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The New Pyramid of Needs for the Digital Citizen: A Transition towards Smart Human Cities

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Abstract: This article analyzes the cultural transition towards postmodernity or a knowledge society and its impact on the changing needs of cities. This transition is characterized by a growing diversification of the use of technologies in most of the economic, political, educational, social, and cultural activities of different human groups. The concept of smart cities emerges, in which the roles and behaviors of citizens are redefined in physical spaces and in their interactions, as well as the function of institutions and interpersonal relationships. Emerging models of social and cultural behavior are required to analyze and systematize these realities, to understand how to increase effectiveness in action, and to rethink education and new ways of teaching and learning. All these processes are based on phenomena of innovation and management, mediated by technology. We proposed an analysis of the new digital skills of these individuals. The elements that shape the reformulation of roles and reference models, as well as an analysis of the postmodern cultural changes and the formation of a holistic, human-community-technology vision, are based on a new pyramid of training needs in which technologies are placed at the service of people's development, organizations, society, and culture.

Keywords: ICT skills; smart human cities; digital gap; knowledge society; bi-dimensional identity; needs pyramid

1. Introduction

In the current era, great changes are being experienced in which interconnected societies are demanding new ways to reformulate society, human interactions, and education. Authors such as Martinez [1] express that we are facing a crisis of the fundamentals of thinking, philosophical knowledge, and scientific knowledge as they are demanding new definitions. These changes will relentlessly affect the cultural uniqueness and some aspects of the global culture. According to Morin [2], this process is related to action ecology, considering that as soon as an individual carries out an action, this process starts to escape from its original intention and enters a complex plot that gives it a new dynamism.

In the social current, characterized by an increasing demand of goods and services, it is worthwhile to ask if human beings will have the capacity to revert the actions that are carrying the planet to a point without return with regard to the natural and ecological heritage of future generations and the entire human species. This problem requires a complex solution: a new utopian city that modifies its metabolism by significantly reducing the waste produced [3]. New concepts are needed to help citizens in order to understand the consequences of their actions and omissions. In this context arises a new conception of city known as a smart city. A smart city is mainly characterized by the demographic explosion of the suburbs and the growth of information and communication technologies (ICT) in

most human activities. As stated by Conesa [4], the essence of the smart city lies in the capacity that cities have always had to reinvent and innovate. Said condition needs to connect with the current challenges of cultural transition, as it urgently requires focusing on its efforts in the sustainability of the same, since, according to the projections for the year 2050, the worldwide urban population will reach the 6.4 million inhabitants [5].

From this stage, it becomes possible to consider ICTs a factor that influences both the understanding of how the city works and the attitude citizens are taking towards diminishing the negative effects of the climatic change and towards social equity. That is, ICTs can influence attitudes towards citizen participation, transportation, education and employment, and developing politics that could improve the life quality of its citizens. In fact, the ways of gathering data or information about the city are changing our way of understanding it [6].

As defined by Harrison, Eckman, Hamilton, Hartswickm, Kalagnanam, Paraszczak et al. [7] the smart city is (a) equipped, through the use of sensors and personal devices, to capture real-life data; (b) interconnected, by the integration of the data captured in computer platforms; and (c) intelligent, and processes, models and visualizes the information to make future decisions. Although this definition bases the concept of intelligence on the city rather than on computer decisions, this does not necessarily mean its inhabitants will complete all their paperwork online [8]. There are differences between a digital city and a smart city, since the first seeks to cater a broadband computer infrastructure to attend the requests of the companies, citizenship, and governments [9], and the second shows up as a consequence of the intersection between the society of the knowledge and the digital city [10].

This concept has been made by humans, little by little. For example, it is associated with the resolution of the public problems. These mean that the solutions are based on the technology in the frame of an association between different participants. These two are private and public [11]. In this same perspective, The Digital Country Foundation in Chile defines smart cities as the following:

> "Through the application of technology in different fields, places are changing to become more efficient regarding the use of resources, energy-saving, improving the services delivered and promoting a sustainable development, solving the main problems citizens have to face". [12] (p. 3)

According to the Committee of Digital and Knowledge-Based (Comisión de Ciudades Digitales y del Conocimiento) Cities, a smart city is one that includes ICTs in its critical infrastructure, and its components and public services are offered in order to make them more interactive, efficient and to make the citizenship more aware of them [13]. The same commission proposes six key fields and indicators that every smart city must take into consideration: the economy, citizenship, management, mobility, surroundings, and quality of life.

In sum, an intelligent city must stand out with as an efficient performance in said dimensions and have as a basis a combination of communication, infrastructure, economic development, and activities of the citizenship that allow a rational use of the natural resources by means of a participatory government [13]. However, Olmedo and López [14] pose that two new dimensions should be incorporated, as they are of equal or higher importance than the previous: versatility and the accessibility to users. The first refers to the capacity that objects or places need to be used by any user, whereas the second focuses on the possibility that smart cities can provide services adapted to all its inhabitants, especially to those that are disadvantaged by physical circumstances, for example, sensory, economic, among others.

Another interesting concept is the smart human city. It arises from the need to generate inclusive spaces inside the cities to avoid the differences between people. By prioritizing citizen rights over technology use, the smart human city incorporates a more humane vision of the smart city.

In the literature, there is a wide range of related concepts, such as the sharing cities. This includes knowledge-exchange platforms and exchange of resources among citizens, assumed like social agents between themselves and/or with the institutions; circular economies that promote a social and

economic model based on the recycling and the optimization of the efficient use of resources or products throughout its life cycle, increasing its value and reducing the environmental impact and the generation of waste; and the concept of WeGovernment, which evolves from the understanding of citizens like customers or consumers to consider them partners, empowering them so as to have a more active role in management of the city. All these concepts pretend to increase the capacity of participation of the citizenship to influence, decide and contribute to the development and management of the city [4].

The new tendencies conceive that citizens are those that give the city the possibility to be considered smart. These citizens promote sustainability through its interaction in real and digital spaces. But who are these citizens? How do they conceive reality? What are their sources of information, and how do they administer it? Which is the border between the information and knowledge? How do they generate and transfer knowledge? How are they taught, and how do they learn? These questions have not been tackled sufficiently in the literature because they require new models of reference. Therefore, this article aims to reach the answers to these questions, proposing a new pyramid of the needs of the digital citizen in the transition to the postmodern world.

