of the sample hotels stated that they provide services for people with disabilities in leisure facilities (e.g. children's playground accessible to people with disabilities, swimming pool, etc.) and food and beverage department (menu list of large font, etc.).

Table 6. Provided services per hotel for People with Disabilities

Provided services for People with Disabilities	**Frequency (Hotels)**	**Percentage distribution %**
Rooms for People with Disabilities	85	87,63%
Accessible areas	85	87,63%
Elevators Braille Signage	78	80,41%
Audio-visual information in the rooms for People with Disabilities	58	59,79%
Other accessible services for People with Disabilities	34	35,05%

Table 7 below shows the innovative hotel services available to people with disabilities during their holidays.

An innovative implementation has been implemented - for People with Disabilities			**An innovative implementation has not been implemented - for People with Disabilities**
12		**Percentage Distribution %**	85
Hotel Website with digital material accessible to People with Disabilities	12	12,37%	-
Information for accessible areas for People with Disabilities in Rhodes	9	9,28%	-
Access for the People with Disabilities to the beach of the hotel using the appropriate equipment	8	8,25%	-
Percentage Distribution %	**12,37%**		**87,63%**

Table 7. Innovative hotel Applications for People with Disabilities

More specifically, we notice that only 12,37% of our sample hotels provide some innovative service-applications to the disabled, while most of the hotels have not adopted any innovative service-applications for people with disabilities. More specifically, 12,37% of the sample hotels have a website with digital content that is accessible to people with disabilities through the internet. Also, 9,28% provides printed material for accessible areas for people with disabilities in Rhodes, while 8,25% provides access to the beach of the hotel with the use of suitable equipment for people with disabilities. It is obvious that a very large percentage of the sample hotels (87.63%) have not adopted any innovative service-applications regarding to disabled customers. The main reasons that make it impossible to install these applications at present are high installation costs and maintenance costs.
Table 8 below shows the hotel departments where the hotel manager considers it necessary to install innovative apps-services for people with disabilities.

Hotel Departments	Frequency (Hotels)	Percentage Distribution %
Rooms	97	100%
Booking / Webpage	97	100%
Animation & Sports Areas	84	86,60%
Public Areas	81	83,50%
Front Desk / Reception	74	76,29%

Table 8. Hotel operation areas that it is necessary to install Innovative Applications-Services for People with Disabilities

The absolute percent of the distribution (100%) considers that in the hotel rooms and in the reservation department (including its website) it is necessary to install innovative service-applications for people with disabilities. Also, with the percentage of 86,60%, the animation and sports areas are followed by 83,50% of the public areas of the hotel, while 76,29% is recorded by the Front Desk / Reception.

When asked whether the hotel layout facilitates the installation and implementation of innovative services for the disabled, as well as what hotel managers consider as essential prerequisites for the effective installation and implementation of innovative services for people with disabilities in the hotel, the answers have great interest (Tables 9, 10).

Hotel fitting / installation of Innovative Applications for the Disabled	Frequency (Hotels)	Percentage distribution %
It is possible to install and apply innovative services for People with Disabilities	78	80,41%
It is impossible to install and apply innovative services for People with Disabilities	19	19,59%
Total	**97**	**100%**

Table 9. Ability to install Innovative Applications
for People with Disabilities in the hotel

Conditions for installing Innovative Applications for People with Disabilities	Frequency (Hotels)	Percentage distribution %
Government subvention & support	95	97,94%
Accessible public areas	94	96,90%
Intention to invest in Disabled People services	86	88,66%
Staff training regarding Disabled Persons' rights	71	73,96%
The change of philosophy towards the servicing of Disabled People in hotels	57	58,76%

Table 10. Basic conditions for the effective installation and implementation of Innovative Services for the Disabled in the hotel

More specifically, we note that 80,41% of the sample hotels believe that the hotel's spatial planning greatly facilitates the installation and implementation of innovative services for the disabled, while 19,59% responded negatively. It is estimated that the large percentage can be justified, since most of the hotels in the sample are resort hotels and their facilities are spread over thousands of square meters.
Regarding the basic conditions for the effective installation and implementation of innovative services for people with disabilities in the hotel, the answers given were the state subsidy (97,94%), the proper fitting of the hotel premises (96,90%), the intention (88,66%), staff training in basic services for disabled people (73,96%) and finally the change of philosophy towards the servicing of disabled people in hotels (58,76%).

The adoption by the hotels of technological innovation for disabled customers will obviously have a positive impact on the hotel operation. According to the results of the survey the main benefits are the attraction of potential disabled customers and their escorts from new markets (97,94%), the increase of the satisfaction of disabled people from the hotel services provided (96,90%), the potential increase in the percentage of individual disablements by disabled persons (84,53%), as well as the possible increase in the percentage of hotel bookings for disabled people (81,44%), the extension of the tourist season (79,38%) and the possible increase of overnight stays and consumption in the various departments (76,29%) (Table 11).

Hotel benefits	Frequency (Hotels)	Percentage distribution %
Attract potential clients and their escorts from new markets	95	97,94%
Increasing the satisfaction of Disabled People from provided services	94	96,90%
Possible increase in individual bookings from Disabled People	82	84,53%
Possible increase in bookings for tourists' packages for People with Disabilities	79	81,44%
Extension of tourist season	77	79,38%
Possible increases in overnight stays and consumption in other departments	74	76,29%
Other benefits	32	32,99%

Table 11. Hotel Benefits from Adoption
Technological Innovation for People with Disabilities

According to the results of the survey the benefits for the disabled client from the adoption of the innovative service - applications in hotels are its expected ease in providing hotel services (100%), the feeling of security and care in the increased- (97,94%), as well as the inclusion of the disabled in a particular community, meaning the hotel's clientele (84,53%) (Table 12).

Benefits for Disabled People	Frequency (Hotels)	Percentage distribution%
Facility in terms of provided hotel services	97	100%
Feeling safe and caring for the special needs of Disabled Customers	95	97,94%
Integration of Disabled People into a particular community, the hotel's clientele	82	84,53%
Other benefits	24	24,74%

Table 12. Benefits for Disabled People from Adoption Technological Innovation by hotel

Also, the tourist destination will have a positive impact in attracting disabled customers from different markets. More specifically, the main benefits for the tourist destination are the advertising of the tourist destination (95,88%), the identification of the tourist destination as accessible to the disabled (84,53%), the extension of the tourist season (79,38% %) and finally the possible increase of revenues for the tourism enterprises, etc. (76,29%) (Table 13).

Benefits for the tourist destination	Frequency (Hotels)	Percentage distribution %
Tourist destination advertising	93	95,88%
Identifying a tourist destination as accessible to People with Disabilities	82	84,53%
Extension of tourist season	77	79,38%
Revenue growth for tourism enterprises, etc.	74	76,29%
Other benefits	19	19,59%

Table 13. Benefits of a tourist destination from Adoption Technological Innovation by hotel

40.10.2 Survey results (People with Disabilities)

According to the results of the survey are concerned, as they have emerged from the answers of the disabled people of Rhodes, very interesting findings are apparent. More specifically 38,10% of the survey sample does not go on vacation, 25,40% goes on holidays every 3 years, 19,04% goes to holidays every 2 years, while only 17,46% (Table 14).

I'm not going on a vacation	Every Year	Every 2 years	More than 2 years	Total
24	11	12	16	63
38,10%	17,46%	19,04%	25,40%	100%

Table 14. Vacation Frequency of Disabled People

Regarding to the duration of holidays 56,41% of the sample spends 3-5 nights, 25,64% spends 6-10 nights, 10,25% spends 1-2 nights, while the rest 7,70% spends more than 10 nights at the hotel (Table 15). The majority of people with disabilities are always on their holiday with their escort (89,75%), while only 10,25% are unaccompanied (Table 16).

1-2 room nights	3-5 room nights	6-10 room nights	10+ room nights	Total
4	22	10	3	39
10,25%	56,41%	25,64%	7,70%	100%

Table 15. Duration of holidays for Disabled People

Holidays with escorts	Holidays without escorts	Total
35	4	39
89,75%	10,25%	100%

Table 16. Disabled People escorts during the holidays

A large number of people with disabilities (66,67%) spend an average of 101€ -150€ per day (including accommodation costs), 20,51% spend an average of 151€ -200€, while only 12,82% spends an average of 50€ -100€ (Table 17). As a result, it is clear that holidays for people with disabilities are relatively expensive, if we even consider the economic crisis that exists in Greece.

50€ - 100€	101€ - 150€	151€ - 200€	200€ +	Total
5	26	8	0	39
12,82%	66,67%	20,51%	0%	100%

Table 17. Holiday expenses per day

Table 18 presents the most important accessibility facilities for people with disabilities in order to choose a holiday accommodation. More specifically, the absolute percentage of the survey sample (100%) considers that the hotel should have a central entrance with a ramp, rooms suitable for disabled people (on the ground floor), accessible public areas (catering, etc.) with ramps and special signs, lifts accessible to people with disabilities and also parking spaces for disabled customers.
Also, 87,30% of the sample considers significant the existence of recreational facilities for people with disabilities in the hotel, while 77,78% is the existence of a site appropriately designed for people with disabilities. Finally, 74,60% consider the existence of an accessible reception area (reception, lobby, etc.) in the hotel.

Accessibility facilities in the hotel	Frequency (Hotels)	Percentage distribution %
Main Entrance with a ramp	63	100%
Rooms for Disabled People (on the ground floor)	63	100%
Accessible public areas with ramps and special signs	63	100%
Elevators specially designed and equipped for easy use by such persons and for the blind	63	100%
Parking spaces with proper identification for vehicles of persons with reduced mobility	63	100%
Animation & Sports Areas for Disabled People	55	87,30%
Booking / Webpage	49	77,78%
Front Desk / Reception	47	74,60%

Table 18. Accessibility facilities for the Disabled

Table 19 below shows the hotel's operating departments, where it is considered necessary for the disabled to install innovative service-applications for people with disabilities in the hotel.

Hotel function departments	Frequency (Hotels)	Percentage distribution %
Rooms	63	100%
Public areas	63	100%
Bookings / Webpage	60	95,24%
Animation & Sports Areas	59	93,65%
Front Desk / Reception	55	87,30%

Table 19. Hotel Segments where it is necessary to install Innovative Services for the Disabled

The absolute percentage of the sample of the survey (100%) considers that in the rooms as well as in the public areas of the hotel it is necessary to install innovative service-applications for people with disabilities. Also, 95,24% follows the hotel booking department of the hotel (including its website), 93,65% animation & sports areas, and 87,30% is the front desk / reception area.

Table 20 below presents the viewpoint of people with disabilities regarding the importance of adopting innovative service-applications for people with disabilities in a hotel, depending on the choice of a particular hotel. More specifically, in all responses, 68,26% considers it important to very important the adoption of innovative service-applications for people with disabilities in a hotel. The 22,22% figure does not seem to be directly influenced by the choice of a hotel, while 9,52% of the survey sample does not consider the innovative apps-services for the disabled to be very important in order to choose a particular accommodation for holidays.

