

Society 5.0 and Social Development

Carlos Miguel Ferreira¹, and Sandro Serpa^{2,*}

1 Interdisciplinary Centre of Social Sciences—CICS.NOVA, Polytechnic Institute of Castelo Branco, Estoril Higher Institute for Tourism and Hotel Studies, 1069-061 Lisbon, Portugal; cmiguelferreira@ipcb.pt ORCID: <https://orcid.org/0000-0002-0130-4650>

2 Department of Sociology, Faculty of Social and Human Sciences, University of the Azores, Interdisciplinary Centre of Social Sciences—CICS.UAc/CICS.NOVA.UAc, and Interdisciplinary Centre for Childhood and Adolescence—NICA—UAc, 9501-801 Ponta Delgada, Portugal; sandro.nf.serpa@uac.pt ORCID: <https://orcid.org/0000-0003-4286-4440>

* Correspondence: sandro.nf.serpa@uac.pt

Abstract: In this working paper we intended to address the emergence of what, potentially, will be a central concept in the very near future, Society 5.0 and that arises politically in (with) following the implementation of the concept of Industry 4.0. Society 5.0 proposes to deepen the potential of the individual-technology relationship in the promotion of the improvement of the quality of life of all people through a super smart society, is an extremely recent concept as a guiding social development that can have a profound impact in societies at all levels, such as quality of life and sustainability. It is a presentation that is based on very recent³ publications, but which also has a prospective component, which always generates some indetermination and uncertainty. Also, for this reason, it is a contribution that seeks above all else to contribute to this very urgent and necessary discussion.

Keywords: society 5.0; industry 4.0; social development; sustainable innovation.

1. Introduction

The idea of progress has often been associated with modernity and social theory itself (Mouzakitis, 2017, Chavarro, 2018). In the bibliographical research carried out, as a curiosity the Wikipedia itself (in a consultation held on April 14, 2018) has referred to the concept of Industry 4.0 (Wikipedia, 2018), which raises interest worldwide in several, but it still does not have the concept of Society 5.0 (Wikipedia, 2018b). In this paper, we can see that there is a lack of knowledge about the concept of Society 5.0 (Wikipedia, 2018b).

From a longitudinal perspective, for Harayama (2017, p. 10):

“So, just what is Society 5.0? Taking a long view of history, I think we can define Society 1.0 as groups of people hunting and gathering in harmonious coexistence with nature, Society 2.0 as forming groups based on agricultural cultivation, increasing organization and nation-building, Society 3.0 is a society that promotes industrialization through the Industrial Revolution, making mass production possible, and Society 4.0 as an information society that realizes increasing added value by connecting intangible assets as information networks. Society 5.0 is an information society built upon Society 4.0, aiming for a prosperous human-centered society.”

In this article we intend to observe the emergence of what, potentially, will be a central concept in the very near future, Society 5.0 as "proposing to further the potential of the individual-technology relationship in fostering the enhancement of the quality of life of all people through a super smart society" (Serpa, & Ferreira, 2018) and that arises in part in (with) following the implementation of the concept of Industry 4.0. and their impact (Shamim, Cang, Yu, Li, 2017; Liao, Deschamps, Loures, & Ramos, 2017). It is an

argumentative analysis, while position manuscript, which is based on some very recent publications, but also has a prospective component, which always generates some indeterminacy. Also, for this reason, it is a contribution that seeks above all to collaborate to open this discussion.

To that end, a chapter is presented in which the concept of Industry 4.0 is presented and discussed, followed by an analysis of Society 5.0.

2. Industry 4.0

Industry 4.0. is often considered to be a fourth industrial revolution because of the profound effects it brings and will bring as a new productive paradigm with application in various areas of activity (Abreu, 2018; Morrar, & Arman, Mousa, 2017; Liu, Cao, Yang, & Jiang, Nogal-Davila, Fernández-Caramés, Díaz-Bouza, & Vilar-Montesinos, 2016, and Angelo, Lloyd, Deschamps, Goh, Saldivar, & Li, 2017; Pilloni, 2018).

This concept of Industry 4.0 emerged in Germany in 2011 in the quest to apply digital computer technologies to production (Abreu, 2018, Morrar, & Arman, Mousa, 2017, Pilloni, 2018, Ang, Goh, Saldivar, & Li, Sasajima, Takayanagi, & Kanamaru, 2017).