2. Framework

2.1. Bi-Dimensional Identity: The Concept of a Holistic and Eclectic Citizen

The widespread growth of social networks has increased the possibility for people to express their opinions regarding diverse subjects of public or private matter while under the anonymity that the internet offers. However, this participation is not equal to that found in presidential or local elections of a country or city. Who, then, are these citizens?

Aristotle defines man as a rational and political animal. Therefore, humans are separated from other animals because of their ability to think and reflect about what they do and because of their political involvement. That is to say, as humans we have to live in a society (city, polis) with other beings. Individuals cannot live alone because they all have a language, are symbolic beings, and therefore need others to share this world of symbols with them [15].

Citizenship is a process that gets stronger as people become conscious of their role as political subjects and get involved in personal and collective problems. Thus, to suffocate a city with technology is worthless if its inhabitants do not face the challenges of their society. However, in addition to the fact that cities are moving towards an ideal of sustainability, what should citizens do in order to take advantage of the technology and information available?

Reasonably, the first step is to generate conditions of transformation of the archetype typical of the modern man: an individualistic citizen, whose conception of success is supported by what he/she can buy and consume. As restated by Fromm, "the main goal of human culture is to have more and more" [16] (p. 11).

In this sense, it is worthwhile to analyze whether it is possible to change the focus and work to develop a holistic citizenship, whose principles are supported, according to Salazar [17], by a bigger community than the total of citizens that compose it, with virtues based on freedom, an emancipating willingness, and the autonomic and social vocation. Moreover, it is important to comprehend if it is possible to form new generations of eclectic citizens that can perform effectively in the dimensions of tangible things and in the virtual world, to take care of the natural surroundings, managing information for good purposes, and manage knowledge to contribute to a better world. In other words, these citizens would need to work proactively to create more smart cities, because they work for the real world and virtual world. For this, it is necessary to understand man's good qualities and his own contradictions and limitations manifested in the real and virtual world, changing only his behavior. The transition to the postmodern society or knowledge society incorporates the fifth dimension of the virtuality that has changed the forms of human interaction. The bi-dimensional identity demands citizens' behavior and in this new dimension that requires holistic and eclectic abilities.

From the view point of the behavior of knowledge, according to Careaga and Avendaño [18], arises the need of a reconceptualization, incorporating the notion of virtual epistemology. Virtual epistemology, a postmodern proposal about new notions related to the behavior of knowledge in virtual contexts, requires the approximation of theoretical notions that explain the phenomenon. Among those, the following stand out: (a) a split in the understanding of the modern concept of knowledge; (b) the axiom expands to the relation subject-object-subject which involves a substantial change in the way to conceive the sources of knowledge; (c) postmodern knowledge would be rooted in comprising the relations that constitute the sources of said truth; (d) the cybernetic resides in the efficiency of man's interaction with the sources of knowledge; (e) man's creations reveal to it transforming it; (f) the possibility to manage knowledge, representing and transferring one's own intellectual constructors through cyberspace, and; (g) mutual modification as effect.

In the case of education, this approach caters to a vision that involves the need for reconsidering roles, especially the educational one, and the modalities that are adopted in the pedagogical relation in the current cultural stage. These would have to move from a rationalist-academic conception, in which it assumes a function of cognitive filter, to a more proactive conception of the autonomy of learning, sustained by a horizontal conception of the pedagogical relation [18].

This new vision about the behavior of knowledge given by virtual epistemology involves a clear differentiation between the administration of information (access and representation) and the management of knowledge (creation and transfer), which requires a redesign of roles. In agreement with Careaga [19], and Careaga and Barnes [20], where is the epistemological border between the administration of information and the management of the knowledge?

The administration of information involves basic competencies that allow the efficient access to the information sources and to its processed representation the data. The management of knowledge involves creation and transfer of knowledge, competencies that allow transferring the intellectual and practical constructs through the conceptual mediation of some language, as it is appreciated in Figure 1.

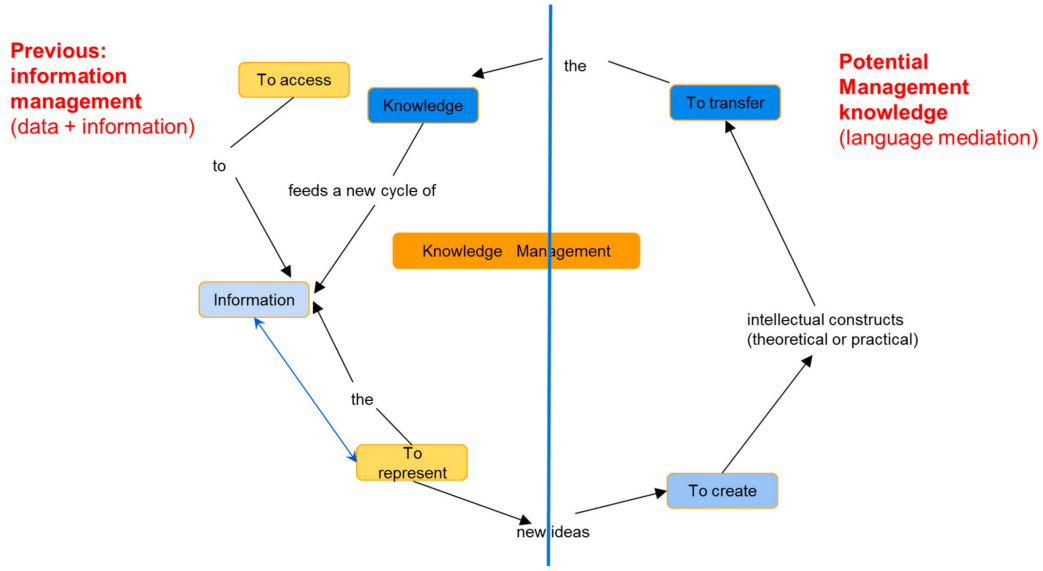

Figure 1. The Knowledge Management Pedagogical Circuit. (Source: Careaga and Barnes, 2015).

In this context, the challenge consists in trying to comprise, from the theory, the identity of these bi-dimensional cyber-citizens and the spaces where they move and learn. In this regard, Reig and Vilchez [21] propose that, with the rise of internet and the social networks, we are confronted with a paradigm change and with the evolution of a new type of individual, a hyper individual or connected individual who is difficult to surprise. Because of the reciprocal influence between the cultures like the

consequence of globalization [22], there have been an increased number of people who have seen too many things to be surprised easily [23].