	Extremely Insignificant	Insignificant	Quite Important	Important	Very Important
Selection of accommodation due to the availability of innovative service-applications for People with Disabilities	0	6	14	35	8

Table 20. Selection importance of accommodation due to the availability of Innovative Service-Applications for People with Disabilities

Regarding the basic prerequisites for the effective installation and implementation of innovative services for people with disabilities in the hotel, the responses given by the Disabled persons concerned the change of philosophy regarding the servicing of disabled people in hotel enterprises (100%), the staff training in the basic principles of service (93,65%), the appropriate knowledge for the effective implementation (92,06%), the proper fitting of the hotel premises (74,60%) and the government subvention (71,43% %) (Table 21).

Conditions for installing innovative applications for People with Disabilities	Frequency (Hotels)	Percentage distribution %
The change of philosophy towards the servicing of Disabled People in hotel enterprises	63	100%
Staff training regarding Disabled Persons' rights	59	93,65%
Appropriate knowledge for effective implementation by People with Disabilities	58	92,06%
Accessible public areas	47	74,60%
Government subvention & support	45	71,43%

Table 21. Basic conditions for the effective installation and implementation of Innovative Services for the Disabled in the hotel

According to the results of the survey, the benefits for the disabled customer from the adoption of the hotel's innovative service-applications, are its expected ease in providing hotel services (100%), the feeling of safety and care in the increased personal needs of disabled customer (100%), as well as the high satisfaction rate of the hotel's services (95.24%) (Table 22).

Benefits for Disabled People	Frequency (Hotels)	Percentage distribution %
Facility in terms of hotel services provided	63	100%
Feeling safe and caring for the special needs of Disabled Customers	63	100%
Satisfaction from the hotel's services	60	95,24%
Other benefits	19	30,16%

Table 22. Benefits for Disabled People from Adoption Technological Innovation from the hotel

Also, according to the respondents' answers, the tourist destination will have a positive impact in attracting disabled customers from different markets. More specifically, the main benefits for the tourist destination are the identification of the tourist destination as accessible to the disabled (96,83%), the tourist destination advertising (95,24%), the extension of the tourist season (77,78% %) and finally the possible revenue growth for tourism enterprises, etc.(76,19%) (Table 23).

Benefits for the tourist destination	Frequency (Hotels)	Percentage distribution %
Identifying a tourist destination as accessible to People with Disabilities	61	96,83%
Tourist destination advertising	60	95,24%
Extension of tourist season	49	77,78%
Revenue growth for tourism enterprises, etc.	48	76,19%
Other benefits	17	26,98%

Table 23. Benefits of a tourist destination from Adoption Technological Innovation from the hotel

40.11 Conclusions

Undoubtedly in the global tourism industry, the design and adaptation of the premises of most accommodation for disabled customers is a priority and one of the basic prerequisites for tourism development.

Achieving the objectives for the effective service of disabled people depends to a large extent on the use of innovative service-applications that facilitate their daily stay in the hotel and at the destination of their vacation.

According to the results of the survey, most hotels in Rhodes are accessible to people with disabilities, according to the required specifications, but are lagging behind in adopting innovative applications-services for that particular customer market. The main reason for this is the lack of government subsidy for the specific investment activities, as well as the inadequacy in the layout of the hotel enterprises premises. It is reasonable that the government in the current period, due to the financial crisis, cannot afford financially to such proposed investments. However, under certain conditions, this can be done by private initiative.

The adoption of innovative applications-services by hotel enterprises would be able to create the conditions for the systematic and methodical promotion of Rhodes as an accessible holiday destination for people with disabilities. In fact, it could be a first step in trying to extent the tourist season and bring great economic benefits and international visibility to the island.

The enormous advertising of Rhodes will strengthen its image as a tourist destination and will contribute to the further development of many special forms of tourism (thermal tourism, medical tourism, etc.), increased financial investment in new technologies as well as other investment activities.

Increasing the market share of people with disabilities in Rhodes will significantly boost the revenues of hotels and other tourism enterprises. As a result, the travel of disabled people and their escorts can be a very important potential tourist market for the benefit of tourism enterprises and service enterprises, while enhancing the development of Rhodes and the Greek economy.

We conclude that the challenge of providing high-quality services to people with disabilities by hotels is great and becomes even greater when the size and value of the offer to that particular customer market is perceived.

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41 Crime Indicators-Based Information System in Public and Judicial Management

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Improving crime prevention strategies is of high importance in public and judicial management and contributes to a better quality of human life. This paper presents an information system that was designed for monitoring crime indicators in order to improve decision-making tactics in crime prevention in public and judicial management. The developed information system can be used to store and process information regarding predefined crime indicators regarding several categories of crimes. Interpreting the variances of the proposed crime indicators can support decision making process. Furthermore, the system can help public managers to develop predictive models and perform crime risk assessment for protecting human life. This paper describes the developed application, its structure and the implementation technologies and also how it can be used in public management in adopting proactive measures regarding crime prevention policies. Considering the latest development of Information and Communication Technology (ICT) and the increased amount crime information, it is significant for the public authorities utilize an information system for managing this kind of data in order to evaluate crime associated issues and also to prevent crime expansion. Furthermore, the developed system can be used as a decision-making tool for applying more efficient crime prevention and urban management strategies.

41.1 Keywords:

Crime Indicators; Information System; Judicial Management; Public Management.

41.2 Introduction

Information and Communication Technology (ICT) has been adopted in public decision making strategies, since a large amount of information related to management issues must be processed, analyzed and stored [1][2]. Management information systems have promoted a more computerized way of data management and also the construction of improved decision making models according to the provided information [3][4][5].

Criminal actions have a negative impact on the society in many sectors such as public safety, tourism and economic development. Applying crime prevention strategies is very significant, especially in urban environments and contributes to an improved quality of life. Furthermore, crime violence is considered as a strong inhibitory factor in the citizens' activities and also for the people who want to visit the city [6][7].

The integration of crime indicators in public decision making strategies can facilitate the measurement of the public safety performance and promote sustainable crime prevention strategies [8][9].

Considering the increased amount of crime information in public management and planning and also the development of new information management systems, Information and Communication Technology (ICT), must be integrated in public and judicial administration, especially when an increased amount of crime data related to decision making must be processed and analyzed statistically.

In this research, an information system was developed for monitoring crime indicators and crime related factors (e.g. Socioeconomic factors) in public and judicial management for promoting sustainable safety management strategies by using several technologies for storing and elaborating the collected crime data. In the next sections, the system and its application framework are described.

41.3 Theoretical framework

41.3.1 Crime Indicators

Crime indicators are considered as a systematic approach for measuring and reporting on crime performance aiming at a reliable estimation of crime trends and in measuring urban sustainability [10][11]. Classifying crime into basic categories in a unified classification system have been investigated by the European Union authorities so as to construct an EU-level offence classification system with offence definitions [12]. Figure 1 shows a wide range of priority offences according to the EULOCS: The EU Level Offence Classification System.

	Offence Categories / Types
General offence categories / types	European Arrest Warrant (EAW)
	Crimes against Persons/Children
	Crimes within Eurojust Mandate
	Crimes within the EUROPOL mandate
	Cross-border offences
	Organized crime
	CTS and CVS indicators
	Traditional offences
	High volume offences
	EU-defined offences
	High level aggregated data
Specific Offence Categories / Types	Assault and battery
	Intentional homicide
	Rape
	Theft
	Motor vehicle theft
	Robbery
	Racist violence & related racist crimes, (including xenophobia, anti-semitic etc.)
	Offences against labour law
	Trafficking in Human Beings
	Smuggling of Migrants
	Drug law offences
	Terrorism
	Financing of terrorism
	Fraud and Money Laundering
	Fraud to insurance and the various categories of fraud
	Cross border fraud offences

Figure 1: Categorized offences according to EULOCS: The EU Level Offence Classification System[28].

[28] Source: https://ec.europa.eu/home-affairs/sites/homeaffairs/files/doc_centre/crime/docs/eulocs_en.pdf

Also, another organization, the United Nations Office on Drugs and Crime (UNODC) has classified crime by creating crime categories and subcategories as a tool against criminal activities. The developed crime classification was called International Classification of Crime for Statistical Purposes (ICCS). The ICCS is a classification structure of crimes with hierarchical categories which have a degree of similarity. The scope of the ICCS is to promote the comparability of the crime statistics at national and international levels.

UNODC has grouped criminal offences into homogenous categories, at four hierarchical levels: Levels 1, 2, 3 and 4. Level 1 categories were constructed to cover all criminal acts that constitute a crime. Criminal offences at Levels 2, 3 and 4 provide observations at more aggregated levels. Figure 2, shows level 1 crime categories designed by the United Nations Office on Drugs and Crime in order to cover all criminal acts.

	LEVEL 1 CATEGORIES
1	Acts leading to death or intending to cause death
2	Acts leading to harm or intending to cause harm to the person
3	Injurious acts of a sexual nature
4	Acts against property involving violence or threat against a person
5	Acts against property only
6	Acts involving controlled psychoactive substances or other drugs
7	Acts involving fraud, deception or corruption
8	Acts against public order, authority and provisions of the State
9	Acts against public safety and state security
10	Acts against the natural environment
11	Other criminal acts not elsewhere classified

Figure 2: Level 1 crime categories developed by the United Nations Office on Drugs and Crime to cover all criminal acts [29].

Furthermore, some countries and their police departments have classified crime into crime indicators in order to deal with crime statistics with a more formal way. For example, by the Toronto Police proposed the following crime indicators: assault, auto theft, break and enter, murder, sexual assault and theft over. Figure 3, shows the percentage change of the crime indicators proposed by the Toronto police from the year 2016 to the year 2017.

This research adopts a core set of crime indicators based on international crime practice and a secondary set of detailed offences rates that will be helpful in interpreting the core set of crime indicators. The core set of crime indicators consists of the following indicators: assault, auto theft, break and enter, murder, robbery, sexual assault and theft over.

[29] Source:http://www.unodc.org/unodc/index.html

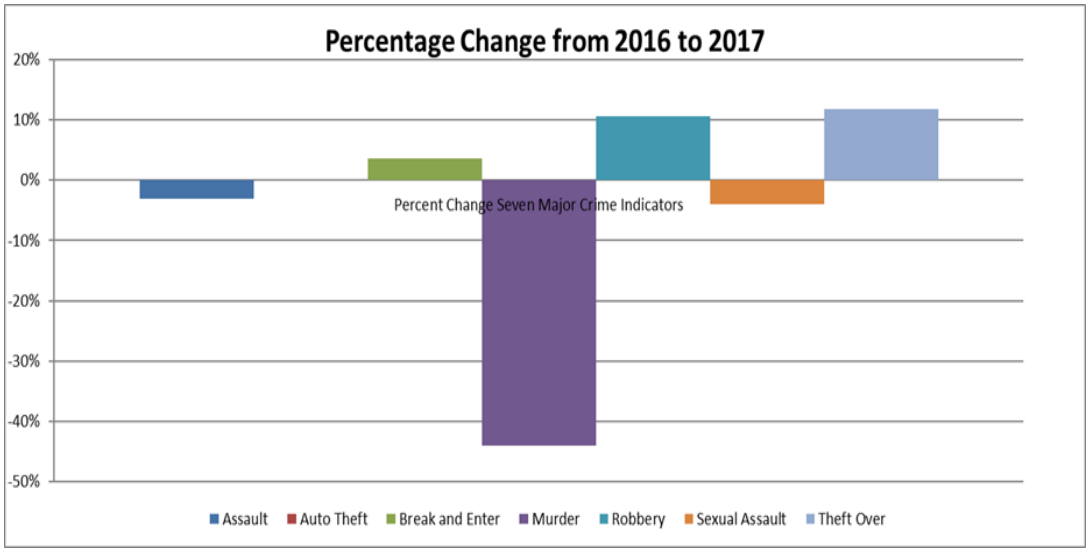

Figure 3: Percentage change of the crime indicators proposed by the Toronto police[30].

