From simplex to complex: designing for wellbeing at scale.

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Abstract. In this article, we propose a theoretical framework of reference for the design for wellbeing, mainly in large techno ecosystems like smart cities and smart learning ecosystems taken here as examples. Starting from a people/human-centered vision of such ecosystems and the identification of their smartness with the ASLERD pyramids of needs, the mapping on the levels of this latter of the wellbeing - either defined by the living conditions generated by the context and perceived at the individual level due to the involvement in the technologically augmented processes taking place within the ecosystem - is discussed. It is also shown that the multidimensional smartness-wellbeing construct incorporates the perspective of the design for the experience, whatever the focus and the zoom level applied by the designers to the ecosystem under consideration. Finally, we show that the proposed theoretical framework allows the adoption of a bottom-up participatory approach to evaluate the smartness of the ecosystems of interest and, thus, the possibility of comparing ecosystems with similar characteristics and identifying their peculiarities with respect to the proposed framework.

Keywords: Design for Wellbeing, Design for the Experience, People-Centered Smart Cities, Learning Ecosystems, Ecosystems Smartness, ASLERD Pyramid, Participatory Evaluation of Smartness and Wellbeing.

1 Introduction

Recently, the concept of wellbeing has attracted the interest of a growing number of researchers engaged in the design of technological applications and techno systems, with the aim of identifying the relevant dimensions that may induce in individuals an increased perception of wellbeing due to their interaction with the technological artifacts. [1,2]. Although design for wellbeing can be considered an evolution of human-computer interaction - which over time has widened its horizons in going toward interaction design [48-49] and, then, design for the experience [3,5, 53,54] - to date, the concept of wellbeing still remains somewhat elusive [51], and we are not aware of

explorations on its applicability in the case of techno systems characterized by considerable size and complexity such as smart cities or smart learning ecosystems.
Therefore, this article aims to identify the components of wellbeing that can be considered significant in the design of such ecosystems, together with the construct that can be used to evaluate them based on people's feelings.
To get there, we will take a people-centered perspective on smart ecosystems that will allow us to define, accordingly, what should be meant by ecosystem smartness. Then, since the design for wellbeing can be considered an extension of the design for experience, we will discuss the relationship between the smartness of techno ecosystems and the design for the experiences.
At this point, we will be ready to identify which are the components that contribute to the concept of wellbeing, in particular when dealing with people-centered techno ecosystems. The discussion will lead us to discover the close relationship existing between wellbeing and smartness.
In conclusion, for the purpose of demonstrating the practical usefulness of the theoretical framework, we will show how the smartness/wellbeing construct can be successfully used both to measure the smartness level achieved by a specific ecosystem and to identify some of its peculiarities, as well as aspects on which to work to improve such level.
On the sidelines of all this, we will discuss some issues that one may have to be confronted with due to the peculiarities of some technological innovation processes.

2 Background: large techno ecosystems and their smartness

A significant example of ecosystems is provided by *smart cities* which with no doubt can be considered complex techno ecosystems. During the so-called “first wave” [6,7], to quantify the beneficial effects of smart cities on their inhabitants a series of classification methodologies have been developed, and rankings of smart cities derived [8,9]. Such methodologies were inspired merely by the efficiency and efficacy perspective - i.e., by the capability of the ecosystems to optimize the consumption of resources and fluidize flows (goods, people data, etc.). A perspective, this one, that reminds the dawn of the Computer-Human Interaction (CHI) domain, during which the machine, and more in general the technological system, were considered at the center of the relationship between human and machine [10] and the main expected benefit was the optimization of the working flows, identified with the well-being of the workers (rather than that of the individuals as a whole). A more evolved vision – people/human-centered one [11-16] - of smart cities has led to a different definition of what smart ecosystems should be, a definition that has been obtained by taking into consideration also the citizens’ opinions [11,12]: "*Ecosystems are smart when individuals, as member of a community, taking part in local sustainable processes achieve a high level of skills and, at the same time, feel also strongly motivated and engaged by continuous, adequate and shared challenges, provided that their primary needs are reasonably satisfied.*". Such definition - which has been slightly upgraded with respect to the original one (see underlined words) to make more clearly emerge the concepts of sustainability, active participation and individual perception - can be applied to any complex techno ecosystem, at any scale: smart regions, smart cities, smart universities, smart schools, smart working places, etc..