According to Morin [24], there is an existing holographic relation between the individuals and society. That is to say, these individuals create the society with their interactions, but this influences in the social area by means of its culture and norms. In the current stage of cultural transition, what is the hologram between the individuals and the society? Are there still three worlds, as described by Popper [25]? The material world, composed of rivers, clouds, stones, plants and animal; the subjective world, composed of feelings, beliefs, thoughts, and the wishes of each person; and the intellectual world, defined by notions, thoughts, theorems, hypothesis, theories, symphonies, paintings and beliefs? The analysis indicates that the hyper individual or bi-dimensional citizen would live in three dissimilar worlds that coexist and surpass the ones posed by Popper. Each one of these worlds provided by its own identity: identity 1, the one made in the physical world (real); identity 2, the one who links the virtual and real world (virtual-real); and an identity 3, the one who configures exclusively in the virtual world (virtual-virtual).

These identities that coexist in distinct worlds move in a complex way without necessarily connecting the real world with the virtual world. Tendencies can show up in bi-dimensional citizen actions that take them to show organized performances that are understood like cyber organisms [26]. Since they unchain complex decisions from very simple ones, they exert control without having to realize the mechanisms that operate to give results. In relation to cybernetics, many meanings and implications are awarded to the scientific discipline that operates with a technological base linking it to the rational science of the machines, to an informational technique, or to the art of giving efficiency to the action.

This last approach gets closer to the eventual implications of the cybernetics in education, as Couffignal [27] pointed out in the 1960s. Based on these cybernetic concepts, it is possible to enter into human communication, attending to the interrelationships established between the individuals and the modalities that acquire these relations when they are made through artificial systems. These systems base their action on the operation of complex systems of automated control and operate to guarantee a determined purpose or end (direction, in a cybernetic sense) without users necessarily knowing the operation of said systems (notion of a black box). In this way, the new development of communication models, defined in virtue of the forms of concretion of said interrelationships, is observed when communication is perfected through networks of machines, which in reality are networks of people.

These systems act as a form of communicational control in smart cities, finding that humans communicate between themselves through technologies. Through the activation of computerized systems, these controls make it possible for them to work efficiently to fulfill the purposes of processing according to the standards with which they were designed. Cybernetics presents specific control techniques. A system behaves like a dynamic model that changes states, flowing in the behavior data and information, both in its modalities of internal communication, and in its interactions with the environment that surrounds it.

Then, the virtual-virtual dimension of bi-dimensionality identity is related to the active presence on the internet and to the interactions of communicational control that develop there by means of Facebook likes, Twitter retweets, photos, and viral videos. The reason to exist is to be on Google, configuring representations of information and knowledge that does not necessarily relate to the objective world of things. McLuhan and Powers [28] would say that this is a result of the presence of a resonant interval, since it has acquired consciousness of two different worlds, the real world and the virtual world situated in cyberspace. This requires accepting that both worlds experience an initial crash, to surface a new environment for human beings: virtual objective ecology.

How can this bi-dimensional citizen, who moves between what is real and virtual in a natural way, understand in its different world's reality, learning and uncertainty of knowledge? Figure 2 represents this scenario in two loops. Loop 1 (blue) denotes the interaction between bi-dimensional citizens and different spaces of formal and informal multidimensional experiences, like cyberspace,

school, family, social networks, or friends. In loop 2 (green), these interactions generate learning that, as it is being adapted to the bi-dimensional reality of citizens, turns into knowledge that feeds the smart city. "The territory is therefore the network, embodied in an archipelago of joined points by lines that allows the traffic" [29] (p. 49).

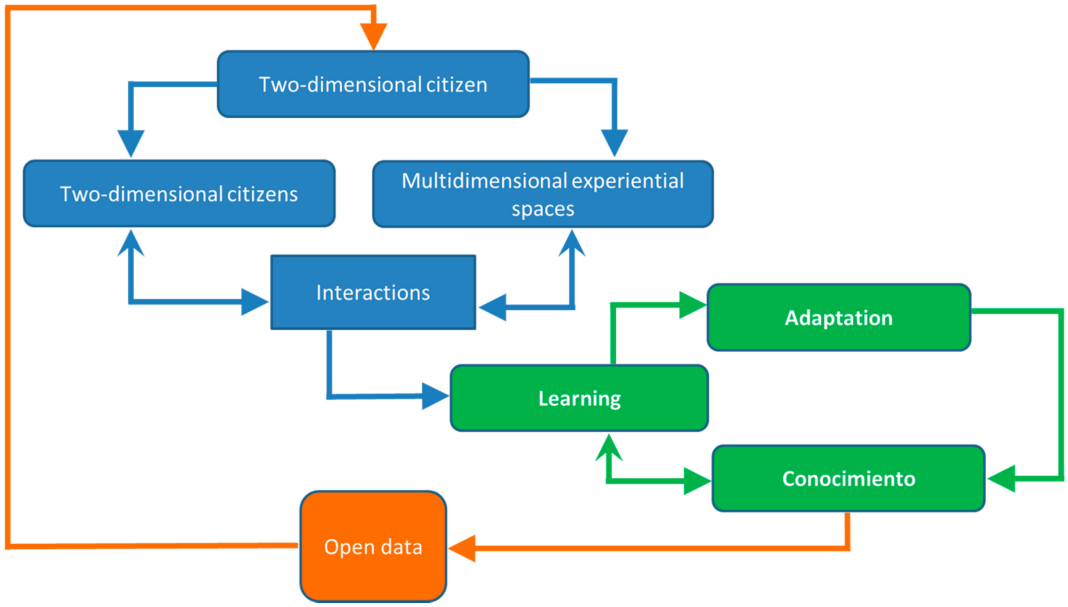

Figure 2. The reality and the contribution of knowledge of the bi-dimensional citizen in a smart human city (Source: Own authorship).

The interesting part of this representation is that the traditional educational system is maintained as a stage of experiences of learning. The school stops being the exclusive center for learning, since in the mixed reality (real + virtual) the formal and informal components complement each other to generate learning. The educational system requires a reformation, posing new modalities in the ways of teaching and learning. It requires reformulating the experiences of learning by means of interactions and adaptations involving diverse multidimensional spaces to improve the training of holistic and eclectic citizens.