41.3.2 Crime Related Indicators

Several studies have shown a significant relationship between crime rates and socioeconomic factors such as unemployment, tourism, population and other factors [13][14][15]. For this reason, the system was designed by taking into consideration also other factors that affect crime.

Several socioeconomic indicators that affect crime rates were selected according to several studies. A research has shown that there is a positive relationship between unemployment rates and vehicle theft rates by examining twenty-two years of data in several States of USA [14]. Another study has examined the influence of unemployment on crime by using datasets of several European countries. The results have shown that unemployment has a positive impact on crime rates [15]. Moreover, several other researchers have shown that there are various factors that affect crime rates, such as population [16][17], poverty and income [18].

The crime related socioeconomic indicators that were selected for designing the systems' database according to the above researches are illustrated in table 1.

Category	Indicator
Demographic	Population
	Population density
Educational and cultural	Illiteracy rate
	Average schooling
Employment	Unemployment rate
	Average income
Income and poverty	GDP per capita
	Average familiar income
Tourism	Number of tourists per year

Table 1: The proposed set of the crime related indicators.

[30] Source: https://www.torontopolice.on.ca/statistics/crime_indicators.php

41.4 Information System Design

The first step in the system's design is to define the kinds of data that will be inserted and processed in the system's Database Management System (DBMS). The information system was designed to support all kinds of indicators proposed in the previous sections. Also, the system was designed to be flexible, since any new kinds of indicators can be added to the system. The system was designed to support data regarding the crime indicators (value, region, time that was measured, unit, etc.). Also, the system was designed to store predicted values of the crime indicators. This is helpful when crime indicators are predicted by several kinds of methods (e.g. By using neural networks). This helps the stakeholders and the public managers to adopt crime prevention strategies.

Several researches have shown a positive relationship between crime rates and other factors such as poverty, unemployment, tourism, population and other factors [13][14]. For this reason, the system's database was designed in order to store also other factors that affect crime indicators such as: socioeconomic factors.

41.5 Implementation Technologies

The system was implemented by utilizing a Database Management System (DBMS) and several other technologies and programming tools. Visual C Sharp was used as a programming language in order to build the forms of the application. Visual C Sharp is an object-oriented programming language which permits the utilization of objects of many kinds (ActiveX Data Objects, Data Access Objects, etc.) in order to build the GUI (Graphical User Interface) of the system [19]. Microsoft SQL Server was utilized as a database management system which is considered as one of the most reliable database management systems. Microsoft .NET Framework was used as a framework for constructing the application.

41.6 Results and Discussion

Considering that the public safety management strategies include the interpretation of several urban indicators in order to adopt the most suitable strategies for protecting the citizens, a prototype information system was designed to facilitate the decision-making process in crime prevention and safety management.

The developed system provides a more computerized way of monitoring and managing crime indicators and crime related data of several kinds. The data can be inserted, stored and processed in the searchable database of the system.

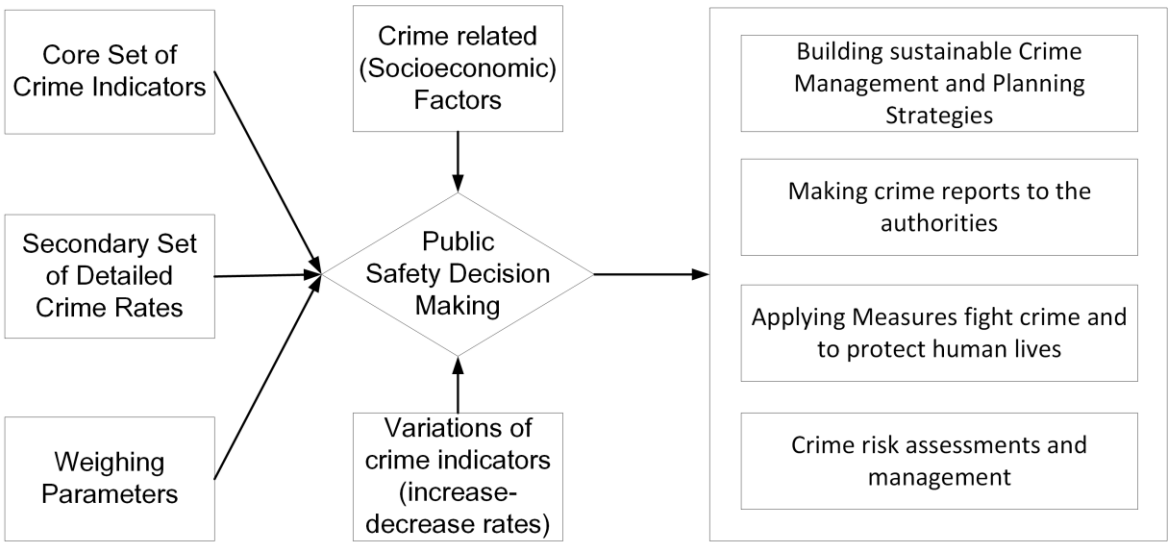

Figure 4: The proposed model of using the developed system.

Figure 4 illustrates the proposed model for using the developed crime indicators information system. The collected crime data regarding the core crime indicators, the detailed crime data of every crime and the crime related factors (unemployment, poverty, etc.) as they were described in section 2.2, are inserted into the system's database. The decision makers can put weights in the crime indicators (for example weights according to the severity of every crime indictor by using Wolfgang Crime Severity Index [20]) to calculate the total crime impact when they have to make a decision about a crime related issue.

The decision-making process includes the development of the optimal strategies for building the best decision making models by weighing the inserted data about the crime data. The constructed decision making models are useful in order to adopt sustainable public and judicial management strategies, and also to make reports to the authorities (Ministry of Justice, judicial authorities in investigating crime cases, etc.). Furthermore, the system can be used to facilitate the stakeholders in taking crime prevention measures in order to protect the human lives and also to perform crime risk assessments for evaluating the degree of the public safety for the citizens and the tourists.

Also, the system supports the insertion of every kind of crime data and not only crime indicators, which helps the stakeholders and public and police managers to investigate the connection between an indicator and the levels of another crime factor and also this helps managers to produce new sets of crime indicators.

The advantage of the developed information system compared to others [21][22] is that authorities and the stakeholders can take into consideration multiple factors: crime indicators, crime related socioeconomic indicators in order to facilitate a sustainable decision making in crime issues in a more holistic way.

Another advantage is that the system can be easily used to extract datasets that can be used when sending reports to the public and judicial authorities. Also, the system can manage a large number of data compared to the traditional decision making applications.

By using the developed system, crime data regarding crime indicators and crime rates for every offence can be monitored (in order to adopt crime prevention strategies in regions where crime indicator levels are too high) and analyzed in order to adopt the

adequate public safety strategies for protecting the human lives and for advancing the prosperity of life.

41.7 Conclusions

The rapid development of Information and Communication Technology (ICT) has led to the construction of new information systems for supporting decision making tactics regarding public management issues [5][23].

Several researches have shown that the development of sets of indicators can be used for implementing sustainable management practices in several sectors of public management and planning [11][24].

Considering the development of Information and Communication Technology (ICT) and the highly-increased amount of crime data, and also the development of new information systems for managing and monitoring data, it is very important for public administration to utilize an information system, like the one described in this paper, that will manage all crime – related data regarding also indicators which will help to perform crime risk assessments about the safety dangers in a more holistic way by using the collected data.

The significance of the crime indicators is very high for evaluating possible public safety dangers and also for helping public administration to adopt crime prevention, management and planning strategies.

Also, monitoring and interpreting the levels of the crime indicators through the developed information system can be utilized as a tool for a more efficient crime and urban management. Furthermore, the system provides information about factors connected to crime such as socioeconomic factors and demographic factors useful in public decision making for assessing crime prevention models.

This research contributes to the prevention of the negative impacts of crime on human lives by monitoring and processing crime indicators and crime related data in order to help the public authorities and stakeholders to adopt the adequate strategies for fighting crime and preventing crime expansion.

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AUTOMATION

42 Energy optimization in cloud based infrastructures

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42.1 Abstract

In the last couple of years, cloud services became more popular. On the one hand, service complexity increased and on the other requirements related with the Quality of Service and Service Level Agreement negotiations moved to synergic cloud-based architectures. The number of the data centers increased and also a federated architecture of data centers were introduced. However, one of the major effects was the increase of the consumed electricity from Data Centers (DCs) which had negative impact in energy footprint and the environmental conditions. In this paper, we present an optimization procedure, focusing on minimization of the energy consumption of the data centers, based on grouping genetic algorithms and we provide experimental results from a real DC.

42.2 Introduction

The ever increasing demand for computing capacity and the resulting burgeoning of large scale Data Centers (DCs), which constitute huge energy sinks, have a direct impact on the ICT related energy consumption. This huge energy consumption poses a great challenge for the energy sector and the problem is further intensified by the volatility of the energy markets and the inability of Smart Grids to follow the electricity demand-response model, which impedes the seamless integration of large scale DCs to the energy network. Thus, Smart Grid operators need to address on the one hand the immense energy consumption of DCs and on the other hand the erratic operation of Smart Grids, caused by the inability to follow the demand-response paradigm.
To elaborate on the first of the two problems, the increase of DCs, which is accompanied by huge electricity consumption and sub-optimal energy management, directly affects their energy footprint and the environmental conditions. It is well known that the average server utilization in DCs is low, often below 30% of the maximum server load [1], [2] and only 10% in case of facilities that provide interactive services [3]. This low utilization is primarily due to two reasons: (i) the provisioning of a DC is done based on the expected peak load, rather than the average load. For interactive services, peak utilization often exceeds the average utilization by more than a factor of three [3]; and (ii) in order to provide redundancy in the

event of failure. DC operators deploy more systems than are actually needed. The over-design and over-provisioning of DCs and the increased number of low utilized servers, have significantly increased the waste of energy. In the last couple of years, the electricity consumed by DCs has doubled, representing an aggregate annual growth rate of 16.7% per year worldwide [4]. Approximately 80% of this growth is caused by the increased electricity used by servers, 10% by the growth in electricity used for DC communications and around 10% by the growth in electricity by storage equipment.

Besides electricity consumed for supporting the computational operation of the servers, a huge amount of energy is also consumed for the cooling of DC servers. To lower this waste of energy, DC containment strategies (both hot aisle and cold aisle) are widely regarded as the starting point for energy-efficiency best practices. Moreover, the so called “Green DCs” aim to use a number of green electricity sources (e.g. photovoltaic cells, geothermal power, hydroelectric energy, etc.), for normal operations and cooling purposes. The results are, in many cases, impressive, but they still represent a minority of the deployed DCs and even in those cases the intermittent nature of green electricity sources make the need for integration of green energy sources to the energy network and for stable Smart Grid operation more actual than ever.