Following and according to the above definition, the smartness of an ecosystem has been identified in a multidimensional construct [17] (the so-called ASLERD [18] pyramid), see fig. 1, derived from the integration of the theory of *flow* [19] with the *Maslow's hierarchy of needs* [20] adapted to techno-ecosystems (see fig. 2). It is worth noting, in fact, that the *basic needs* include not only the individual needs considered by the Maslow's pyramid (food and security) but also those characterizing a techno-ecosystems (infrastructures, access to services and info) and their livability (environment, mobility), in accordance with what is considered relevant by the citizens [11,12]. Going up in the ASLERD pyramid we find the social and psychological needs. It is important to note that in fig.1 social needs are expressed in a more generic form - *social interaction* – with respect to the Maslow pyramid where the needs of love and belonging are considered. The last two levels and partly the third last (satisfaction stays at the opposite of frustration) are connected to the achievement of the *flow* state since the meaningfulness of any experience is strictly related to the level and quality of the challenges proposed to the individuals (or to a community) by the context and, as well, to the capability of the challenges to foster the exploitation of people's inner potentials, that in turn generate the demand for higher level challenges (but still engaging and appealing). Progression along this spiral is expected to lead to self-realization, i.e. to the achievement of the top level of the ASLERD pyramid.

Fig. 1. The dimensions that contribute to defining the smartness of large techno ecosystems (ASLERD [18] pyramid – Association for Smart Learning Ecosystems and Regional Development).

3 Relation between the ASLERD pyramid and the design for the experience

Since design for the well-being can be considered an extension of the design for the experience, before dwelling on the concept of *wellbeing* and its relationship to the *smartness* of techno ecosystems, it is important to analyze the relationship between the *design for experience* and the *ASLERD pyramid*. This also considers that every process that takes place in an ecosystem represents an experience for the involved individuals. For this purpose, it is important to define, first of all, what is meant by *experience* in this context [4,5]: each experience is a *process*, each experience (even if collective) is *personal* and each experience can be *contextualized*. Moreover, each experience is *dynamic*. For this reason, fig. 2 provides a static representation of the experiential space as a 3D space built on three main axes – *process, individual, and place* - to which is added a fourth dimension, the temporal one, needed to account for the dynamical nature of the experience (pre – during – post).

On one of the main axes, *process* one, are shown the three layers of the organic process [31] that, in our opinion, represents at best the *experience as a process*, since such layers map the three basic functionalities that all *living organisms*, at any level, fulfill:

- investigate the environment to collect information & learn;
- elaborate the information to design/produce;
- communicate the *outcomes* by means of *behaviors* that, in the case of very complex organisms, may occur by means of very highly structured and conventional languages.

All three functionalities/layers are expected to be active throughout the entire experiential process, albeit with different intensities depending on the phases and the stage of the evolution of the experience.

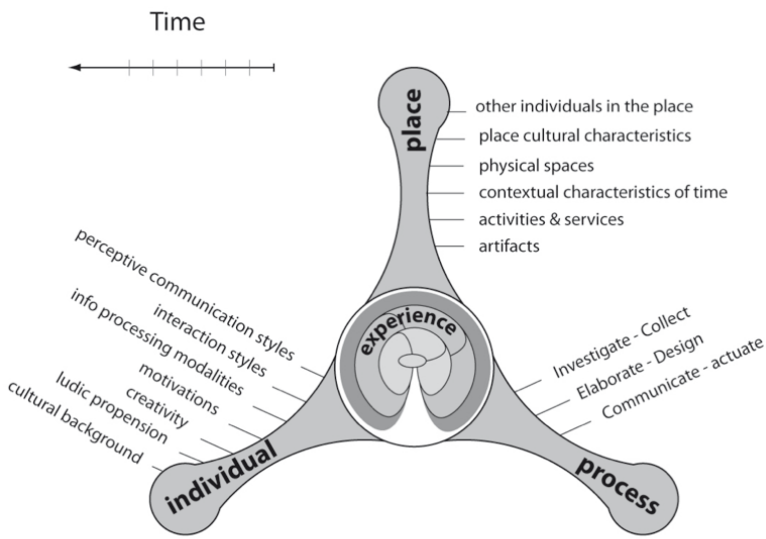

Fig. 2. 3D + 1 multidimensional model of the experience.