Similarly, citizenship and education go together according to the new tendencies of change in the smart human city. At the beginning of the 20th century, Rousseau made this association between the citizen and his education, indivisible "in a weighted synthesis of both inalienable appearances, the one of the liberal individual and the republican citizen" [30] (p. 212). At the same time Gimeno sustained the same questions, stating, at the beginning of this century, that "the citizenship (what makes possible the exercise of democracy, of the republican version of Athenian origin) and the education need and invigorate reciprocally" [31] (p. 155).

It is important that the holistic and eclectic citizen is conscious of the impacts that globalization has on the citizenship because "if people remain unsatisfied with the role that citizens have, the stability of the democratic political systems could erode" [32] (p. 373). This empowerment or citizen intelligence is described by Sarmiento [3] through a series of responsibilities that the holistic citizen assumes in the smart city: commitment to the environmental politics of the city, commitment to energy efficiency and recycling.

2.2. Challenges for Education in the Smart Human City

Education is facing a historical moment that demands reformation. The digital revolution has impregnated the classical forms to teach and learn. Its main function of educating useful people for society has been affected. The formal educational system is not able to answer the new demands of

smart human cities, society, and culture. The Foundation Education 2020 in Chile proposes that Latin America has been transformed into a continent of functional illiterates, where, although the levels of coverage have increased, it continues to coexist in a process of including exclusion [33], in which the inclusion without quality continues to deny the right to education [34].

In this regard, Foucault [35] posits that disciplinary organizations organize and distribute time with diverse activities to change the behavior of the individuals regarding previously established criteria, measuring through examinations how governable a person is and how they could be classified in society.

This increase of the distance between the education and the needs of the people, together with the imbalance between what is received and what is needed, is what De Corte [36] defines as the educational gap. This has been explained from another point of view by Robles [37], the one who poses three paradoxes:

1. Education decides to contribute to the success of the individual career of all the students, but is forced to evaluate the learning of the contents that it communicates, and its results are always uneven.
2. On the one hand, education needs to consider the individualities of the students and take precautions with the diversity of aptitudes, vocations and expectations. Yet students must be treated like equals.
3. The class is made collectively within the context of the classroom. It is made up of an indefinite quantity of individuals with different experiences, from different families, and with enclosed consciousness and, therefore, must follow the same content of the class.

These paradoxes are the opposite of what it happens outside the classroom. The educational system transforms into a time catcher where students, during a determinate number of daily hours, live in an analog parallel world. Afterwards, they go back to their multidimensional and mixed spaces, where the real world and the virtual world coexist. The latter is still insufficiently incorporated in the educational classrooms. How can education in the context of the new intelligent cities be re-taught? To answer to this question, the following premises must be established:

(a) The educational system is one space of multidimensional experiences of holistic citizens, and is not the center, but has the capacity to influence the rest of space.
(b) Learning occurs in multiple real and virtual dimensions.
(c) The educational system must adapt and answer to the learning needs of the holistic and eclectic citizen.
(d) To diminish the educational gap, it is necessary to design inside the educational system multidimensional experiences of learning that recognize the personal surroundings of learning and management of knowledge of holistic and eclectic citizens.
(e) It is necessary to consider three conceptions: 1. A new epistemological condition, in which the digital citizens know to resolve the border between how to access and represent information of how knowledge is created and transferred; 2. The recognition of a new digital citizen identity based on the notion of bi-dimensionality, that is, a citizen remitted to the real and to the virtual space, and; 3. The notion of a complex redesign of a new citizen that, according to Morin [24], is understood by its autonomy/dependency, individuality, and self-production.

Thus, lifelong learning with the following attributes is proposed: multidimensional; holistic; eclectic; situated; interactive (related to classroom and distributed learning); self-regulated; autonomous; connective; adaptable (in any place and by means of any format or space, real or virtual), and; recursive.

For this re-significance of the bi-dimensional learning, one must work in the following meta-concepts: adaptation; the holistic and eclectic vision in the training of the digital citizen, and; the new pyramid of needs for the digital citizen.

2.3. The Adaptation

The skill of adaptation "involves the wish and the skill to change central competences and expand continuously the degree and depth of the skill" [38] (p. 223). Similarly, it is possible to transfer one's own knowledge and skills to the new tasks and contexts of learnings to a lifelong state [39,40]. This is especially true in this time, as designated by Bauman [41], which is like liquid modernity, that moves to the individuals by the uncertainty rather than by the certainties.

Álvarez [42] posits that examples like Wikipedia and the massive open courses online (MOOC) relate to the autonomous learning competence anytime, in the network, openly, massively, and ubiquitously. The epistemological foundation that sustains this possibility of adaptation and learning anytime and in any place is based on the connectivism theory [43] that maintains that learning can reside in artificial devices.

For Zapata-Ros [44], this connectivity premise contradicts the theories and conceptions of learning, arguing that it corresponds to an exclusively human activity linked to the faculties to know, represent, relate, transmit, and execute. However, why would it have to reside only in the human mind? Siemens [43] offers some clarity when affirming that learning is fundamentally a process of training networks. A subject then forms part of a network of nodes connected between them, being itself one of these nodes that contributes to those connections. Therefore, learning is a process of the creation of thousands of new connections that connect with contents, people, groups, services and repositories [45]. Likewise, the epistemological frame of connectivism is related to an emergent knowledge, connected and adaptive [43], where the knowledge remains in the individual, but resides in the community.

Siemens explained how the theories of analog or modern learning did not consider identity 3 (explained in Section 2) [43]. When he affirmed that these were obsolete, perhaps he should have explained a bit more about how learning online could fit perfectly with this new human identity. Cyberspace is the mind of identity 3 (where the distributed learning is produced); the databases and searchers are versions of the inferior brain, half and upper, fed by thousands of connections. When Siemens created the first MOOC, perhaps he suspected that internet users were newborns with identity 3 that were not yet conscious of it. Ruíz-Velasco [46] defends this idea when affirming that learning is a process that can occur in multiple environments outside of people's control. This process can reside outside of the human being, either inside of an organization or in a database.

The possibility to learn anytime and anywhere requires management of learning spaces and knowledge.

2.4. The Holistic and Eclectic Vision for Training the Digital Citizen

A holistic approach can be appreciated in the model of research, creation, and re-thought of contents in personal surroundings of learning (see Figure 3). This proposal incorporates an eclectic look at the real world and the virtual world. It then considers two circuits: one related to the consumption of information, and the other to the collaborative production of knowledge.

