Digital Maturity: What Is and how to Build it

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Abstract
New generations of citizens and workers have grown up alongside new technologies that they use to view their options, to communicate and decide. Because of this they implicitly expect and demand innovative learning models and languages. These new training tools should not however be limited only to so-called 'digital natives': the development of new skills and new ways of solving problems concerns all generations of workers. The continual need for knowledge updates, rapid analysis and response, flexibility and receptiveness to change and the integration of systems and persons is of prime importance for all types of organizations.

The approach, and mental and operative habits of those employed in highly digitalized environments cannot remain the same as they were for those employed in past workplaces: we must therefore develop what we call Digital Management Competencies (DMCs). In this contribution we will attempt to explain what is meant by DMCs by comparing them with similar concepts such as e-skills and e-leadership competencies that have been described in studies conducted by the European Community. We will focus on the importance of DMCs for current organizational models and for the future evolution of organizations. Developing this line of reasoning will lead us eventually to consider the broader concept of Work Maturity that currently needs to be reassessed in the light of the changes mentioned previously. In this way we will be able to explain a new type of maturity that we will call Digital Maturity. In this paper we describe some examples of the use of Serious Games in company training, to demonstrate how these innovative tools meet the formative needs of a society and work environments that are undergoing profound change. Playing games is not only useful for developing skills and knowledge; it is also closely connected with the building of personal identity and is 'interwoven' with the construction of group and company culture. The potential SGs have for making a contribution to development of this kind undoubtedly represents one of the most interesting paths to explore in the future.

1. Introduction

The increasingly widespread and pervasive presence of new technologies, especially that of the Internet is radically changing the way we relate to situations and people, thus creating what could be described as the 'digitalization' of our life styles. Their influence is also clearly visible in the work field where a merging of real and virtual worlds is bringing about a profound change in the way we conceive and manage organizational processes that provide services and produce goods.

A number of different terms have been coined in order to describe these scenarios. For example, the "Internet of things" is used to describe the linking of objects via the Net, which, thanks to technology, are then able to exchange data with the environment and interact among themselves and with those who are using them. There is also the "Industrial Internet", a term that highlights the ability of machines to listen and react in an intelligent way so as to render productive systems more effective and efficient.

Work processes, tools and systems are clearly changing shape; it is equally clear that the way we use and interact with these instruments is also bound to change. If we are to avoid losing incisiveness and efficacy, the approach, and mental and operative habits of those employed in highly digitalized environments cannot remain the same as they were for those employed in traditional workplaces. We must therefore develop what we can call Digital Management Competencies comparing them with similar concepts such as e-skills and e-leadership competencies that have been described in studies conducted by the European Community. We will focus on importance of technologies for current organizational models and for the future evolution of organizations. Developing this line of reasoning will lead us eventually to consider the broader concept of Work Maturity that currently needs to be reassessed in the light of the changes mentioned previously. In this way we will be able to explain a new type of maturity that we will call Digital Maturity. At the end of the paper, we will show a possible learning methodology functional to the concept of digital maturity, the Serious Games, the advantages in using them and how they can support development paths in business organizations.

2. Digital technologies and their influence on skill models

For several years now considerable interest has focused on the impact digital technologies are having on work, and particularly on workers' skills.

The EC, which is quite active in this field of study, has pinpointed a variety of skills linked to digital technologies. A classification based on a number of sources divides the so-called e-skills into three major categories [1]:

- *ICT practitioner skills*: specialist capabilities for managing ICT systems that range from research to designing, strategic planning, production, consultancy and maintenance of the said systems.
- *ICT user skills:* capabilities needed to use ICT systems at an individual user level, the ability to employ the software and specific tools that sustain business processes.
- *E-business skills*: these are also known as *e-leadership* skills and refer to the ability to exploit opportunities provided by digital technologies for making organizations more effective and efficient. They also include the ability to modify organizational or productive processes and create new business opportunities.

Although on the whole we agree with the clear classification put forward by the EC, there is the risk that this may perpetuate a 'traditional' vision of organizational roles in which there are planners and users, innovators and those who simply have to adapt to innovation, those who understand technology and those who simply have to use it. Clearly, in an organization there will always be those who, at an individual level, are more inclined towards innovation and leadership. Nevertheless, modern enterprises need to eliminate clear-cut distinctions between decision makers and those who carry out decisions, and between innovators and those who follow innovation.