On another axis, the *individual* one, are shown the individual *experience styles* (sub-dimensions of the main axis). They include: perceptive-communicational preferences (in/out), information processing peculiarities (sequential/global; by contrast), interaction styles (physical, social, emotional, cognitive), game attitude (propensity for competition, risk, vertigo, and mimicry [52]), creativity with the propensity for divergence and innovation, intrinsic motivation (the engine of the individual experience not included in other experience styles). Of course, many of the experience styles listed above could be detailed further through a subdivision of the subspace of representation.

Finally, on the third axis are shown the characteristics of the *place* within which the individual interacts and coevolves: the average (or individual) characteristics of people/persona (others from our main actor) who are acting in the place, the own characteristics of the place (cultural stratifications, typology, etc..), the characteristics of physical and/or virtual spaces (lighting, noise level, weather conditions, location, size, etc..), associated activities/services, interactions with other contexts/place (modalities and intensity of the non-locality), the contextual characteristics of time (season, month, day, hour, etc..), the characteristics of artifacts relevant to the process considered, etc.. Some features of the place may emerge as a product of the interaction between the individuals and the environment, or among places, and tend to stratify (cultural stratification -> *cultural DNA of the place*).

The place, therefore, can be seen as the context within which the individual is merged, and with which interacts and coevolve.

It is possible, thus, to assume a point of view that we could define *external* with respect to the ecosystem in which the focus is on the *individual's experience* and on her/his interaction with the elements of the context. In other words, in this case, the focus is more on the sub-dimensions of the *individual* axis, rather than on those of the *place* axis. Differently, we can think of the place as a social ecosystem - to which the community (and all individuals) belong - whose functioning determines the experience of the community/individuals. In this case, the focus shifts to the sub-dimensions of the *place* axis that are shown also in fig.1. The sub-dimensions of the *place* axis in fig. 2, in fact, tend to coincide with the lowest levels of the ASLERD pyramid.

It is worth noting how during the last few years an increasing number of designers (and not only) are paying more attention to the elements of a place that define it as a natural context [42], up to taking into consideration also *non-human personas* (animals and plants) [43]. Within certain limits, this enlarged design perspective falls into what could be called *environmental preservation*, which applies not only to the cultural stratifications (i.e. the cultural objects) but also to all other components of a natural ecosystem. In fact, the ultimate goal of such attention could be, anyway, considered for the good of humans and, anticipating the next section, can be put in strict relation to the contribution that the environmental dimensions of the ASLERD pyramid could provide to the overall well-being (see fig. 3). For sure it implies the worry about the well-being of other than human entities, but one has also to realize that humans could provide their opinion and take part, for example in participatory evaluations, while other non-human entities cannot. In other words, at least up to now, in any design act has been always the human that has defined the conditions of the well-being of non-humans. This latter depends only on the level of awareness and responsibility of the humans for a living environment, that only they have the possibility to modify consistently and permanently by means of design acts (although also some non-humans may slightly shape temporarily the environment).

As you go up the levels of the ASLERD pyramid and move towards social and psychological needs, the focus tends to shift from the ecosystem to the community that, in principle, could be declined also in terms of subgroups of individuals or even single individuals. Moving toward the upper levels of the ASLERD pyramid, thus, would imply also moving away from the average behavior of a population to approach that of single individuals or subgroups of individuals.

Finally, a further element worth reflecting on is the progressive degree of independence that machines, despite being man-made artifacts, are achieving. Likely, with the development and spread of artificial intelligence applications, we may one day, probably not far off, reach a point where it will no longer be easy to distinguish the boundary between machines and humans. This boundary goes far beyond recognizing or not recognizing the capability of a machine to chat as a human [44,45] or detecting unintentional biases induced in the behavior of humans by the design of given algorithms [46,47]. It will concern the difference between being competent or not being competent, being capable to produce new cultural objects or not [50]. We will be faced with a situation where we will have to ask ourselves if the machine is capable of *acts of design* (regardless of the field of interest). At present, the ability of machines to interact and react is exclusively the result of highly sophisticated statistical approaches that, using a huge amount of data, can determine plausible answers from what it has been. Nothing prevents us from thinking that at some point machines might be able, thanks to improved statistical approaches, to produce inferences, i.e. to identify plausible actions that are not included in what *has been* but that would be part of what *could be*. In other words, machines might become able to *read between the lines* (the etymology of the word intelligent) and, therefore, *perform acts of design*. Perhaps it might be time to start thinking about how this might impact human experiences and the *smartness* (and *well-being*, see next section) of a people-centered smart ecosystem, also as the result of the action of human-designed artifacts.

