International Journal of Arts and Social Science www.ijassjournal.com
ISSN: 2581-7922,
Volume 3 Issue 3, May-June 2020.

Futuristic Scenarios of Technological Prospective in Software Developers

Angel Salvatierra Melgar
Graduate School, César Vallejo University, Lima, Peru
https://orcid.org/0000-0003-2817-630X

ABSTRACT: *The study proves the need to identify involved people´s perceptions about futuristic technological scenarios in the training of those of software development professionals, approaching from the arguments of the non-experimental methodological design of an explanatory descriptive type developed in an intentional sample Due to the role played by each element of analysis within the institution involved in the study, a questionnaire was provided for each study variable where the data were collected, showing the results by levels and the pseudo r 2 coefficient reported by the regression statistician logistics, reaching the next conclusion. The design of future scenarios of technological foresight shows an impact on the level of uncertainty for the training of software developers at the Higher Technological Institute, since it contributes significantly to the planning of strategies, reaching higher levels of effectiveness and efficiency of the educational service and respond to uncertain upcoming demands.*

KEYWORDS: *Futuristic Scenarios, Technology Foresight, Software Developers*

I. INTRODUCTION

Organizations currently need to be more reflective about upcoming technological changes to respond to current international needs and circumstances [1] (Leduc & Ponge, 2018), and should be more interested in those new technologies that originate in different areas of interest. for the organization. New technologies can create strategic opportunities that allow continuous improvement in their functional processes [2] (Amorós Pons & García González, 2015), they show threatening risks since the advertising context directs messages to consumers that are inappropriate for their field or training professional, which is the result of natural evolution. The study shows the importance of designing futuristic scenarios of technological foresight that affect the level of uncertainty in the training of software developers to respond to the coming demands so that they respond to changes in different times and circumstances as they are lived. currently a pandemic. In this regard [3] (Rodríguez, 2015), conceptualizes futuristic design as a way to capture information and produce knowledge about the future and its application in the construction of viable and sustainable plans in a range of future scenarios, which we are undoubtedly very close or every day of our existence we are part of it.

In the studies by [4] (Rodríguez Figueroa, 2016), he designed a science, technology and innovation scenario for 2040, identifies the gap between Peru and Latin American countries, who states that in the future They will energize and prioritize science, technology and innovation that responds to the changing moment within a composition of creative thinking. Technological foresight helps to refine decision-making processes, analyze expert visions and design alternative scenarios that allow the formulation of strategies for achievements and skills for future professionals. [5] (Amezcua-Allieri et al., 2019) encourages the future production and extraction of products and their derivatives, as well as the use of alternative carbon energy that is replacing the use of fossil fuels based on rhythm changing technology and strategic objectives that help the development of a country like ours, in this regard [6] (Inche Mitma & Chung Pinzás, 2014), shows a prospective virtual university study to 2030, in its arguments based on the Strategic foresight of the French school based on Michel Godet

who applied strategic foresight with the methods of scenario analysis, structural analysis and the matrix of actors, these will allow designing strategies to evaluate a desirable future for university education in the virtual modality , [7] (Armijos, 2017), who manifests the main contributions of the prospective approach to academic management, which is manifested in an ace The approach of the thought and the prospective model directly in the institutions of university education, concludes that the correct application of a prospective model, the scenarios are obtained that lead to the improvement of the route to follow, under this argument [8] (Astarriaga, 2016) exposes the approaches to the processes of strategic reflection and planning, planning to the new challenges of the future that are posed to the strategic prospective itself and the coming changes of all kinds such as: social, transport, technological, communication, culture, among others , which should take into account in their strategy and uncertain planning process, which will be possible for developers of new systems, in this regard [9] (Zapata et al., 2015), states that generations of developers show relationships that determine their inclinations to start or continue software projects, this explains how complexity tends to energize and show the pred ominance to manage software developer cooperation effectively that responds to current needs and uncertain future.

In the study by [10] (Montoya & Julieth, 2016), the future that would allow them to inform themselves about possible policies to take into account in the long term in strategic plans for innovation in technological surveillance could occur, and therefore is designed based on of possible or "future" futures without falling into fantasy but into the imaginary world, [11] (Espinal, 2015). He quotes Maurice Blondel, however [12] (Jiménez et al., 2019), he proposes agile process of XP for in the development of software for robots on platforms for education, it is evident such as customer stories, diagrams based in UML, digital stamps and lines of code in the Python language that demonstrate good usability practices and the quality of code in software development using the paradigm useful for educational technology and research projects.

Under these arguments, the purpose of the study was to show the perspective of the design of future scenarios of technological foresight at the level of uncertainty in the training of software developers. The study was based on the training of software programmers, since it is a key element and has been involved in the main technological changes, since it has fostered the definition of new services and work models in organizations, and has promoted organizations improve the quality of service to its clients, develop innovative services, conquer new markets, and in general be more competitive and sustainable; therefore, it is essential to know future scenarios of technological foresight in order to help reduce uncertainty in the planning of new work schemes for organizations and especially technical training for software development.