The concept of Industry 4.0 is generally accepted in the body of scientific knowledge (Abreu, 2018), despite some variations in its definition and consideration of its social and political implications (Müller, Kiel, & Voigt, 2018). But what exactly does Industry 4.0 consist of? It can be considered that "it consists in comprehensive and systematic digital networking of the creation, logistics and use of products or services" (Hennies and Raudjärv, 2015, p.1). In summary:

"Industry 4.0 includes horizontal integration of data flow between partners, suppliers and customers, as well as vertical integration within the organizational structure, involving factors related to the development of the final product and combining the real world with the virtual world. The result is a system where all processes are fully integrated, thus building an updated information platform in real time" (Abreu, 2018, p. 129).

Then, Industry 4.0 looks for an integration between technology, virtual space and the human being, between the real world and the virtual world resulting in a true collaborative network (Hennies and Raudjärv, 2015) that articulates: intelligent robots; automated simulations; Internet of things; cloud computing; additive manufacturing; and big data analytics (Ang, Goh, Saldivar and Li, 2017).

In this logic of integration of the real with the digital, the "smart factory" is central (Lin, Shyu, & Ding, 2017, p.4):

"The smart factory is a core concept of Industry 4.0, which employs cyber-physical systems to monitor the physical production processes of the factory and make decentralized decision-making possible. Then the physical systems become the Internet of Things, communicating and cooperating both with each other and with humans in real-time via the wireless web."

According to Müller, Kiel, & Voigt (2018), industry attention is focused too much on the economic and technological dimensions (Pfeiffer, 2016; Pilloni, 2018). as well as technological (Morrar, Arman, & Mousa, 2017; Moniz, & Krings, 2016).

Innovation is another fundamental concept in Industry 4.0 (Hennies and Raudjärv, 2015; Palazzeschi, Bucci and Di Fabio, 2018; Shamim, Cang, Yu, & Li, 2017; Center for Research and Development Strategy: Japan Science and Technology Agency, 2017). In order for permanent innovation to occur, learning for change and flexibility, both individual and organizational, is essential and not just technology (Abreu, 2018; Palazzeschi, Bucci, & Di Fabio, 2018; Shamim, Cang, Yu, & Li, 2017 Morman, & Mousa, 2017):

"The social perspective demonstrates that technical innovations are likely to positively affect the diffusion of social innovation, and vice versa. The technological revolution that accompanies the Industry 4.0 achieve its true potential in combination with social innovation. Hence, businesses that

succeed in Industry 4.0 will be those that offer both social progress and economic benefits.” (Morrar, Arman, & Mousa, 2017, p. 18).

This context, presented from a forma direta, is one for socio and social essential of the emergency of Society 5.0.

3. Society 5.0

Wang, Yuan, Yong, Wang, Xiao, & Qin (2018) indicate that the concept of society 5.0 emerged in 2015 having this concept emerged in Japan (Abreu, 2018) in a strategic national political initiative (Keidanren, 2016; Harayama, 2017; Center for Research and Development Strategy: Japan Science and Technology Agency, 2017). Society 5.0 is followed to a certain extent by Industry 4.0, and while Industry 4.0 focuses on production, Society 5.0 will seek to put human beings at the center of innovation for Prasetyo, & Arman, (2017) and Costa (2018) (I-SCOOP, 2018; Serpanos, 2018), taking advantage of the impact of technology and the results of industry 4.0 with the deepening of technological integration in improving quality of life, social responsibility and sustainability.

For Hayashi, Sasajima, Takayanagi, & Kanamaru, (2017), Japan with Society 5.0 seeks:

“create new values by collaborating and cooperating with several different systems, and plans standardization of data formats, models, system architecture, etc. and development of necessary human resources. In addition, it is expected that enhancements of intellectual properties development, international standardization, IoT system construction technologies, big data analysis technologies, artificial intelligence technologies and so on encourage Japan’s competitiveness in “super smart society”” (p. 264).

Keidanren (Japan Business Federation) (2016) presents as aims of Society 5.0:

“Every individual including elderly people and women can live safe and secured comfortable and healthy life and each and every individual can realize his/her desired lifestyle. . . .

Improvement of productivity through digitization and reform of business models are promoted, and at the same time, the new economy and society will be realized by promoting innovation and globalization. . . .

Efforts are made to solve a pile of issues of our country such as falling population, super aging society and natural disasters so that rich and vigorous future will be realized. Through overseas expansion of new businesses and services, we can contribute to solving global scale issues as well.” (p. 10).