4 Relation between the ASLERD pyramid and the well-being

Design for well-being and in particular the design of technologies capable to support and foster the achievement of well-being [1,2] represents an extension of the design for the experience [3,5] and implies the need to identify the meaning of the term *well-being* together with the factors that contribute to its achievement. The meaning and causes of the well-being, however, together with the complexity of the construct describing it, depend on the complexity of the technological ecosystem that is expected to mediate its achievement. To justify this statement let's go back for a moment to the origin of the civilization. The first artifacts realized by our ancestors were certainly capable to satisfy the demand of ergonomics, effectiveness and efficiency with respect to the execution of specific tasks. The outcomes derived from their use - for example getting more abundant and higher quality food - have certainly caused an increase in something that can be defined as *well-being*. With time the technologies designed and realized by humans

increased in complexity, pervaded the vital space, the whole ecosystem, and started to shape it. At the same time the ways through which they have been able to mediate the achievement of well-being changed. Inevitably also the construct describing well-being became more complex, either due to the redefinition of the ecosystem and to the need to take into consideration also psychological and social implications.
By comparing [21] the multidimensional construct reported in the second column from left of fig. 3 with the quality of life indices defined by EUROSTAT (to measure the level of well-being [38] generated by a context) one realizes that the lower four levels of the ASLERD pyramid are strictly connected to the well-being induced by an urban context in the citizens. As a consequence *design for the well-being* of smart cities, or other complex techno ecosystems, is expected to support the capability of the environment and of the embedded technologies to foster the increase of the ecosystems' smartness. At this point it is important to stress that the ecosystems' smartness should be considered a social construct and that it should emerge, bottom-up, from the feelings of the citizens whose needs have to be satisfied: from the most basic ones to the most sophisticated and complex ones, like those of social and psychological nature not considered by the EUROSTAT.

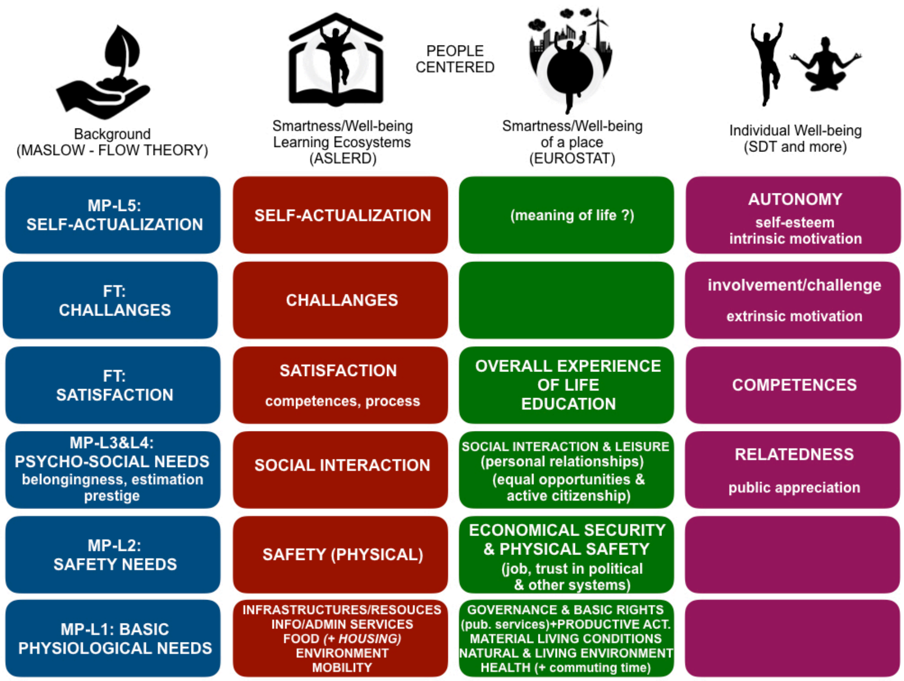

Fig. 3. ASLERD pyramid of *smartness/well-being* (amaranth boxes) compared with a) the constituents of the Maslow pyramid [20] and of the *flow* theory [19] (blue boxes); b) the elements considered by the EUROSTAT [17] to define the well-being generated in a person by a context/place (green boxes); and the pillar of the *Self-Determination Theory* [18] (violet boxes) to determine the individual psychological well-being (in particular in a working environment).