As already highlighted above, this additional problem, that is the instability of the Smart Grids and the difficulty to follow the electricity demand-response model constitutes a major problem in the energy sector. In particular, as Europe shifts away from fossil fuels, electricity is becoming an even more important energy vector and the seamless integration of renewable energy sources to the energy network becomes imperative. More than 29 European countries have targets for a share of renewable energy in the range of 10-33% until 2020. Achieving these goals is vital for the EU internal energy market, as it will lower the dependency on importing oil and it will help towards a more sustainable growth. The implementation of more intelligent and active transmission, distribution and supply systems in the form of Smart Grids is central to the success of such a development. Thus, Smart Grids are very high on the agenda of the European energy and ICT sector. However, the problem is that Smart Grids have difficulty in following the electricity demand-response model. The introduction of Smart City technology is also being developed as a mechanism to enable intelligence in buildings, city blocks and regions. As a result, we need solutions, which can support the features of the Smart Grid, coupled with the capabilities of Smart Cities, in order to carefully manage the energy profile of DCs, especially under periods of increased demand.

Recent literature suggests that the problem of optimizing and coordinating the energy consumption of federated Data Centers and its alignment with the Smart Grid stabilization needs, is actively researched. In [5], a survey on the existing techniques utilizing geographical load balancing for optimizing the energy consumption of Data Centers in the context of a Smart Grid is presented. The optimization may have different targets, including absolute energy consumption with respect to QoS guarantees [6], cost [7] and carbon footprint [8], the techniques employed varying among Mixed Integer Programming, Dynamic Programming, heuristics through Genetic Algorithms etc [5]. Load balancing of Data Centers in the context of the Smart Grid are also investigated in [9], where the authors present a two-stage framework for modelling the relevant interactions and formulate a cost-minimization problem based on linear programming. Similarly, the authors of [10] present a cooperation scheme between Smart Grids and Data Centers, with the aim to maximize the share of renewables in the energy mix used for Data Center operation. The problem of optimal load (VM) allocation in federated Data Centers is also tackled in [11], where a greedy heuristic is presented with a view towards minimizing the carbon dioxide emissions due to Data Center

operation. Finally, in [12], an in-depth survey of existing algorithms and techniques for orchestrated energy management and energy sustainability in federated clouds is presented.
In the direction of tackling the above problems and significantly contributing toward improving the energy efficiency of DCs and stabilizing Smart Grids, the present paper introduces a holistic approach interconnecting networks of DCs and Smart Grids, addressing both problems in a complementary way. Specifically, in the context of smart city and Smart Grid integration, a network of synergetic DCs can adjust its operation shifting load to regions of renewable energy surplus, playing a key role toward Smart Grid stabilization and “Green” operation of modern DCs. Moreover, the proposed approach can be seamlessly integrated to legacy DC equipment discounting any capital expenditure employing solely the software defined networking (SDN) and software defined infrastructures (SDI) of legacy DC equipment. The paper is organized as follows Section 2 introduces the predictive optimization techniques, in order to implement the proposed approach. Section 3 presents the preliminary results obtained by an in-house micro DC, after the employment of the predictive optimization techniques described in Section 2. Finally, Section 4 concludes the paper and presents relevant perspectives.

42.3 Predictive Optimization

The employment of load prediction methods for the efficient prediction of the standalone DC load, the synergetic DC load and the user load is of paramount importance for the efficient optimization of the load allocation to the synergetic DCs. Such methods provide energy predictions based on the user habits, the behavior and the workload patterns as well as the weather forecast, allowing the devise of predictive energy patterns. Subsequently, based on these a priori devised energy patterns the relevant optimization modules can devise relevant plans optimizing the VM / load allocation to standalone and synergetic DCs, based on the Smart Grid status.
A number of techniques have been proposed for forecasting aggregated and correlated energy consumption inspired by machine learning, and have passed from linear regression and autoregressive moving average models [13] to neural networks [14] and boosting approaches [15] and finally to the Support Vector Machine For Regression (SVR) that is a state of the art forecasting method [16-18] . The SVR uses the same principles as the Support Vector Machine (SVM) for classification, but as output instead of a real number, which has infinite possibilities, it returns a margin of tolerance, to minimize error.
The SVR method is employed for energy consumption forecasting, as it combines several desirable properties compared with other existing techniques: it has a good behavior even if the ratio between the number of variables and the number of observations becomes very unfavorable, with highly correlated predictors, it makes possible to construct a nonlinear model without explicitly having to produce new descriptors (the famous "kernel trick"), while a deeply study of the characteristics of the method allows to make comparison with penalized regression such as ridge regression [19], whereas a number of pre-calibrated SVR toolkits can be found online [20], facilitating the easier fine-tuning of the SVR.
Having fine-tuned the SVR parameters for the load prediction at DC and user level an appropriate optimization algorithm must be selected in order to efficiently employ the SDI (through cloud managers such as OpenStack [21], OpenNebula [22] and Eucalyptus [23]) in order to minimize the reserved physical resources and the implicit operating cost. In practice, VMs reserve virtual shared CPU and shared storage, whereas the only physical resource reserved in a stringent way is the server physical memory. Thus, the problem of optimal VM

allocation across the network of synergetic DCs is reduced to that of allocating the aggregate server memory to VMs, based on their forecasted load and availability.
The above problem can be reduced to a “bin packing” problem [24] and has been formally formulated by the authors in [25]. In particular, “the problem of VM allocation can be considered as a “bin packing” problem, where given a finite set *U={u1,u2,…,un}* of “items”(i.e. VMs) and a rational “size” (i.e. memory) *s(u)* for each item *u* ε *U* a partition of U into disjoint subsets *U1,U2,…,Uk* must be found such that the sum of the sizes of the items in each subset *Ui* is no more than a respective “bin size”(i.e. server memory) *Si* and such that *k* is as small as possible. Thus, VMs of memory *s* need to be allotted to servers of memory *S*, while reserving the minimum number of servers, whereas a memory granularity of 512MB can be assumed which is a typical value encountered in practice.”
The above problem constitutes an NP-hard problem [24], however a number of approximation and heuristic techniques can be employed to provide solutions to the problem. The Best Fit Decreasing Algorithm (BFD) [24] constitutes one of the best approximation algorithms for the “bin packing” problem and it can be employed to achieve a consolidated VM allocation. As stressed by the authors in [25] in the direction of employing the BFD “the DC servers are indexed based on their energy-efficiency, with energy-efficient servers being assigned a lower index. Subsequently, “items” (i.e. VMs) are placed into “bins”(i.e. servers) in order of increasing index. As a result, energy-efficient servers are assigned a higher priority and for instance servers of a Green Room are reserved first, or servers of the same DC segment are reserved prior to remote DC servers in order to allow remote DC servers to hibernate, providing substantial energy savings. Next, “items” in U are sorted by size and re-indexed so that $s(u1) \geq s(u2) \geq \cdots \geq s(un)$. “Items” are then placed in order of increasing index, first into the occupied “bins” of lower available capacity and then, in case they do not fit into the occupied “bins”, or in case of a tie, “items” are placed in order of increasing index into the lower indexed “bin” they fit.”
Thus, the documented success of the BFD approximation solution can be exploited to initialize the search of an appropriate heuristic approach. Specifically, the above solution is used as an initial seed to initialize the search of a Genetic Algorithm (GA) approach [26]. The GA constitutes one of the most successful heuristics [26], however, a number of factors hinder the convergence of GA when the latter is applied to grouping problems such as the “bin packing” problem in hand. In particular, grouping problems – aiming either to find a good partition of a set or better yet to group together the members of a set - challenge the cornerstone of the GA, namely the principal of minimal redundancy of each solution, as different encodings and different permutations of the groups may refer to the same solution. Also, solution clustering into groups hinders the passing of useful (i.e. standalone) information to the next generation through the crossover and mutation operators of the GAs [27-29].
In this course, the Grouping Genetic Algorithms (GGA) have been proposed [27] allowing the encoding of grouping problems like the one in hand, by using groups or in our case “bins” as the GA building blocks on which GA operators are applied. One could envisage a GGA as a simple GA where each gene of a GAs’ chromosome corresponds to a tuple of elements corresponding to the “items” of each “bin”, whereas the “bins” are the building blocks evolved by the employment of the GAs. This approach alters all GA operators significantly, however this approach outperforms the standalone GA substantially when applied to grouping problems.
The employment of the GGA, initialized by the BFD, for the optimal VM allocation, allows for the consolidated allocation of VMs at an intra-DC level as well as an inter-DC level, whenever a VM consolidation is imposed by the Smart Grid operation. Thus, the distributed application of the above optimization algorithm on DC sites, when that is deemed necessary

based on the SVR load predictions, could yield significant energy savings as well as reliable Smart Grid operation.
In order to validate the efficiency of the proposed approach and the feasibility and applicability of the proposed approach employing solely the SDI, the preliminary results of the optimized VM allocation are tested on an in-house micro DC and the obtained data corroborating the substantial benefits arising from the proposed approach are presented hereafter.

42.4 Experimental Results

In the process of developing and fine-tuning the prediction engine and optimization module, a number of attested scenarios were used as benchmark to quantify the convergence of the developed optimization algorithms and the accuracy of the developed prediction models. These optimized test scenarios to which the predictive optimization converged to, were then implemented based on the SDI of a small scale testbed, as a proof of concept, employing OpenStack for the actuation of these scenarios. The testbed consists of 4 low consumption blade servers (less than 50W of energy consumption at average load, simultaneously underclocking idle cores) which run artificial loads to emulate the operation of a commercial DC.

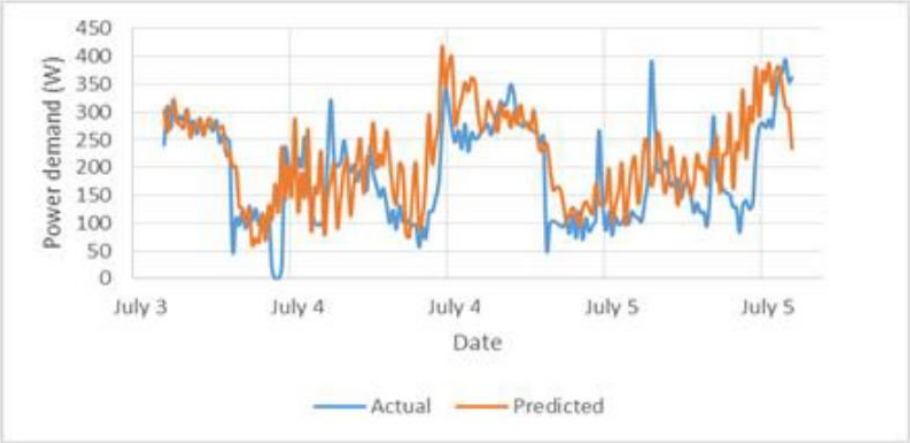

Figure 1: Prediction Engine performance

The performance of the implemented prediction engine is depicted in Figure 1, where the load (power) prediction is plotted against the real power demand values. The training set of the prediction engine spanned two months of data. The Root Mean Squared Error between the actual power demand values and the predicted ones is 74.3 which is considered acceptable for our value range, granted the limited training set volume; further training of the prediction engine is required in order to acquire more accurate results.