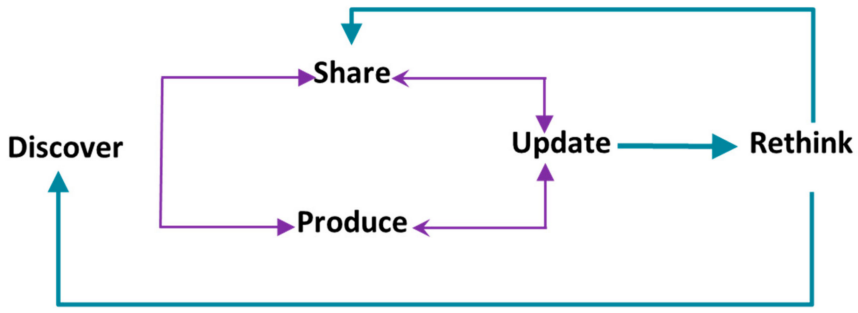

Figure 3. Model of nonlinear learning and rethinking of contents in virtual environments (Source: Own authorship).

The relationship between the model's different verbs show a sequence of research and re-construction of knowledge based in the hypertextual, not sequential theory. Hypertextual theory pretends to reflect nonlinear learning that is typical of the digital bi-dimensional citizens. In relation to the hypertext, Corona [47] indicates that it refers to the forms in which a user visits, sails, moves, and interacts with data on internet.

Nonlinear learning associates the notion of distributed and flexible curriculum that does not correspond to the rationality of a traditional curriculum, mostly rigid, academically rational, formal and prescribed, as it is nowadays. Nonlinear learning is self-regulated, formal, informal, face to face, virtual and temporal. Nonlinear learning implies making connections between things people already knew and new knowledge. This meant that persons actively constructed the knowledge as they needed it, in a subjective and individual way, because each individual experiences distinct social and psychological phenomena in an entirely unique phenomenon.

Together with the hypertextual theory, the model makes evident the collaborative production of knowledge through the production of intellectual constructs and digital devices.

3. The New Pyramid of Needs for the Digital Citizen: A Proposal for Analysis

These new interactive scenarios called resounding spaces by Castells [48], and places or resonant intervals by McLuhan and Powers [28], require citizens with bi-dimensional identities to be capable of managing face-to-face or virtual contexts. It seems interesting to highlight that it is necessary to differentiate between a bi-dimensional identity and a bi-dimensional context. Even though the penetration of ICT has contributed to the face-to-face duality, it does not necessarily mean that, a priori, two-dimensional identities are configured. In fact, Prensky [49] disdained his own idea of being digital native, arguing that they do not exist, and that they really are not as skilled as thought. Although they know how to use technology, they do not know how to learn with it. Negroponte [50] would say that this confusion is related to the concepts of identity, that it is related to the transformation, from atom culture to a bits culture. This is about a process of construction of a hologram representation of humans in virtuality, through small circuits to be seen and complex codes to be understandable [51]. In fact, according to Sibilla [52], this process of construction about identity or this mix between organic and technology requires new theoretical guides that search about how virtuality has been started or to configure a new bi-dimensional identity, that inquire into singular identities in human aggrupation and their link with culture according to human scale.

Therefore, new theoretical guides are required to inquire about this term of virtuality. This concept has been creating new necessities in users, such as in groups of human identity and their interactions with human scale culture.

To design the proposal of this new pyramid of needs for the digital citizen (see Figure 4), it seems interesting to make a contrast with Maslow's hierarchy of needs [53]: new postmodern needs do not deny the permanent needs of the modern citizen. What happens is that permanent needs incorporate new needs based in a mixed reality that involves the real and virtual worlds. These new needs surface with the increasing ability for people to connect, society and the culture. In the measure that a greater quantity of subjects, understood technologically like natural systems excessively complex and probabilistic, relate with other people or institutions using automated means of communication, in this new communicational interactions, new decisions and control decisions for purposes are produced. These processes, proper to the postmodern world, require new skills and the increasing satisfaction of new needs to create the bi-dimensional profile of a digital citizen. These levels of complexity increase from the subjects to the local culture to the global culture.

Figure 4. Pyramid of needs for the digital citizen (Source: Own authorship).

The formulation of the new pyramid of needs for the digital citizen emerges in the postmodern; these are dynamic transculturation processes that make the relationship in the interconnected world complex. This requires satisfying emerging necessities of bi-dimensional citizens (face-to-face or virtual), which complement Maslow's pyramid. This is because it requires a new dimension and definitions at the level of the cultural user, singular cultures and the interaction between them and the human scale.

The new pyramid of needs incorporates the complexity of the cultural transition to postmodernism, giving the new dimension of virtuality and new dynamics that are in cyberspace and the connection with the objective. Therefore, the inverted pyramid does not deny Maslow's pyramid validity (postmodern new necessities do not deny permanent necessities of the modern citizen), otherwise, it places a new rationality by its side, which complements and increases according to the emerging necessities related to the digital citizen, smart city and human scale. This creates a new referent that is theoretically formulated; however, it will be looked for in the implications of its dimensions, categories, standards and indicators that account for every level of complexity.

Some of these new necessities are evident, for instance, in the results of the last report gathered by Project Tomorrow [54], that made a survey with more than 400,000 students in primary, secondary and high school in the United States, finding around a quarter of students already took some virtual classes in math, science and English. More than a half of the total (56%) of the students declared that they use technology to learn outside the classroom. Around 79% of students in high school and 69% in secondary school use the internet at least once per week in order to support their homework. On the one hand, around a half of the students in high school use the internet every day to do their school homework. On the other hand, 14% of teachers declare that they use the internet to assign homework. This report recommends that students are using mobile devices for their own learning processes, online courses are popular, and there are gaps between generations in terms of students in secondary and high school related to the use of technology and the restrictive consequences associated to the use of technology.

In the first level of individual needs, we find the need for digital literacy, which allows individuals to use ICTs in an effective way, so they can access information sources, as well as administer and represent the information. These processes are linked to the development and the management of the individual talents that contribute to the production of a collective identity. The ways of learning are modified because of the new need for self-regulated and autonomous learning, which goes beyond the limits of time and space of modern educational institutions. The bi-dimensional identity of these digital citizens poses the need to develop a holistic and eclectic vision of reality. The holistic need origins in that the digital citizen must integrate the elements of the real world (tangible reality), the idea world (immanent reality), and cyberspace (virtual reality). Moreover, it must be able to develop an eclectic

capacity (a) when confronted with the need to identify and decide on the real components, ideal and virtual, that better contribute to the definition of its identity as a bi-dimensional subject, (b) when developing its individuality, like a member of a specific human grouping, and (c) in determining the positive and ethical characteristics of its transfers of knowledge to human culture.