In this context, the key point is the identification of an additional framework that integrated with that produced by the EUROSTAT allows to map the ASLERD pyramid on the total individual well-being.

This framework is offered by the Self-Determination Theory (SDT) [22] considered capable to explain the relationships between design features and individual well-being [23]. For SDT, the primary psychological needs to be satisfied are *autonomy*, *competence*, and *relatedness* of the individuals. Where such primary needs can be retrieved in levels of the ASLERD pyramid? Whether you look at the pyramid from the point of view of the individual, or from that of a community, autonomy, competence, and relatedness are in relation to the higher levels of the pyramid. In particular, relatedness coincides with the need for social relations (fourth last level) which is certainly the basis for both self-appreciation and public appreciation. As seen previously, the last levels of the pyramid are closely linked to the ability of the techno ecosystem to stimulate the state of flow, that is a state of engagement. This latter is characterized by a high level of satisfaction, which also contributes to the perception of possessing adequate skills to address the challenges posed by the technological context. As well-known, and already stated above, to maintain the state of flow with time the level of the challenges must be increased to prevent the development in the individual/community of a state of boredom and, as well, to foster the development of a higher level of competences. This is a mechanism that reminds the learning stimulated by the encroachment in the proximal space of development [24]. Maintaining the flow state is therefore the main way towards self-fulfillment and self-realization of individuals and of the community. Certainly, the engagement associated with the state of flow, generated by the adequacy of the challenges, also implies an adequate perception of autonomy and, probably, increases the level of extrinsic motivation. This latter is different from the intrinsic motivations which have a different and potentially very varied origin. It should be considered the main engine of the ongoing processes, capable to stimulate their development, together with that of the associated activities and behaviors. Nevertheless, the achievement of an adequate degree of self-fulfillment can also provide reinforcement of intrinsic motivations.

We would like to stress that in complex techno ecosystems, like smart cities, the scale of reference is that involving the whole community, the social one, but nothing prevents the possibility of scaling down to study the effects of the techno-ecosystem, or a part of it, on subcategories of individuals and/or on specific behaviors and tasks. It is unavoidable that if you zoom in on specific technologies or tasks, you may end up with the interaction between the individual and the interface offered by the technologies, as in standard Human-Computer Interaction (HCI) investigations. We therefore can state that the nature and the level of detail of the investigations depend on the scale of interest of the investigator either with respect to the techno ecosystem or to the society, since the latter is made up of individuals. At all scales, however, the ASLERD pyramid of smartness can act as a framework of reference for *smartness* and *well-being*. Indeed, the discussed overlapping with the Maslow pyramid plus the flow theory from one side and with the EUROSTAT framework and the SDT from the other side, see fig. 3, works pretty well, although it is not perfect, for example for what concerns the cause and/or the mediator role of some constructs. This latter is certainly an issue that would be worth exploring in greater detail in the future.

5 Notes on the innovation process

Although it is not one of the foci of this article, another connected aspect, worthy of being analyzed, is the modification of the techno ecosystems that is induced by the technological developments or, in other words by the technology innovation and adoption process which is subjected the context due to the continuous introduction of new technologies.

From the point of view of the SDT, technology adoption is caused by the degree to which a "*system would enhance his or her sense of autonomy, competence or relatedness in any facet of life*" [23]. Actually, the adoption of a technology is only the last phase of an innovation process, which is a process that must go through a certain number of phases – for example, *awareness*, *acceptance,* and *adoption* [25] - and that involves, as well described in the literature, the concomitant intervention of numerous factors. In the past, in fact, scholars have proposed numerous models [26-29] to describe the innovation processes and several studies have been conducted to demonstrate the relevance of a given set of factors rather than another. At present, however, the causal relations among them, if any, have not yet been fully identified.

The situation becomes more complex if, instead of a well-identified technology and of a confined context, we have to consider a techno ecosystem. Even more complex the situation becomes if the acceptance phase is forced by contingent events like what has happened during the pandemic outbreak for, among others, also learning ecosystems, with the switch from f2f to online learning [30,41].

In very large ecosystems permeated by many, and often, interconnected techno-systems and infrastructures, like smart cities, the innovation processes take on even more peculiar characteristics since new technologies are introduced continuously. Although the innovation may concern a given sector, and therefore a given level of the ASLERD pyramid, new technologies may often interlace with many other technologies making it difficult to trace the effects of their introduction. In other words, large techno ecosystems are characterized by the coexistence of all phases of an innovation process, which at the same time affect different subsystems and/or applications and, due to the interaction between multiple systems/applications, may prevent to conduct studies at the scale of a single technology. In fact, even in the case in which we wish to limit ourselves to study the interaction between an individual and a single technology, this latter would be most likely interlaced with other technologies to which the individual is exposed, so that it would be difficult to determine in a simple way the effects of the technology under consideration on the well-being of the individual, for example at the behavioral scale.