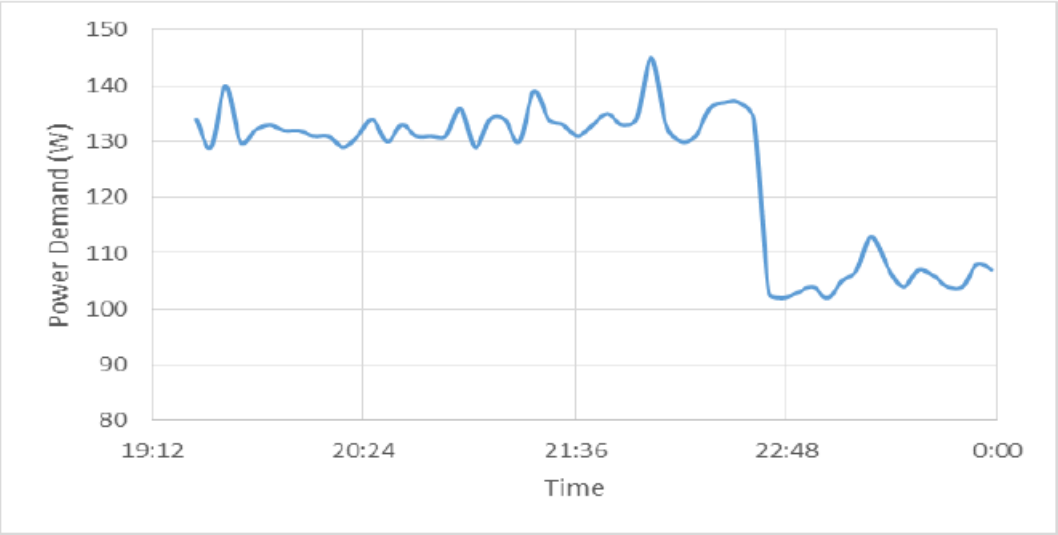

Figure 2: *Test optimization scenario result*

In the same context, Figure 2 presents the outcome of the load optimization on the aforementioned test setup. Specifically, under random load and granted relevant predictions from the prediction engine, the optimization component was able to reorganize the existing load in such a way that the energy consumption dropped by approximately 15%, exhibiting that through proper management, the energy consumption of DCs can be significantly lowered, to help towards assisting the operation of Smart Grids. Moreover, when considering the ability to relocate loads to geographically distant DCs when intra-DC optimization is unable to accommodate the load inside the DC boundaries, the coordination of DC loads with the Smart Grid demand response plans, is expected to contribute substantially to the achievement of Smart Grid stability.

42.5 Conclusions

In this paper, a framework for achieving energy optimization in federated DCs has been presented, employing continuous DC resources and network monitoring and scalar optimization architectures operating at local and federated levels. In the course of minimizing the energy consumption at local DC level, we employ load optimization through load re-allocation, coupled with near future load predictions, implemented with the help of support vector regression techniques. The results of the prediction and optimization processes are presented and briefly discussed, indicating significant power savings may be achieved by employing the proposed architecture.

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43 Artificial Neural Networks in Forecasting Key Air Pollutant Factors in Public and Environmental Management

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The application of artificial neural networks in various fields has been increased the last years with the development of new neural network learning techniques and tools for developing neural network models. This paper studies the construction of artificial neural network models in order to predict key air pollutants. Forecasting air pollutants is vital in the environmental and public management and planning since it can be used in preventing environmental degradation and also in protecting human life by helping the authorities to take proactive measures. The levels of air pollution parameters were chosen to be predicted, since these factors are related with human health problems especially respiratory deceases. Multiple artificial neural network models were constructed by using different architectures regarding the number of the neurons in hidden layers, the number of the hidden layers and also the transfer functions in order to build the optimal model that would forecast efficiently the levels of air pollution factors. The Multilayer Feedforward Perceptron was utilized in this research since it is the most suitable for time series forecasting according to the literature. The proposed methodology can be valuable in public administration, since it can be used as a decision tool for applying more efficient environmental management practices and also in adopting sustainable decision making strategies.
Keywords: Artificial Intelligence; Neural Networks; Environmental Management; Public Management.

43.1 Introduction

The natural environmental conditions affect thoroughly the quality of human life. Especially, air pollution has negative impact on human health since it is connected to various diseases such as respiratory irritations, infections and other kinds of health problems [1][2][3].
The associations between mortality and environmental air pollution has been examined by several researchers [4][5]. A research [4] has showed that the total mortality was substantially associated with carbon monoxide and nitrogen dioxide air concentrations and weekly connected with sulfur dioxide and Particulate Matter 10 (PM10) concentrations.

Another research [5] has showed that mortality is positively associated with deaths caused by lung cancer and also by cardiopulmonary diseases. The same study has shown that total mortality was strongly associated with air pollution.
The significance of air pollution information is very high in environmental management and planning since environmental pollution is connected to environmental degradation.
Furthermore, data regarding air pollution must be studied by the authorities in order to adopt the most adequate environmental policies so as to protect the human health and also the environment, the natural habitats and to prevent the environmental degradation [6][7].
Environmental data regarding air pollutant factors can play a significant role in public management and also in environmental decision making by promoting sustainable management and planning strategies [8][9].
Information and Communication Technology has been applied in several sectors of environmental management [10]. Artificial neural networks have been applied in many scientific fields. New neural network based technologies and programming tools has rapidly increased the application of artificial intelligence in multiple sectors [11][12][13][14].
A research [13] has examined the forecasting of two important air pollutant factors: ozone and nitrogen dioxide by taking into consideration several climate and other kinds of environmental data for the city of Los Angeles. Multiple Neural network models were built in order to achieve the optimal prediction results. The final results showed a very good prediction accuracy.
Another research [14] has shown that artificial intelligence can be applied in developing methodologies for predicting air SO2 concentrations in industrial areas with thermal power plants which have highly polluted ambient. This study has focused on air pollution modelling and in SO2 emissions forecasting and the results showed a good prediction accuracy.
In this research, the construction of artificial neural network models is investigated for forecasting key air pollutant factors. In the next sections, the followed methodology and the theoretical background are described, and also the factors that have been examined in order to develop the optimal network topology of the forecasting model and the produced results.

43.2 Theoretical background

43.2.1 Artificial Neural Networks

Artificial Neural Networks (ANNs) are considered as artificial computational systems that simulate the neural structure of the human brain. The input data traverse through the neural connections.
A neural network elaborates the data from the input parameters. The output results are produced according to the input parameters [15].
Artificial neural networks are used in this study in order to forecast the values of the key air pollution factors: carbon monoxide, ozone, sulfur dioxide, and nitrogen dioxide.
In a feed forward multilayer neural network, the network structure includes neurons, which are connected in a forward only direction. A typical feedforward neural network structure consists of an input layer, one or more hidden layers and an output layer. Every layer consists of a number of neurons [16][17].
A Feed Forward Multilayer Perceptron (FFMLP) was utilized in this research, since many studies have shown that it is the most suitable for issues that have to deal time series predictions. The structure of a typical feed forward neural network is shown in figure 1.

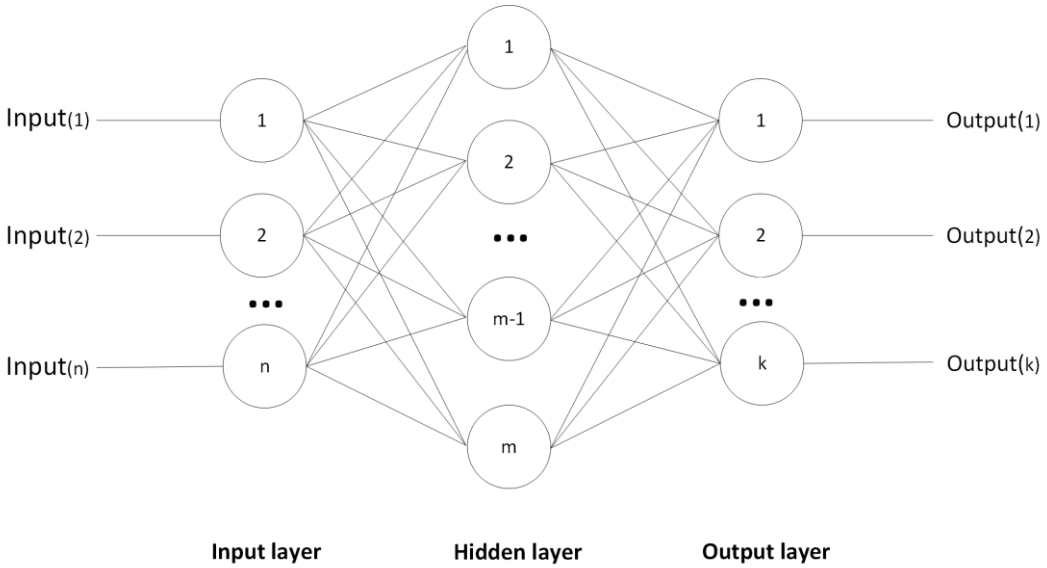

Figure 1: A simplified structure of a typical feedforward neural network. *n* is the number of neurons in the input layer, *m* is the number of neurons in the hidden layer and *m* is the number of neurons in the output layer.

43.2.2 Scaled conjugate gradient algorithm

The Scaled Conjugate Gradient (SCG) algorithm was proposed by Møller in 1993 [18]. The Scaled Conjugate Gradient algorithm was implemented in this research for training the artificial neural network models. Scaled conjugate gradient algorithm is one of the fastest training algorithms among several others training algorithms [18].
Conjugate gradient techniques produce faster convergence than gradient descent methods by applying a search in all the gradient directions in order to determine the step size scaling method. Scaled conjugate gradient algorithm minimizes the goal functions and uses a step size scaling method to achieve a faster learning process [18][19][20].

43.2.3 Key air pollutant factors

The key air pollutant factors in urban environmental that are examined in this research are: carbon monoxide, ozone, sulfur dioxide, and nitrogen dioxide. These factors have a negative impact on human health as many researches have shown [21][22][23]. According to many researches, the prementioned pollutant factors have been associated with various diseases.
According to several researches, mortality is associated with air ozone and nitrogen dioxide levels in several places of the world [21][22]. Also, a research has shown a strong association between air carbon monoxide concentrations and the hospitalizations for heart failure in several Canadian cities [23]. According to another research, proinflammatory mediators were induced by ozone and nitrogen dioxide in human bronchial epithelial cells [24]. Also, another research, showed the association of ozone and daily mortality rate in several cities of East Asia [25]. Furthermore, another research has shown that air pollutant factors: nitrogen dioxide, sulfur dioxide, and carbon monoxide have a negative impact on human health [26].

43.3 Research methodology

The research methodology is divided into four stages: data collection, data preparation, neural network forecasting model construction, the application of the optimum neural network model in order to forecast the values of the air pollutant factors. In the first stage, air pollution data were collected and in the second phase the data were cleansed and prepared for feeding the neural network models. In the third stage, several kinds of neural networks were developed by examining different topologies in order to construct the optimal neural network prediction model. In the last phase, the optimum neural network model was tested in order to predict the concentrations of the air pollution factors.

43.4 Results

43.4.1 Study Area and Data Collection

The data were retrieved from the US Environmental Protection Agency (EPA) for the city of New York. Data regarding the daily concentration of carbon monoxide, ozone, sulfur dioxide, and of the nitrogen dioxide were processed and prepared in order to be used as input in the feed forward neural network models.
The air pollution data were collected, checked for incoherencies and duplicates and then prepared to feed the neural networks. The period of time that was examined was from January 2016 to June 2016 for the city of New York in USA.