The second level of the singular needs refers to the dynamic between the subjects, understood as cultural agents, and the identity formation of the human grouping to which it belongs. The most remarkable need is of epistemological character since the digital citizen needs to surpass the existent border between the administration of information and the management of knowledge to perform efficiently in smart human cities. The capacity to create intellectual and/or practical constructs and to make them transferable requires the mediation of learning and knowledge through some abstract expression of language. Once this is achieved, this individual will be considered a dimensioned citizen at the level of his/her singular culture. He/she will be an agent generator of knowledge that positively influences the processes of creating a local cultural identity. Digital citizenship surfaces from smart cities by means of the management of knowledge of its cultural agents, and those who are able to link with other human groupings.

The third level of the global needs is based on digital inclusion. It is only possible to be a citizen of the world if one has the technological skills and access to technology in order to communicate. It creates the need for adaptation to real, mixed, and virtual contexts. This creates the need to re-think what is known because the categories of the modernity have been altered. It is necessary to add virtuality to the four categories of modernity, namely, length, plus width, plus height, plus time. The digital citizen is no longer just dimensional with the objective reality but also with virtual reality. This forces us to re-think these categories of thought. This new need is absolutely necessary, and is proper to the postmodern world that is transformed gradually into a cultural pattern. Similarly, the need to transfer knowledge arises. The cultural singularity of human groups is questioned by the new dynamics of culture on a human scale. The singular epistemology, situated locally, extrapolates to a virtual epistemology that is formed by all the digital citizens that can participate actively in the global culture. This is because the citizens have gradually satisfied their basic digital needs at the level of the subjects. That is, they have managed their own culture mediated by technologies and have begun to experience intense processes of intercultural illustration, transculturation, and acculturation.

4. Conclusions

The smart city is a consequence of two phenomena of the human history [55]. On one hand, urbanization has increased around the world and, on the other, there is the digital revolution, which is characterized by the use of ICT in every sort of human activity.

The exposed analysis allows us to conclude that computerized and hyperconnected cities do not necessarily involve the creation of smart cities. The technological implementation in itself does not bring like consequence the creation of networks of digital citizens empowered with their role in the real or virtual world, neither has it secured local or global impacts.

We finally argue that in order to be considered as a smart city, a city must improve citizens' quality of life, making them part of decisions, such as government or city planning. Related to this topic, Bakici, Amirall and Wareham [56] propose a smart city as a live laboratory in which citizens can interact via ICT.

It is possible to find an effect of smart cities in the project that Bill Gates is developing, who acquired 100 km^2 of desert near Phoenix (Arizona) in order to develop his vision of the city of the future. According to Belmont Partners [57] (the real estate company in charge of the project), the vision that Gates wants to develop includes a city with digital network, with huge high-speed data centers, new manufacturing technologies and distribution models, vehicles without drivers, with logistics working autonomously. Even though, currently, there are few people living in this area, the idea is that the smart city will incrementally grow its population through years until it has a population of 182,000. A few years ago the use of touchscreen to control the light, music or temperature was something

unthinkable for the era; now it is common that houses have home automation of various control. In the same way, it is highly probably that the analysis of this experimental experience and its impact will come later.

The cities need campaigns of digital literacy and digital illumination to guarantee accessibility. They also need intellectual development and technological talents to generate digital inclusion within citizens that contribute to make cities smarter. This does not exclusively mean in function of its own development, but in relation to the talents of citizens, the singular identity of the human groupings that inhabit them and its links with culture on a human scale.

In this sense, digital citizens of future generations will have to develop a cybernetic-intuitive consciousness that allows them to perform according to a bi-dimensional identity. The objective reality is the reality of tangible objects; and the virtual reality is the reality of cyberspace that moves with other rhythms and distinct categories to the ones of modernity. We can affirm then that the mixed coexistence of both realities is the typical stage of smart human cities.

In the transition to the postmodern world, learning occurs in multiple real and virtual dimensions. The modern educational system has to adapt to the needs of a new citizen in training with the goal of diminishing the educational gap, moving to the design of multidimensional experiences in education, and learning to recognize the personal surroundings of learning and the surroundings of management of knowledge of holistic and eclectic citizens.

The required education is based on self-regulated and autonomous learning that promotes the training of capable intelligent citizens to identify and surpass the epistemological border that separates the administration of information from knowledge management. Said citizens will learn in the formal educational systems and will learn about their own knowledge, making it transferable to their local and global cultures.

It is necessary to re-think the categories of thought, moving from linear, characteristic of modernity, to a holistic and eclectic thought that promotes effective and ethical performance in the real and virtual worlds. In this context, a new pyramid of needs for the digital citizen arises in a mixed real-virtual reality, mediated by the cybernetic characteristic of individuals and social groups and with a local and global cultural impact.

The virtual world is not different from the real world in its contents; it only behaves with different dynamics and categories. Both worlds are the reflection of man's intelligence, goodness, virtues, capacities, and talents, as well as his weaknesses, contradictions, passions and misfortunes. In order to be an intelligent digital citizen, it is necessary to recognize that, although nature is man's home which he must respect, virtuality is the new dimension of the postmodern man. This man must take care filling the dimension with contents that, apart from healthy digital fun, would have to be impregnated with an ethical sense, aesthetics, knowledge, education, art, science, society, humanity and culture.

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References

1. Martínez, M. *Epistemología y Metodología Cualitativa en las Ciencias Sociales*; Editorial Trillas: Ciudad de México, Mexico, 2008.
2. Morin, E. *El Método III: El Conocimiento del Conocimiento*; Ediciones Cátedra: Madrid, Spain, 1999.