6 The evaluation of the ecosystems' smartness/well-being

Evaluating the level of smartness-wellbeing produced by a smart ecosystem (and even single applications) is still an open topic (see for example the open debate inside the SDT-HCI community [51]), and that is why in this section we report an example (citing others as well) of how this level can be evaluated in the case of smart learning ecosystems, even for comparative purposes. To evaluate the *smartness-wellbeing* of complex ecosystems, defined as a multidimensional construct (see fig.3), one can adopt either a top-down and/or a bottom-up approach. In the first case, one has to identify a consistent number of measurable indicators and indices for each of the dimensions that compose the construct. This is the approach that has been followed to produce smart city rankings, based for example on the six-pillar model, and that is affected by the criticalities discussed in [11-13]. The second approach, the bottom-up one, implies the active participation of the individuals in the assessment of the ecosystem's smartness/wellbeing. This latter is the approach that best fits with a people/human-centered vision of smart cities, and other smaller ecosystems (universities, schools, etc.). It implies the use of questionnaires and the need to involve the individuals - who animate the ecosystems of interest - in a participatory evaluation (co-evaluation) process.
For each type of ecosystem, it is necessary to map the dimensions of the ASLERD pyramid on a set of factors to be evaluated by the individuals. The questionnaires must include both quantitative and qualitative questions. The first ones allow for the use of adequate statistical methods aimed at determining the contribution of each level of the construct to the well-being of the ecosystems. The second one allows identifying at best the aspects (including criticalities) that have determined the numerical evaluations.

In the past we have conducted fairly detailed studies in the case of universities and schools involving, in many cases, individuals with various roles (e.g. teachers, parents, students in the case of schools; teachers, researchers, doctoral students, bachelor/master students in the case of universities) [32,33].

In one of these studies, we involved the students of a certain number of European universities [21]. By studying the correlation among factors, we observed that not all the dimensions of the ASLERD pyramid contributed in a considerable and independent way to the definition of perceived well-being. For the students, the most relevant dimensions, albeit not completely independent (orthogonal), were those concerning the physical infrastructures, administrative-information services, and food, together with the dimensions related to the social and psychological needs: social interaction, challenge, and self-realization. By performing a principal component analysis (PCA) [39,40] of the data it was possible to plot the position occupied by the universities over the years on a 2D plane defined by the first two principal components, see fig. 4, and, as well, to identify a direction of increasing smartness (red line from left to right).

Using the same approach but involving more categories of actors - for example students, teachers and parents of a school - it was possible to show how the perceived level of smartness can differ from category to category and to follow its evolution from one year to the next [33]. In principle, it would be possible to evaluate the level of smartness/well-being perceived by each individual, but this was not the aim of our studies, which were used, instead, to trigger a process of improvement needed to support the increase of the level of smartness/well-being perceived by each macro-category of actors and by the community as a whole. To this end, the answers to the open questions were examined, which made possible to identify the specific problems felt by each category and to start co-design processes [34-36] dedicated either to the improvement of processes and technologies already in place and/or to the design from scratch new ones.