This work concept, known as *Social business* or *Enterprise Social Network,* aims at constructing a 'Network of people' (mainly informal and flexible) to create value for the organization, Networks that can use new technologies to manage communication, gather information, process it and generate shared knowledge**.** If we are to follow this organizational vision, certain technologies cannot be used in a merely 'passive' manner. Using them in an informed and creative way will become an essential prerequisite for being able to add value to work. In short, what we call "digital maturity" is vital for work at all levels.

An interesting point of view on the nature of e-skills singles out 5 cognitive processes that make up this type of competence [2]:

- *E-awareness*: the ability to make a critical analysis of the opportunities and risks involved in the use of technologies in specific contexts, as well as the results of strategies and actions that envisage the use of technologies.
- *Technological literacy*: mastery of the use of digital media to achieve personal and professional objectives by being able to interact with hardware and software tools.
- *Informational literacy*: the capacity to comprehend, evaluate and interpret data coming from different sources.
- *Digital literacy*: the capacity to construct new knowledge through strategies based on digital technologies.
- *Media literacy*: understanding how traditional and digital media are evolving and integrating and the large-scale change this merger is bringing about.

The processes described above detect important aspects of what is now a very close relation between 'thinking processes' (how we manage data, analyse them, take decisions and approach problem solving) and new technologies. One important aspect could be termed *authorship*, or *creativity*, the inventiveness of those who use technological systems.

3. Towards a concept of 'Digital Maturity'

The idea of 'Professional Maturity', which is the ultimate aim of anyone involved in staff development, has taken on a new dimension to become a new concept that we could call 'Digital Maturity' including three levels that must be taken into consideration for enhancing the ability to relate to digital technologies:

- *Technical.* This concerns being aware of the possibilities different types of technologies offer us for achieving different aims: planning and managing work, communicating, collaborating with others, designing, learning, teaching, etc. It requires a basic knowledge of hardware although progress in the technical field is making this simpler as devices are becoming easier and easier to use. On the other hand, the opportunities offered at software level are

increasingly wide-ranging and are expanding exponentially due mainly to the Internet that enables anyone with a basic knowledge of programming to produce software and applications.

- *Critical.* This means the capacity to use technologies in a critical and knowledgeable way and therefore has many points in common with some of the processes described previously. Knowledgeable usage is quite similar to the aforementioned E-awareness as it concerns the capacity to comprehend the impact that information and communications technologies are having on work and society, grasp the nature of these changes and be aware of the consequences at a global and personal level. Besides a 'systemic' awareness of the digital revolution, this level also involves thinking critically when using these technologies and all the information managed by them.

- *Dialogic.* Here we are dealing with the most important level of what we term Digital Maturity, the one that comprises and integrates the previous levels. It concerns the capacity to build up new knowledge by using digital tools and strategies, and in this way is similar to the aforementioned Digital literacy. This level gives support to a vision of digital skills based on induction and negotiation, and defines them as involving principally diverging rather than converging thinking. In other words not as skills that are used to carry out or apply things, but something with which reality can be manipulated in a creative way both in soft (e.g. processes, communications systems) and hard terms (physical environments) [3].

The aforementioned levels, and especially the last one that we described as entering into a dialogue with the digital world, highlight the fact that the relationship with technologies has to be conceived in an intrinsically creative way. But how can we develop Digital Maturity? What principles should a training project or intervention aimed at organizational change be based on in order to support the type of skill we are referring to? The T.E.L. projects mentioned at the beginning of this paragraph have shown that digital technologies have elements and properties that should be given a prominent place in training if we are to promote Digital Maturity.

To do this, we must bear in mind some of the transversal properties of digital technologies since these are essential when it comes to using technologies in a creative way.

One of these properties is openness, or the capacity to connect people, systems and processes beyond traditional categories and professional compartmental divisions.

A second property concerns flexibility or the possibility of 'constructing technologies' i.e. adapting them, for instance, or personalising them or 'rearranging' them.

A third characteristic which is worth highlighting and which we can call 'intelligence', or more accurately self-regulation capacity, is derived from the second property. There are numerous examples of this capacity on an industrial scale: aeroplanes that diagnose their own systems and programme maintenance before landing, or wind turbines that communicate between one another to optimize energy production.

Openness, flexibility and self-regulation are principles and ways of conceiving technologies that enable us to abandon the mechanistic, one-way patterns left over from the industrial revolution and especially mass media (which are still all too present). What we have referred to as the dialogic level represents a new approach to the way we relate to technologies and means exploiting the capacity of new media to gather information, managing a vast volume of data, analysing it and providing us with feedback, freely connecting people and environments and automating work and decisional processes.