3. Sarmiento, J. Ciudades y Ciudadanos Inteligentes. El Componente Humano de las Smart Cities. *Telos Cuad. Comun. Innov.* **2016**, *105*, 76–83.
4. Conesa, P. Smart cities: Una visión integral para acelerar la innovación urbana, un camino a recorrer. *Rev. Telos* **2016**, *105*, 6–8.
5. Organización de las Naciones Unidas, Departamento de Asuntos Económicos y Sociales. Más de la Mitad de la Población Vive en Áreas Urbanas y Seguirá Creciendo. Available online: http://www.un.org/es/development/desa/news/population/world-urbanization-prospects-2014.html (accessed on 19 November 2017).
6. Ratti, C. Smart cities: Lo que de verdad importa. *MIT Technol. Rev.* **2013**. Available online: https://www.technologyreview.es/s/3749/smart-cities-lo-que-de-verdad-importa (accessed on 19 November 2017).
7. Harrison, C.; Eckman, B.; Hamilton, R.; Hartswickm, P.; Kalagnanam, J.; Paraszczak, J.; Williams, P. Foundations for smarter cities. *J. Res. Dev.* **2010**, *54*, 1–16.
8. Colado, S.; Gutiérrez, A.; Vives, C.; Valencia, E. *Smart City. Hacia la Gestión Inteligente*; Marcombo: Barcelona, Spain, 2014.
9. Ishida, T.; Isbister, K. *Digital Cities: Technologies, Experiences, and Future Perspectives*; Springer: Berlin, Germany, 2002.
10. Albino, V.; Berardi, U.; Dangelico, R. Smart Cities: Definitions, dimensions, performance, and initiatives. *J. Urban Technol.* **2015**, *22*, 3–21. [CrossRef]
11. Arizmendi, S.; Navío, J.; Portilla, J. Smart cities: ¿Cómo determinar el estado de desarrollo de una ciudad inteligente? *Telos Cuad. Comun. Innov.* **2016**, *105*, 49–65.
12. Cohen, B.; Obediente, E. Estudio Ranking de Ciudades Inteligentes en Chile. Centro de Estudios Digitales, Fundación País Digital. 2014. Available online: http://dg6223fhel5c2.cloudfront.net/PD/wp-content/uploads/2014/06/Ranking-Ciudades-Inteligentes-en-Chile.pdf (accessed on 19 November 2017).
13. Comisión de Ciudades Digitales y del Conocimiento. Estudio Internacional Sobre la Situación de las TIC, la Innovación y el Conocimiento en las Ciudades. 2012. Available online: http://www.uclg-digitalcities.org/la-comision-presenta-el-smart-cities-study-en-la-reunion-anual-celebrada-en-dakar/ (accessed on 1 October 2017).
14. Olmedo, E.; López, A. De la smart city a la smart human city. Inclusión digital en aplicaciones. *Rev. Fuentes* **2015**, *17*, 41–65. [CrossRef]
15. Savater, F. *La Aventura del Pensamiento*; Penguin Random House Grupo Editorial S. A: Santiago, Chile, 2014.
16. Fromm, E. *¿Tener o Ser?* Fondo de Cultura Económica: Ciudad de México, Mexico, 1978.
17. Salazar, R. Quién es el Sujeto Insumiso. 2008. Available online: http://conceptos.sociales.unam.mx/conceptos_final/478trabajo.pdf (accessed on 19 November 2017).
18. Careaga, M.; Avendaño, A. *Currículum Cibernético y Gestión del Conocimiento. Fundamentos y Modelos de Referencia*; RIL, Ed.; Editorial UCSC: Santiago, Chile, 2017.
19. Careaga, M. Circuito Pedagógico de Gestión del Conocimiento. 2008. Available online: http://www.ucsc.cl/wp-content/uploads/2013/09/educacion-parte-2.pdf (accessed on 19 November 2017).
20. Careaga, M.; Barnes, S. Actualización Circuito Pedagógico de Gestión del Conocimiento. 2015. Available online: http://marcelocareaga.blogspot.com/ (accessed on 19 November 2017).
21. Reig, D.; Vílchez, L. *Los Jóvenes en la Era de la Hiperconectividad: Tendencias, Claves y Miradas*; Fundación Telefónica: Santiago, Chile, 2013. Available online: https://www.fundaciontelefonica.com/arte_cultura/publicaciones-listado/pagina-item-publicaciones/itempubli/182/ (accessed on 19 November 2017).
22. García, N. *Lectores, Espectadores e Internautas*; Editorial Gedisa: Barcelona, Spain, 2007.
23. Hannerz, U. *Conexiones Transnacionales*; Frónesis Cátedra Universitat de Valencia: Madrid, Spain, 1996.
24. Morin, E. *La Cabeza Bien Puesta. Repensar la Reforma. Reformar el Pensamiento*; Nueva Visión: Buenos Aires, Argentina, 2002.
25. Popper, K. *Objective Knowledge: An Evolutionary Approach*; Oxford University Press: Oxford, UK, 1972.
26. Wiener, N. *Cybernetics or Control and Communication in the Animal and the Machine*; John Wiley and Sons: New York, NY, USA, 1961.
27. Couffignal, L. *Cibernética y Educación*; Édition de Minuit: Paris, France, 1964.
28. McLuhan, M.; Powers, B.R. *La Aldea Global. Transformaciones en la Vida y Los Medios de Comunicación en el Siglo XXI*; Editorial Gedisa: Barcelona, Spain, 1989.