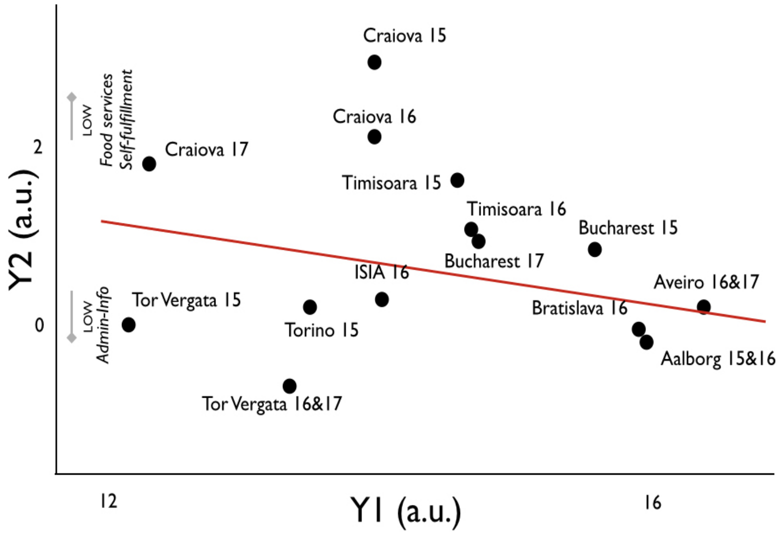

Fig. 4. Positioning of the universities on the plane identified by the two principal components, Y1 and Y2. Y1 and Y2 have been derived from a PCA applied to a reduced set of indices: Infrastructures, Food services, Access to admin service and info, Support to socialization, Challenges, and Self-fulfillment selected as explained in [21]. The red line indicates the direction of increasing "smartness" (from left to right).

The evaluation approach described above, as well as the activation of the virtuous circle of *participatory evaluation - re-design* can be pursued only in the presence of a technologically mature ecosystem, i.e. a system in which the process of technological innovation has reached its steady state and the various phases of this process take place in parallel following a continuous and controlled introduction of new technologies (as discussed in section 5). This evaluation approach, most likely cannot be used in ecosystems that are upset by the sudden and forced use of a set of technologies, as happened for all learning ecosystems during the pandemics. In this situation, there is no longer any stable framework of reference, and becomes very difficult to extract reliable information on the evolution of the innovation process or on the factors that sustain its progress. Indeed, the sudden switch from face-to-face teaching to online teaching of all learning ecosystems resulted in the forced adoption of a significant bouquet of learning technologies by all the actors of the educational processes and this required to carry out over the time-prolonged monitoring of the educational ecosystems (see the case of the Italian schools still in progress [30,37,41]), with the aim to understand how the innovation process was evolving and which factors have been capable to influence its development. Only once the steady state will be reached - which most likely will occur in a period estimated between two and five years [25,26] - it is possible to evaluate again the level of perceived smartness/well-being using the approach described above and get reliable information of the effects provoked by such a technological shock on learning ecosystems and the associated players/stakeholders.

7 Conclusions

Although Design for wellbeing is still in an early stage, as we have shown in this contribution, it is possible to construct a framework that can help designers take on welbeing as a goal for interventions at any level of scale including the ecosystem one that characterizes, for example, smart cities or smaller ecosystems such as learning ecosystems.

The key to the theoretical framework lies in adopting a people-centered perspective of ecosystems at any scale. Indeed, the assumption of this perspective has allowed us to define a multilevel construct based on a customizable integration of Maslow's pyramid of needs and the concept of flow, a construct that we have defined as the smartness of the ecosystem. The reflection made on the concept of well-being and the definitions that have been given of it allowed us, moreover, to show how smartness is a complete construct because on its levels can be mapped both the wellbeing generated by the living conditions "controlled" by the context and the wellbeing perceived at the individual level due to the involvement in the technologically augmented processes that take place within the ecosystem.

Mapping wellbeing onto smartness allows this latter construct to be used both for an overall bottom-up (i.e., people-centered) assessment of the ecosystem as a whole and/or for the assessment of more limited sub-processes, or to make emerge the perceptions of specific categories of actors. Evaluation choices that determined by the specific interests of the designers or of the stakeholders. Smartness serves as a flexible framework for an evaluation process that in its evolution could also show how some dimensions might have negligible relevance for a given class of ecosystems (as happened in the case of measurements performed on university smart learning ecosystems).

It was also shown how the smartness-wellbeing construct incorporates the perspective of design for the experience with the possibility of focusing more on the contextualization or on the personalization of the experience, depending on the levels of the construct that are given more consideration by the designer, either in the design phase or in the evaluation one.

A critical point, especially in performing evaluations, may be represented by the continuous innovation processes in which interacting technologies within cooperating technological systems are continuously introduced (as in the case of smart cities) and in the case of forced innovation processes (such as those that took place on occasion of the recent Covid-19 pandemic). In such cases, a continuous monitoring is necessary to identify when the ecosystem has reached a steady state, albeit a dynamic one, as in the case of large ecosystems.

Certainly, the theoretical framework, which has been tested in the case of learning ecosystems, would need further testing to demonstrate its applicability at all scales and for all technologically augmented experiences and, as well, to identify possible correctives. This is the work that the scholars interested in design for wellbeing - hopefully a growing number- will be left to do in the next future.

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