4. 'Digital Maturity': how to build it

The concept of Digital Maturity is functional to business organizations which, as described, have an increasing need for new tools to reach out to all the changes that society and the world of work and organizations are undergoing.

In our experience the Technology Enhanced Learning (TEL) approach, which are a set of training methods, based on particular digital technologies, which emphasize the interactivity of the learning process active experimentation of knowledge and the joint construction of knowledge, can be a effective tool for achieving the Digital Maturity of human resources.

For example, in recent years we have designed and applied in learning paths Serious Games (virtual simulations, like video games, through which you can 'train' specific skills and abilities). These instruments involve, entertain and at the same time are powerful vehicles of learning as they are based on one of the most powerful methods of learning that nature has designed: the "play".

One of the peculiarities of the SG is the ability to simulate complex phenomena that in reality it is difficult to reproduce, analyze and understand (eg. organizational processes of a company or the dynamics of communication between people). In this sense, therefore, such tools extend the range and forms of experience that can be placed at the basis of learning processes.

To summarize, as it is possible to see in Fig. 1, the use of TEL in learning pathways within business organizations involves five substantial benefits.
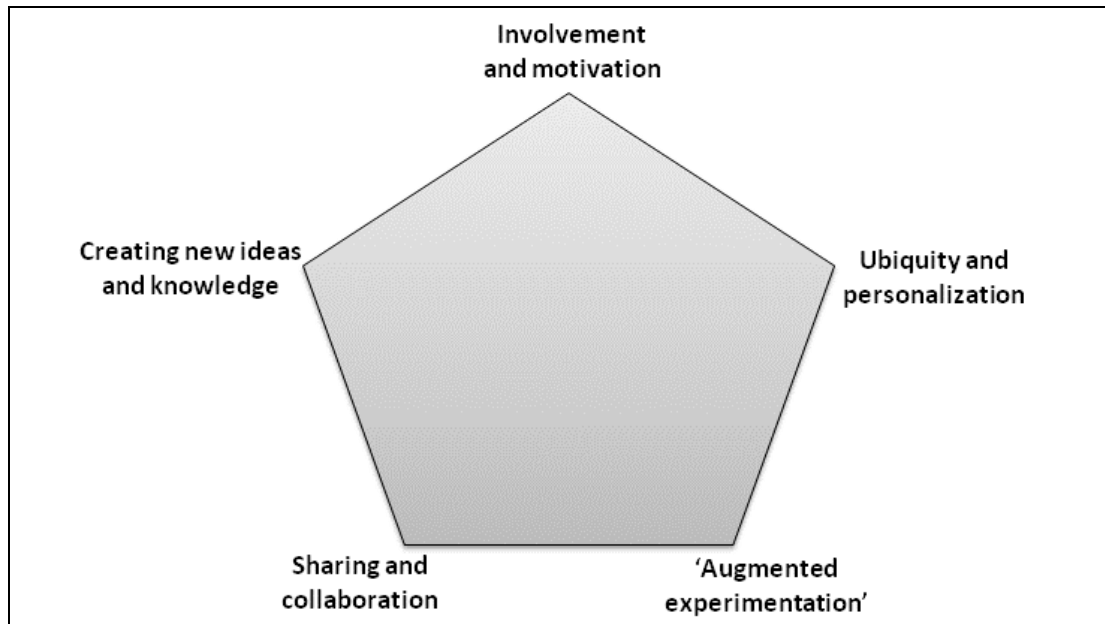
Picture 1 - Five advantages from using TEL in business organizations

The TEL is not just a set of methodologies and tools, but is now a real learning paradigm, a new way of conceiving the educational processes. In this sense, however, the main challenge to renew learning is the ability of those who work in education, to develop new frameworks and new skills, or to re-think their professionalism in digital key.

References

[1] An example of this interest are websites dedicated to e-skills such as: http://ec.europa.eu/enterprise/sectors/ict/e-skills/index_en.htm and to *digital jobs* such as: http://ec.europa.eu/digital-agenda/en/grand-coalition-digital-jobs-0
[2] See for example the overview made by Romani (Romani, 2009)
[3] Nowadays there are technologies and solutions that promise a real revolution, take for example 3D printing, the so-called wearable technologies and more generally, smart environments.