43.4.2 Neural Network Models

The artificial neural network models were developed by utilizing several input parameters that affect the levels of the predicted pollution factors: ozone, sulfur dioxide, nitrogen dioxide and carbon monoxide, such as: the maximum temperature, minimum temperature, average temperature, wind speed, humidity, sunlight hours and the historical data of O_3, NO_2, SO_2 and CO [21]. The input values are: the daily max 8-hour ozone concentration (ppm), daily max 8-hour CO concentration (ppm), the daily maximum 1-hour nitrogen dioxide concentration (ppb), the daily maximum 1-hour sulfur dioxide concentration (ppb), sunlight hours, and also the minimum, maximum and average daily temperature. The output values are the predicted data of O3, NO_2, SO_2 and CO.
The data were separated into three different parts. The 70% of the primary data was used as the training set, the 15% for the validation set and the 15% for the test set. The scaled conjugate gradient algorithm was utilized as the learning algorithm. The training data set was used in order to train the artificial neural network with historical data. The validation set was used in order to evaluate the performance of the artificial neural network models.

43.4.3 Optimum neural network model

Several network topologies were examined by testing different network parameters. The optimal neural network topology was evaluated according to the performance of every developed artificial neural network model. Different neural network topologies were tested regarding the number of the hidden layers (one to two), the number of neurons in every

hidden layer (one to forty neurons) and the most common transfer functions of the hidden layers: Linear Transfer Function (LTF), Tanh-Sigmoid Transfer Function (TSTF), Log-Sigmoid Transfer Function (LSTF).
The optimum network topology was the one with one input layer, and one output layer and with two hidden layers. The optimal network topology that was found consists of 18 neurons in the first hidden layer and 25 neurons in the second hidden layer. The transfer function of the first hidden layer was Tanh-Sigmoid Transfer Function (TSTF) and of the second hidden layer the Linear Transfer Function (LTF). The optimum network model was evaluated by examining the observed minimum Mean Squared Error (MSE) and Root Mean Squared Error (RMSE) among all the other tested neural network models. Table 1 illustrates the best neural network models developed by testing different topologies.

ANN MODEL	Number of hidden layers	Number of neurons 1st hidden layer	Number of neurons 2nd hidden layer	Transfer Functions	MSE Validation Error	MSE Training Error	MSE Test Error
1	2	15	17	LSTF – LTF	62.1506	45.4868	96.1720
2	2	18	25	TSTF – LTF	5.1841	1.8054	5.6143
3	2	20	25	TSTF – LTF	78.8190	58.6007	93.6174
4	2	25	30	LSTF – LTF	69.6709	55.6106	82.0046

Table 1: The best neural network models constructed by testing different topologies.

According to table 1, ANN model 2 was the best forecasting model. The Mean Squared Error (MSE) of the optimal model was found to be 5.1841 at epoch 67. The Root Mean Squared Error (RMSE) of the optimal model was found to be 2.2769. Figure 2 shows the topology of the finally constructed optimum artificial neural network model.

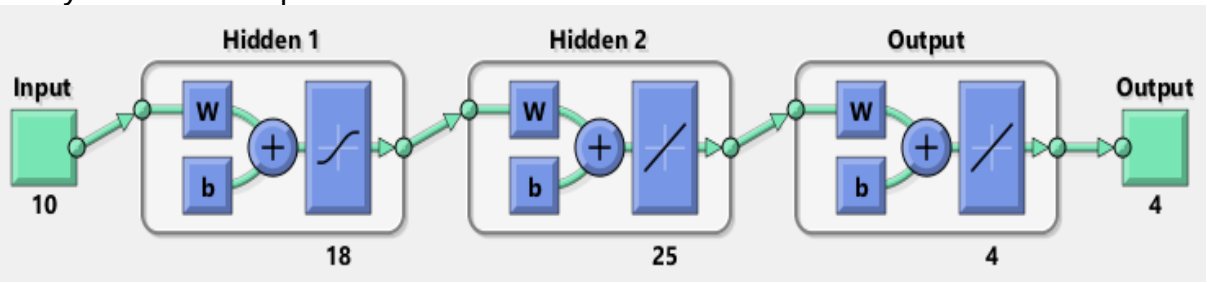

Figure 2: The topology of the optimal artificial neural network model.

The performance plot of the optimal neural network model is illustrated in figure 3 (according to the minimum Mean Squared Error (MSE)). The blue, green and red lines illustrate the performance of the train set, the validation set and the test set correspondingly.

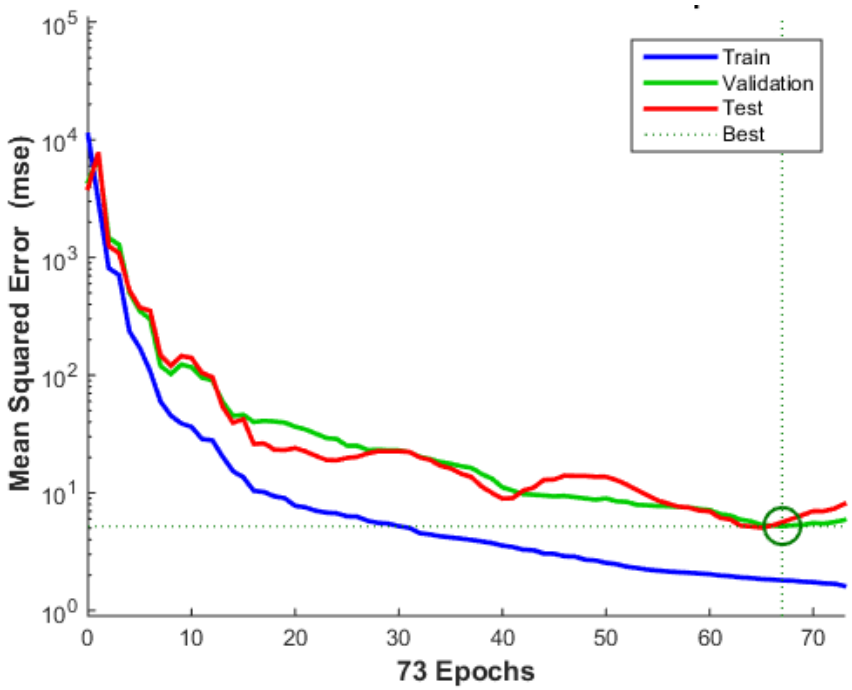

Figure 3: The performance plot of the train set, the validation set and the test set of the optimal neural network model according to the minimum Mean Squared Error (MSE).

43.5 Conclusions and Discussion

Adopting artificial intelligence in forecasting air pollution factors can facilitate the environmental decision making and planning strategies. In this paper, neural network models are developed and compared for their performance in order to discover the optimal model for predicting the levels of the environmental air pollutant factors.

The final results showed an increased accuracy in forecasting the key air pollutant factors that were selected. The optimal artificial neural network model was constructed by taking into consideration multiple factors that affect the concentration of the air pollutant factors, and also by examining several network topologies of the neural network in order to discover the optimum forecasting model. The Multilayer Feedforward Perceptron was utilized in this research since it is the most suitable for time series forecasting according to the literature.

The levels of the key air pollution parameters: carbon monoxide, ozone, sulfur dioxide and nitrogen dioxide were chosen to be predicted, since these factors are related with human health problems and especially with respiratory deceases. This research can contribute to the prevention of these kinds of sequences on human health.

The proposed model can be useful to the authorities in facilitating the adoption of proactive measures so as to improve the effectiveness of environmental management and planning strategies and to be used as a decision-making tool for applying more efficient practices in protecting public health and also in preventing the pollution and the degradation of the natural environment.

43.6 Acknowledgements

US Environmental Protection Agency.

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44 Generic IT Platform Hosted on Mobile Devices for Automated Logistics and Management Processes

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44.1 Abstract

With the rapid development of technology in all areas nowadays there is a constant effort to introduce technological solutions in everyday life with emphasis on materials management information systems (Enterprise Resource Planning). The last few years the variety of this systems have been increased for small business or for SMEs or even for larger companies and industries. In the field of material management with automated processes, ERP applications have only recently begun to make their appearance. This thesis will present the development of a system for automated material storage process in a system built through specific roles that will manage materials using an integrated barcode scanner. In addition we will analyse and describe the operation and modules of other systems that have been created for the same usage. The object of research and development, falls to P.M.S since it deals with modern automation technology applications, we will attempt to construct an original application enabling better management of materials for usage and storage. The aim of this thesis is to create a prototype application that will be innovative with a flexible nature that will give solutions, with low cost, also it will be user friendly. This application will allow quick and proper materials management for storage. In the main part of the study will be an analysis of the programs used for creating the application , the capabilities and the way it works , we will also discuss the advantages and disadvantages and simultaneously propose optimizations to further extend the benefits of the operation. The expected result is that the application can be used by smart devices with android environment and computers without an external barcode scanner, making the application accessible to the buyer with low cost. The main aim of this project is to reduce the time required for registering and counting large number of products for transport and storage.

45 Automated Braking System to Increase Passengers Protection on Modern Public Railway Networks

Ilias Kalathas

G. Smyrnaiou

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D.Tseles

45.1 Abstract

In the first railways in 1830s and 1840s there wasn't any system to inform the driver about the condition of the track, so accidents happened. In order to achieve the most important goal of safety, methods of controlling the movement of trains had to be invented. This system uses circuits on the track which are short-circuited by wheels and axles of a wheel, setting the indication of danger "red" in signalling lamp, behind the train, in order to have adequate time headway between trains to avoid collision of a train with the one in front. The main disadvantage of this system, which is entirely dependent on the driver's perception, led to the development of the application with the term Automatic Protection Trains (A.T.P.), to provide continuous control of train speed. The A.T.P. is a control system used by the railways to avoid collisions with the aid of automatic motion control of maximum speed and braking of the train. This paper presents the equipment of A.T.P. located in each vehicle equipped with a driving cab to describe the automatic functions for the continuous and reliable monitoring of speed and braking. The desired and actual speed indication in the cab, the audible alarm on exceeding the desired speed and the automatic activation of the braking process of the train as well as the stop at stop signs. Along the auxiliary systems in railway track used for the support are examined. In this work, the innovative process that exists in the I.S.A.P trains with the adaptation of the old technology trains (8th, 10th pick) is highlighted. We compare with the previous signalling system (IDUZI) and explain how the A.T.P. is used as a tool to prevent accidents by ensuring smaller time headway between trains to carry more passengers. Finally, the conclusions and future prospects for greater rail safety are presented.

46 A Study And Implementation of an Automated and Integrated System to Support Home Electrical Power and Heating.

C. Michailidis

E.Symeonaki

M.Papoutsidakis

D.Tseles

46.1 Abstract

Nowadays the energy problem has peaked. The essence of the problem lies in the correlation between continuously decreasing energy reserves with continuously increasing energy demands. The current thesis presents an automated water heating system powered by the sun via a solar tracker that aims at heating not just running water but also the whole residence through underfloor heating. The system is capable of rotating its collectors, so that when the desired water and room temperature has been achieved, it can additionally produce electrical energy by means of polycrystalline silicon photovoltaic panels.