There are several challenges to be faced, such as Serpanos (2018): “especially when considering legacy OT systems; the challenges include software integration and upgrade, network interoperability, synchronization in light of real-time processes and applications, and, importantly, security.” (p. 72).

To that end, it is essential: “Formulation of national strategies and integration of government promotion system”, “Development of laws toward implementation of advanced techniques”, “Formation of the knowledge foundation”, “Dynamic engagement of all citizens in the new economy and society”, e “Integration of advanced technologies and society” (Keidanren (Japan Business Federation), 2016, p. 14).

As Wang et al (2018) puts it (p. 6):

“The fundamental theory of Societies 5.0 research is parallel intelligence, which is a novel methodology that extends the traditional artificial intelligence theories to the emerging cyber-physical-social systems (CPSS). More specifically, parallel intelligence is particularly effective in dealing with “human-in-the-loop” type issues with both social complexity and engineering complexity, and aims at seeking agile, focused, and convergent solutions to these uncertain, diversified, and complex issues.”

Society 5.0 therefore has the ultimate goal of improving people’s quality of life by mobilizing the productive and technological potential of Industry 4.0:

"A super smart society is characterized as follows: a society where the various needs of society are finely differentiated and met by providing the necessary products and services in the required amounts to the people who need them when they need them, and in which all people can receive high-quality services and live a comfortable, vigorous life that makes allowances for their various differences such as age, sex, region, or language" (Harayama, 2017, p. 10).

As a last and to some extent unavoidable goal: "it promises to revolutionize society as we know it, and to improve our way of living and living in community, in our personal and professional life" (Costa, 2018).

"The anticipated continued progress of IT will provide individuals and society tremendous opportunities for innovation, growth, and prosperity through human-machine collaboration and co-creation; however, this same advancement is also presenting unprecedented ethical, legal, social, security, privacy and safety challenges that need to be addressed before the true benefit of these opportunities can be realized." (Center for Research and Development Strategy: Japan Science and Technology Agency, 2017, p. 1).

These potential social and educational implications are also recalled by Horikawa in 2017:

"Unprecedented high-speed outcome of innovative technology infiltrate into our social life and we, citizens are compulsory facing the mass flow of actual good and bad influences in our daily life without our notice.

Important subjects of Ethical, Legal, Social Challenges caused by implementation of leading-edge technology to our society is facilitated and this discussion bring us deeply further to the issues to tackle and fast actions to catch up." (Center for Research and Development Strategy: Japan Science and Technology Agency, 2017 p. 233).

However, to achieve this it is necessary to:

"We anticipate a future in which people and the built and natural environments are melded at multiple temporal and spatial scales. The integration of sensing (embedded around, on, and in us), communication, and computation advances converging with our increased knowledge about human perception, cognition, behavior and physiological functions will likely create this future. Yet, to achieve this aspiring state, a fundamental conceptual rethinking is needed at different levels. First, rethinking of physical infrastructure not any longer considered only as a physical entity but deemed as a service; second reframing of other more traditional service systems as we know them today as cognitive cooperative systems. In this new realm the cyber-physical world will cooperate and work side by side with the human world. However, this future can only be viable with the emergence of new bold research to catalyze interdisciplinary social and hard sciences and engineering. These convergences is needed to shape human-technology partnerships that provide a sustainable, vibrant, livable people-centric world. Research, social and ethical implications of this future are discussed." (Medina-Borja, Center for Research and Development Strategy: Japan Science and Technology Agency, 2017, p. 235).

There are, then, many of the challenges I pose to the deployment of Society 5.0.

5. Conclusions

The Society 5.0 is a proposal for human and social development with respect for sustainability being a national design in Japan (Keidanren, 2016). Although we believe that this concept (or at least the underlying objectives) will be extended to other countries.

For the implementation of Society 5.0 not only be a political-ideological concept, it seems to be necessary to integrate several dimensions, such as: "1) Innovation Policy (from government side), 2) Entrepreneurial spirit (from Society Side) and 3) Entrepreneurial Skills (from civil society and institutions)" (Yousefikhah, 2017, p.38).

It is an issue with the future open (i-SCOOP, 2018):

“Whether such a vast societal change will work, and the wall of social acceptance will be broken down is a question that will be answered in the future. Making predictions in this regard would be Western arrogance from our part and a big mistake. So: who knows? And is this a model we could envision in other parts of the world?”.

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