29. Wachter, S. *La Ville Interactive: L'architecture et L'urbanisme au Risque du Numérique et de L'écologie*; L'Harmattan: Paris, France, 2010.
30. Rubio, J. Educar ciudadanos: El planteamiento republicano liberal de rousseau. *Contrastes. Rev. Int. Filos.* **2003**, *8*, 211–227.
31. Gimeno, J. *Educar y Convivir en la Cultura Global. Las Exigencias de la Ciudadanía*; Morata: Madrid, Spain, 2001.
32. Kymlicka, W. *La Política Vernácula: Nacionalismo, Multiculturalismo y Ciudadanía*; Paidós: Barcelona, Spain, 2003.
33. Waissbluth, M. América Latina, un Continente de Analfabetos Funcionales. Fundacion Educacion 2020. 2016. Available online: http://www.flacso.edu.mx/sites/default/files/ponencia_mexico_final_abril_2016.pdf (accessed on 19 November 2017).
34. Gentili, P. Marchas y Contramarchas. El Derecho a la Educación y las Dinámicas de Exclusión Incluyente en América Latina. *Rev. Iberoam. Educ.* **2009**, *49*, 19–57. Available online: https://dialnet.unirioja.es/servlet/autor?codigo=35994 (accessed on 19 November 2017).
35. Foucault, M. *Power Know Ledge: Selected Interviews and Other Writings 1972–1977*; Pantheon Books: New York, NY, USA, 1981.
36. De Corte, E. Una perspectiva innovadora de enseñanza y aprendizaje en la educación superior. In Proceedings of the Conferencia Presentada en el Lanzamiento de la Unidad de Innovación Educativa de la Universidad Nacional Agraria la Molina, Lima, Peru, 2011. Available online: http://www.lamolina.edu.pe/innovacioneducativa/images/files/libros/Art%C3%ADculo%20Peru%20Educa-%20Ambientes%20de%20aprendizaje%20-%20conferencia%20de%20Erik%20de%20Corte%20en%20la%20UNALM%20(Mayo%202011).pdf (accessed on 19 November 2017).
37. Robles, F. *Las Paradojas de la Educación Chilena y la Apología de las Máquinas Triviales. ¿Ha Llegado la Hora del Cambio en el Sistema Educacional?* Facultad de Ciencias Sociales, Departamento de Antropología, Universidad de Chile: Santiago, Chile, 2010. Available online: http://www2.facso.uchile.cl/postgrado/mad/docs/Robles_Educacion_Chile.pdf (accessed on 19 November 2017).
38. Bransford, J.; Stevens, R.; Schwartz, D.; Meltzoff, A.; Pea, R.; Roschelle, J.; Vye, N.; Kuhl, P.; Bell, P.; Barron, B.; et al. Learning theories and education: Toward a decade of synergy. In *Handbook of Educational Psychology*, 2nd ed.; Alexander, A., Winne, P.H., Eds.; Lawrence Erlbaum Associates: Mahwah, NJ, USA, 2006; pp. 209–244.
39. De Corte, E. Learning from Instruction: The Case of Mathematics. *Learn. Inq.* **2007**, *1*, 19–30. [CrossRef]
40. Hatano, G.; Oura, Y. Commentary: Reconceptualizing school learning using insight from expertise research. *Educ. Res.* **2003**, *32*, 26–29. [CrossRef]
41. Bauman, Z. *Liquid Modernity*; Polity Press: Cambridge, UK, 2000.
42. Álvarez, D. Entornos personales de aprendizaje para la gestión del conocimiento en tiempos líquidos. ikasnabar. *Open Educ. Technol.* **2014**. Available online: http://ikasnabar.com/papers/wp-content/uploads/2014/12/DavidAlvarez.pdf (accessed on 19 November 2017).
43. Siemens, G. Connectivism: Learning as Network-Creation. 2006. Available online: http://www.elearnspace.org/Articles/networks.htm (accessed on 19 November 2017).
44. Zapata-Ros, M. Teorías y Modelos sobre el Aprendizaje en Entornos Conectados y Ubicuos. Bases para un nuevo modelo a partir de una visión crítica del conectivismo. *Teoría Educ. Educ. Cult. Soc. Inf.* **2015**, *16*, 69–102. [CrossRef]
45. Bartolomé, A. Conectivismo: Aprender em rede e na rede. In *Tecnologias na Educaçao: Uma Abordagem Crítica para Uma Atuaçao Práctica*; Brito, M., Ed.; UFRPE: Recife, Brasil, 2011; pp. 71–86.
46. Ruíz-Velasco, E. *Cibertrónica: Aprendiendo con Tecnologías de la Inteligencia en la Web Semántica*; Díaz de Santos: Ciudad de México, Mexico, 2013.
47. Corona, J.M. La Construcción Social de Internet: Estrategias de Uso y Significación de la Información. *Rev. Tecnol. Soc. Redes Soc. Divers.* **2012**, *3*, 1–14. Available online: http://www.udgvirtual.udg.mx/paakat/index.php/paakat/article/view/176/244 (accessed on 19 November 2017).
48. Castells, M. Flujos, redes e identidades: Una teoría crítica de la sociedad informacional. In *Nuevas Perspectivas Críticas en Educación*; Castells, M., Flecha, R., Freire, P., Giroux, H., Macedo, D., Willis, P., Eds.; Paidós: Barcelona, Spain, 1994; pp. 13–54.

49. Prensky, M. Nativos e Inmigrantes Digitales. 2010. Available online: http://www.marcprensky.com/writing/Prensky-NATIVOS%20E%20INMIGRANTES%20DIGITALES%20(SEK).pdf (accessed on 19 November 2017).
50. Negroponte, N. *Ser Digital*, 1st ed.; Ediciones B, S.A.: Barcelona, Spain, 1995; ISBN 84-406-5925-3.
51. Dery, M. *Velocidad de Escape*; Síruela: Barcelona, Spain, 1998; pp. 9–10.
52. Sibilla, P. *El Hombre Postorgánico: Cuerpo, Subjetividad y Tecnologías Digitales*, 1st Electronic ed.; Fondo de Cultura Económica: Buenos Aires, Argentina, 2012.
53. Maslow, A. A theory of human motivation. *Psychol. Rev.* **1943**, *50*, 370–396. [CrossRef]
54. Project Tomorrow. Speak Up 2016 Research Project For Digital Learning. 2016. Available online: http://www.tomorrow.org/speakup/index.html (accessed on 19 November 2017).
55. Bouskela, M.; Casseb, M.; Bassi, S.; De Luca, C.; Facchina, M. *La Ruta Hacia las Smart Cities: Migrando de una Gestión Tradicional a la Ciudad Inteligente*; Banco Interamericano de Desarrollo: Washington, DC, USA, 2016. Available online: https://publications.iadb.org/bitstream/handle/11319/7743/La-ruta-hacia-las-smart-cities-Migrando-de-una-gestion-tradicional-a-la-ciudad-inteligente.pdf?sequence=10 (accessed on 19 November 2017).
56. Bakici, T.; Almirrall, E.; Wareham, J.A. Smart city initiative: The case of Barcelona. *J. Knowl. Econ.* **2013**, *4*, 135–148. Available online: https://econpapers.repec.org/article/sprjknowl/v_3a4_3ay_3a2013_3ai_3a2_3ap_3a135-148.htm (accessed on 29 September 2017). [CrossRef]
57. Pascual, A. Así es la Smart City Que Quiere Construir Bill Gates en Estados Unidos. Available online: http://www.quo.es/tecnologia/asi-es-la-smart-city-que-quiere-construir-bill-gates-en-estados-unidos (accessed on 11 November 2017).