47 Shipping Telemetry Systems

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47.1 Abstract

The aim of the Thesis to investigate the Shipping Telemetry Systems (SCADA type) with the help of information systems evaluation models (TAM, IS Success) to draw useful conclusions on the satisfaction of their users and the success of the systems. The research methodology follows the Mixed Method Research (MMR), uses a combination with the quantitative method by using questionnaires and qualitative method by using interviews. The sample numbers 47 users (quantitative research) and 3 manufacturers (qualitative research). The research findings found that: It seems marine telemetry systems are successful in their application area according to the users and the companies-manufacturers and тhe overall evaluation of the systems is high from the stakeholders.

47.2 Key-Words

Shipping Telemetry Systems, SCADA, TAM, IS success, evaluation, satisfaction

47.3 Introduction

The sipping telemetry system (STS) is an SCADA system in maritime sector. This paper has proposed and used a framework (research model) STS evaluation. It is a combination two models: TAM & IS SUCCESS. It examines various shipping telemetry system in the light of an integrated evaluation framework that includes the user satisfaction and acceptance of technology. The findings provided to fill the conceptual gap between user satisfaction and technology acceptance of information system for STS.

47.4 Background

The supervisory control and data acquisition system (SCADA) application is a branch of Industrial Information and referred to the combination of telemetry and data acquisition (Figure 1). SCADA systems, uses the programmable logic controllers (PLC) for monitoring all those critical parameters of an industrial process (e.g. pressure, temperature, humidity, etc.) Required for supervisory control, real-time [1], [2], [5], [6], [7], [8], [9].

Telemetry associated with SCADA systems is the transmission technique and data reception with an agent means. These data are measured and transferred wired or wirelessly, usually from multiple points. The yield of a separate address to every point (addressing) is part of the SCADA system. Data acquisition is an access method, handling and data collection and collaborating with the SCADA telemetry system for transferring the data [2], [3], [9].

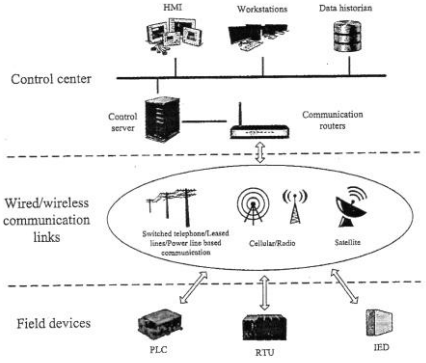

Figure 1.SCADA System

In particular, the shipping use SCADA systems to collect measurements and visual inspection started the implementation in propulsion engines (Figure 2). The target is the reduction of human resources and to improve the safety of personnel and equipment. Today, with the development of new technologies (IT, robotics, mechatronics, internet), telemetry and supervisory intelligence and control systems are expanding continuously, increasing the level of integration of existing ship systems [10].

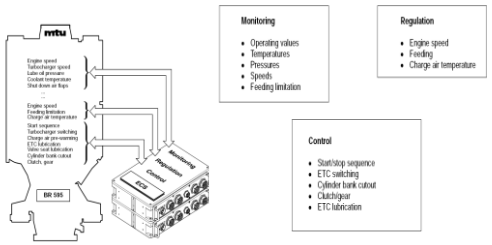

Figure 2. The propulsion engine control with ECS-UNI 595/M system (pressure, temperature, fuel supply)

Below are images of the most important SCADA systems used in the shipping and transport industry, especially in the Greek market:

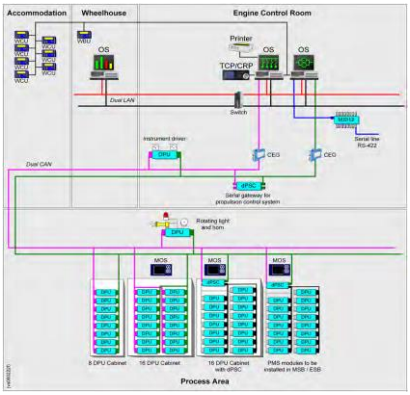

Figure 3. K-Chief 500 system topology

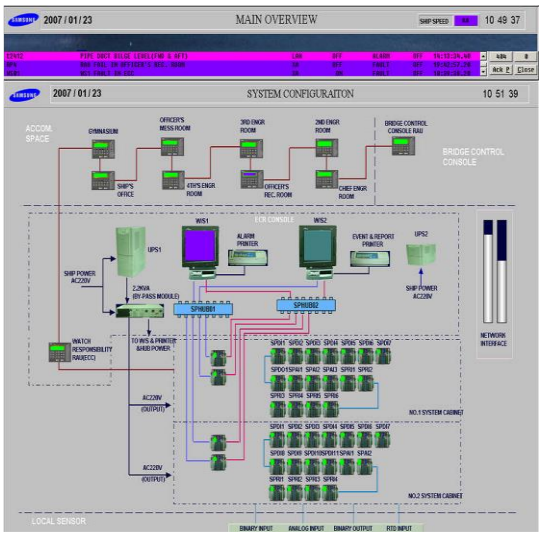

Figure 4. SSAS-Pro system topology

47.5 Methodology

47.5.1 Research model

This Research follows the mixed methodology (Mixed Methods Research) which comprises the following parts:

(a) Qualitative research
- Interviews with experts from companies supplying shipping telemetry systems
- Pilot study

(b) Quantitative research
- Questionnaires shipping telemetry system users
- Pilot survey
- Main survey

The structure of the research model of this study (a combination of IS evaluation models: TAM & IS success)[11],[12],[13],[14] is shown in the following figure:

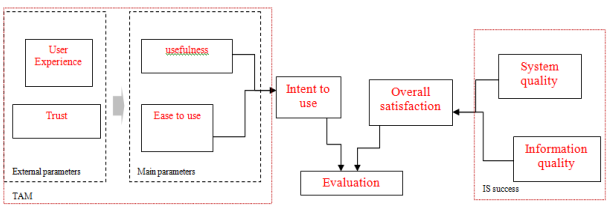

Figure 5. Research model

47.5.2 Research Objectives

The Research Objectives are:

- *RO1:* To investigate the acceptance of technology shipping telemetry systems by their users.
- *RO2:* To investigate the satisfaction of shipping telemetry system users.
- *RO3*: To investigate the overall assessment of shipping telemetry systems.

47.5.3 Hypothesis

The Hypothesis (Quantitative research) of Research Model (Fig.6):

H1.0 The intended use of shipping telemetry systems is not affected by the usefulness
H1.1 The intended use of shipping telemetry systems is affected by the usefulness

H2.0 The intended use of shipping telemetry systems is not affected by the perceived Ease of Use
H2.1 The intended use of shipping telemetry systems is affected by the perceived Ease of Use

H3.0 The intended use of shipping telemetry systems is not affected by the Experience
H3.1 The intended use of shipping telemetry systems is affected by the Experience

H4.0 The intended use of shipping telemetry systems is not affected by the Trust
H4.1 The intended use of shipping telemetry systems is affected by the Trust

H5.0 The system quality is not affected by the information quality
H5.1 The system quality is affected by the information quality

H6.0 Overall satisfaction of the shipping telemetry system is not influenced by the intended use
H6.1 Overall satisfaction of the shipping telemetry system is not influenced by the intended use

H7.0 Overall satisfaction of the shipping telemetry system is not influenced by the system quality
H7.1 Overall satisfaction of the shipping telemetry system is not influenced by the system quality

H8.0 Overall satisfaction of the shipping telemetry system is not influenced by the information quality
H8.1 Overall satisfaction of the shipping telemetry system is not influenced by the information quality

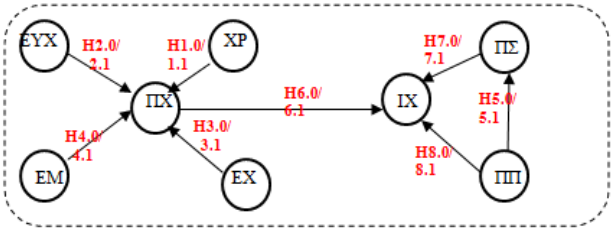

Figure 6. Hypothesis framework

47.5.4 Research Questions

The Research questions (Qualitative research) of Research Model (Fig.7):

- *Q1*: What is the effect of TAM model factors regarding the acceptability of shipping telemetry systems by companies-manufacturers point of view?
- *Q2*: What is the effect of the IS model success factors regarding the degree of success of shipping telemetry systems by companies-manufacturers point of view?
- *Q3*: What is your overall assessment of shipping telemetry systems by companies-manufacturers point of view?

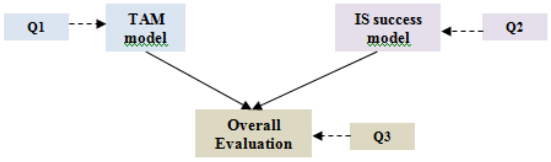

Figure 7. Research Question framework

47.5.5 Triangulation

The Research questions (Qualitative research) of Research Model:
The triangulation is a combination of data sources (users, companies-manufacturers) and linking research hypotheses - research questions (Fig,8):

*RO1:*Set H_1: {H1.0/1.1,H2.0/2.1, H3.0/3.1, H4.0/4.1} *AND* EE 1.1
*Ro22:*Set H_2: {H5.0/5.1} *AND* EE 2.1
*RO3:*Set H_3: {H6.0/6.1, H7.0/7.1, H8.0/8.1} *AND* EE 3.1

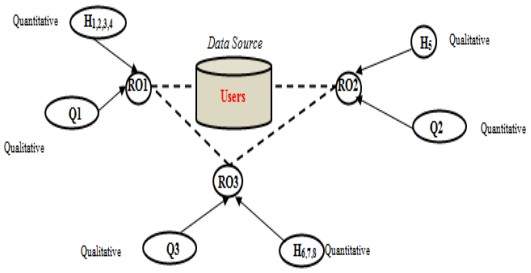

Figure 8. Triangulation procedure

47.5.6 Sample

The sample of this research consisted of 47 users (Quantitative research) and 3 companies-manufacturers (Qualitative research).

47.5.7 Tools

This research contains:
(a) Quantitative research: we use a questionnaire (31 questions and comments).
(b) Qualitative research: we use a hemi-structure interview (21 questions and comments).

47.5.8 Data Analysis

The quantitative analysis of this research includes the following techniques:

- Pilot study
- Analysis of reliability - validity
- Demographic sample analysis (using techniques of descriptive statistics)
- Hypothesis testing (regularity audit, using statistical parametric test or not)
- Export findings

Qualitative analysis of this research includes the following techniques:

- Pilot study
- Analysis of reliability - validity
- Codification participants
- Interpretation-text analysis (using encoding technique)
- Outcome of conclusions

The triangulation of this research includes:

- Findings of research (qualitative & quantitative) connections

47.6 Results

47.6.1 Reliability and Validation

This research has the following quality reliability and validation criteria due to small sample:

(a) Reliability
- Professional experience of researcher (>10 years)
- confirmatory reliability
- triangulation

(b) Validation
- Face validation (pilot research)
- Models validation (TAM & IS success)
- Transferability (inductive approach: RO to Hypothesis/research question)
- Dependability (organized research design)

47.6.2 Quantitative Analysis

The profile of the sample users telemetry systems is:

Table 1. Users Profile

Types of Shipping Telemetry System	Users of sample (N)
Kongsberg K-Chief 500	24
Kongsberg K-Chief 2000	4
Siemens Win CC	21
Samsung SSAS-Pro	12
Hansin	4
ABB	4

The evaluation of shipping telemetry systems users gather high scores (> 6) with the highest Hansin system and lower the Kongsberg K-Chief 2000 system.

The results of Hypothesis analysis are (Tab.2):

- using *Kolmogorov-Smirnov (K-S) & Shapiro-Wilk (S-W)* Test (research variables): have no normal distribution (Sig <0,05), and
- using non-parametric tests (Kruskall-Wallis, Mann-Whitney)

Table 2. Hypothesis Results

Hypothesis	Findings
H1.0/1.1 H2.0/2.1 H3.0/3.1 H4.0/4.1	Sufficient effect the utility to use intention Moderate effect on ease of use intended use Moderate impact the user experience intended use High impact confidence in the intention to use
H5.0/5.1	The information quality affects the mediocre quality system
H6.0/6.1 H7.0/7.1 H8.0/8.1	Moderate effect of using prosthesis in overall satisfaction High impact of quality systems in overall satisfaction Moderate effect of quality information to overall satisfaction

47.6.3 Qualitative Analysis

The qualitative analysis followed the coding methodology (open coding):

Table 3. Coding Results

Ερωτήματα	Αποτελέσματα
Q1	High degree of impact the usefulness, ease of use, trust
Q2	High quality information and systems
Q3	High overall satisfaction (High satisfaction individual users of products and companies)

47.6.4 Triangulation Process

The following table shows the correlation quantitative and qualitative research findings by research objective:

Table 4. Triangulation Results

Research Objectives	Correlations
Research Objective 1 **Acceptance**	Trust & utility systems due to the reliability, security and good training of operators
Research Objective 2 **Success**	Technical specifications provide fast, accurate and reliable information
Research Objective 3 **Overall satisfaction**	High overall evaluation (and sub-systems) agree users and companies

47.7 Conclusion

The research finding showed that:

- All factors of TAM model affect the *intended use*. The biggest impact has the *confidence* (external factor), followed by the *utility*.
- The IS Success factors have little effect according to users, but according to companies-manufacturers there is high quality of systems and information.
- The overall evaluation of the systems is high for users and companies-manufacturers.

The future relative research would be useful for the concerned developers-companies to design better shipping telemetry systems.

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Education
1982 -1988: Doctorate Study at Vienna University of Technology, Faculty of Electronics Engineering, Dpmt of Communications Engineering
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1976 – 1978: Study of Philosophy at University of Vienna

Work Experience
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2006 to 2008: Head of Academy of Educational Technologies and Innovation, Department for Interactive Media and Educational Technologies, Danube University Krems, Austria.

2003 to 2006: Head of Research-Center TIM-Lab, Danube University Krems, Austria. Director of the Research-Phd Program

2002 to 2003: Interim Head of Center of Education and Media, Danube University Krems, Austria. Course director, course developer and lecturer

1996 to 2002: Course director, course developer and lecturer at Danube University, Krems

1995 – 1996: Research on Distance Education at TELAB GesnbR, Vienna. Co-founder of TELAB GesnbR.

1988 – 1995: Head of Development and Production at FOCUS electronics GmbH, Vienna. Co-founder and associate director of FOCUS electronics GmbH

1984 – 1988: University Assistant at Vienna University of Technology, Dpmt of Electronics Engineering

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Selected Publications

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* Bratengeyer, E., "Corporate Learning: Herausforderung Lernkultur im Unternehmen". In Jahrbuch eLearning und Wissensmanagement 2014, Siepmann, F. (Hrsg.), pp36-38, Siepmann Media, ISBN 978-3-9813134-6-8, 2013
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Kirstin Conradie is an early-career researcher in the area of Higher Education Research & Management. She is currently a candidate for the Erasmus Mundus Joint Master in Research and Innovation in Higher Education (MARIHE), though her previous research and work experience span a wide variety of topics. Having completed her undergraduate studies in Philosophy and Applied English Language Studies at Stellenbosch University in South Africa, where she received membership to the Golden Key International Honour Society for academic excellence, she continued her education in Philosophy. Pursuing an Honours degree in this discipline, she graduated cum laude on a thesis which investigated the relationship between pain, human embodiment and personhood. During this time, she also worked as an assistant and tutor within the Stellenbosch Philosophy Department, developing lessons on Moral Philosophy, Logic, Philosophy of Art & Culture and Ancient Greek Philosophy. She also pursued a qualification in teaching Philosophy to children, known under the acronym P4C. Later she worked within the Arts and Social Sciences Faculty Extended Degree Programme, teaching courses in Environmental Philosophy. She also worked for a small educational start-up focused on teaching concepts of sustainability to South African youth, and volunteered as a tutor at an NGO within the township of Mitchells Plain. Having gained a broad experience of education in South Africa, she applied for and received an Erasmus scholarship to pursue her current degree in higher education studies. While studying, she also currently works for the Association of Teacher Education in Europe in an administrative and research capacity.

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1969 Siemens Medical Group
1972 First Austrian employee of Digital Equipment Corporation DEC.
High level technical and business consulting in the areas of networking, telecommunications and online transaction processing in Europe, CEE, Middle East and USA
1997 Master degree at the Danube University Krems and the Alaska Pacific University USA.
Since then running my own company Helix IT Consulting and working for the European Commission in Brussels.
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- 2010 visiting professor at Janghan University, Wuhan, China
- 2007 – 2010 Director of Agency for European Integration, Office Prishtina, Kosovo, “Multidimensional Project for the Implementation of an Institutionalised Partnership between Austria and Kosovo in the Field of Higher Education, Research and Innovation”
- 2004 – 2007 Executive Director University of Applied Sciences St.Poelten
- 1999 – 2004 Vice-president Danube University, 1996 – 2004 dean of “Telecommunication, Information and Media“
- President of EATA (European Association of Telematic-Applications)
- 1979 - 1996 lectures at the University of Vienna
- 1986 professor of the State University of Telecommunication in St. Petersburg
- 1988 - 1996 several duties with Alcatel: sales director of Austria, export director for Central- and Eastern Europe and Latin America.
- Headquarters in Paris with the responsibility for Latin America and Europe, development of the distribution network of Alcatel in Eastern Europe, foundation of 12 companies with nearly 100 subsidiaries (Kazachstan to Hungary)
- Publications: more than 50 books, 2 in seven languages
  - participation in more than 60 compendiums
  - more than 200 articles in specialist journals

48.5 Günter KOCH

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Günter Koch as a professor is guest at Technical Universities in specific in Austria and at the “Danube University”, and permanent Adjunct Professor in Informatics at the IICM-Institute of the Technical University of Graz. He works as a consultant to governments, banks, industries, in specific software dependant or software producing industries.
Professor Koch unites several and even divergent qualifications in his person: entrepreneur, manager and scientist. His last appointment as a manager of a big organisation was until the 1st half of the 1st decade of this century as the CEO of the Austrian Research Centers (ARC), Seibersdorf, today called Austrian Institute of Technology (AIT) , Austria’s largest applied research organisation, employing some 1200 people in many different disciplines, including material sciences, life sciences,

information technologies, system research, medical technology, energy and environment etc.
In his role as CEO in cooperation with a colleague from Graz University he developed the now widely used model ad method of an Intellectual Capital Report (ICR). This model served as the basis for even a law after which all Austrian universities must report their annual progress in respect to the development of their “intellectual capital”.
In 2012 he built-up the Humboldt Cosmos Multiversity, a university complementary think tank in Tenerife, Spain, which became legal in 2014. Since then G. Koch ist its President.
His first appointment in Austria was in the early 90ies, when he was invited to become a guest professor in systems analysis and systems architectures at the computer science faculty of Graz Technical University. During this period he was also a member of the university board of the Sévenan branch of the French University of Compiègne. From 1993 to1997 he was the Founding and General Director of the European Software Institute (ESI) in Bilbao, Spain, at its time a most prominent foundation by the European industry and the European Commission, which later served as the model case for the European Institute of Technology (EIT) with its head office in Budapest. In 1997 he joined SUN Microsystems in their Geneva offices as a chief consultant in Software Engineering and Management.

After having been assistant professor at Karlsruhe University’s computer science faculty from on 1975, he became the founder managing director of a systems company specializing first in medical informatics in 1981 and later in automation and in software technology. He served in this function until 1993. In an extra appointment he was initiating and heading a Technology Center in the city of Freiburg / Germany.
Günter Koch since 1998 lives in Vienna and acts as the Vice President of the Austrian Association for Research in IT and managed (part time) as General Secretary of ‘The New Club of Paris’ from 2005 to 20014. He is a member of the Board of the Fraunhofer Institute FIRST in Berlin, and he is affiliated with the Vienna-based Knowledge Management Associates/ Academy / Association (KM-A) and its cooperation partner www.execupery.com , where he can also be contacted. An extensive CV can be found via http://www.execupery.com/kontakt.htm and – in German - in Wikipedia : http://de.wikipedia.org/wiki/G%C3%BCnter_Koch

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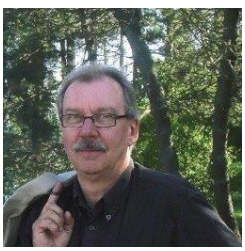

Adj. Prof. Matti Lähdeniemi gained a Ph.D from the University of Turku, and is presently an Adjunct Professor at Tampere University of Technology and at the University of Turku. His special fields are automation, image processing, entrepreneurship, knowledge transfer, quality and impact evaluation and RDI processes. He is/has been the director and consulting tutor of

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48.8 Olli Mertanen

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He has long background as well in industry in the field of communications technology as in engineering education in the field of information technology. He received B.Eng in automation technology (1976) in Kotka Institute of Technology, M.Sc. in digital and computer technology (1979) in Tampere University of Technology where he also received Lic.Sc. in computer science and telecommunications (1985) and D.Sc. in computer communication (1992). His industrial background includes positions in Philips Data Systems and Ericksson telecommunications. During his university career he was mentioned among 100 finnish avantgardists in the field of industry and business and awarded the recognition of EIS / excellent educator in electronics. 2012 he got an Achievement Award by INEER organization for his excellent work in the field of education and for his contribution to the creation of entrepreneurial spirit among future engineers. At the moment he is active in the field of enhancing creation of innovations as a result of co-operation between industry and University and furthermore leading to entrepreneurship.

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Radu Vasiu received the M.Sc. and Ph.D. degrees in Electronics and Telecommunications Engineering from the Politehnica University of Timisoara, Romania in 1982 and 1997, respectively. He is currently a professor at the Faculty of Electronics and Telecommunications Engineering of the Politehnica University of Timisoara. His research interests in the last years are in the area of smart city, open data, e-learning, multimedia and web technologies. Since 1993 he was involved in many international projects (Tempus, Phare, Socrates, Leonardo da Vinci, Life Long Learning, FP6, etc), especially in the field of multimedia and e-learning, both as coordinator or as contractor. He is now the President of the Research Committee of the Politehnica University Senate and the Director of the Multimedia Research Centre.
He acted as invited professor in different universities from UK, Finland, France, Austria, Greece and Netherlands. He has initiated and further developed 5 new degree specialisations at undergraduate and postgraduate level in Multimedia, Digital Media and e-Activities.
The publication list includes 12 books and more than 100 papers presented at different international conferences. He was involved in 28 research or international cooperation projects. He has initiated in 2013 the Timisoara Smart City Commitment as part of the EU Smart Cities and Communities Initiative
Currently, prof. Vasiu acts as President of the International Association for e-Science (IAFeS), that promotes at international level the use of ICT in science and technology.
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