This research will fill knowledge gaps about the uncertainty of technological foresight that gravitationally supports the operational management of technology organizations, which are increasingly dependent on computer systems, software-intensive, key to supporting their strategic leadership in the market, or on the contrary, favor its failure [13] (Anaya, 2006). In the same way, software has ventured into the fields of entertainment and home, modifying lifestyles and opening possibilities for new ways of working, developing new business models and technological training that is of importance to society, not the purpose of building new models for the training of software developers, inserting new scopes in the strategic plans of the institutions, this study helps to solve the complexity in decision-making of modifying strategic management plans and information technologies, reducing the uncertainty of identifying the best information on future technologies that will produce economic and / or social benefits for the country.

II. LITERATURE REVIEW

The theory of foresight, which is conceptualized as the future does not yet exist, this will only depend on the work of man "Godet (1987) and Jouvenel (1968) cited by [14] (Ortega, 2008), this could be defined as a multiple achievement framed within the arguments of reason, because the human being can build the best

possible future, depending fundamentally on a good decision made at the appropriate time, [15] (Berger & Loutre, 1991), the prospective it is a science that focuses on the study of the future in order to understand and influence it, it is also a systemic, dynamic, open discipline, with an integral vision, which shows possible scenarios about the future, not only because of the background of the past, but considering the changes in the future, changes of variables and the actors involved in this dynamism, that knowing this information reduces uncertainty,

According to the general theory of systems [16] (Enciso, 2018), in his theory of the analysis of wholes and the theory of internal and external interactions with his environment, he makes a useful contribution that explains how the phenomena that occur in the In reality, they facilitate understanding the prediction of future behavior from a known reality, [17] (Johansen, 2013). To understand prospective scenario theory, one must know the different types of scenarios of a possible future that are all those scenarios designed for the future that can be imagined, without taking into account whether or not it occurs; It is also explained that, the most feasible feasible scenarios occur and the desirable scenarios that the actors want to reach and can be classified as the most convenient scenarios [18] (Medina Vásquez, 2006)

Likewise, for the Organization and for Economic Cooperation and Development [19] (THE OECD., 2009), it defines technological prospective as a "number of systematic attempts to observe the possible future of science, technology, economy and society, in the long term with the aim of recognizing new technologies that are likely to impact on achieving the best economic and social benefits.

Technological foresight is also based, in the opinions of experts, not based on technical studies to project the present, but rather to identify critical technologies for the future in a strictly scientific-technological context, but instead collects the views of multidisciplinary actors in different fields of knowledge that help locate their visions in the evolution of technology as influential in economic and social evolution that could be oriented and managed from different points in the universe [20] (Migueláñez & Conde, 2011), connectivism, which It is the theory of learning of the digital age and this is theorized in the analysis of the limitations of the theories of behaviorism, cognitivism and constructivism, in this way it is explained how technology influences the way we act, in the way in which we learn and communicate [21] (Siemens et al., 2005), identify the components within this perspe ctiva a: strategic planning, refers to the strategic agents of an organization, technological changes; referring to the inclusion of new technologies, their ways of use, new rules of behavior and new derived products, the risks for decision-making.

Software development is a set of activities that incorporates the complexity of various areas, which implement the functional and non-functional requirements that determine the quality of the software developed, robustness, scalability, responsiveness, maintainability, verifiability, security and disaster recovery in order to meet the needs of dynamic technological changes in the future [22] (Porras Martínez, 2002), applying scientific and engineering principles that solve the immediate needs for information and knowledge

III. METHODOLOGICAL REVIEW

The study is based on the positivist paradigm of scientific research, an empirical-analytical rationalist method, a quantitative methodological approach [23] (Sánchez, 2019) of a non-experimental cross-sectional design with an explanatory descriptive scope, because they consider the phenomenon studied and its elements That composes. The study was carried out in an internationally recognized technological institution and pioneers in the forefront of SENATI technology represented by strategic workers who participate in the decision analysis processes in the elaboration of strategic and academic plans in a total of 30 workers, among administrative heads , academics and technological teachers, selected in an intentional non-probabilistic way [24] (Otzen & Manterola, 2017), data collection was performed using the survey technique with the application of different questionnaire instruments for the two independent and dependent variables [25] (Salvatierra, 2018),

the validity and reliability of the instrument's measurement scale was confirmed using the Cronbach's Alpha coefficient.

Table 1
reliability of the instruments of design of future scenarios of technological foresight and training of Software developers

Variable	Cronbach´s Alpha	Nª of elements
Design of future scenarios of Techological	.985	25
Prospective Software Developers training	.811	12

Data Processing Results - IBM - SPSS Statics

Table 1 shows the result of the Cronbach's alpha test for Design of Futuristic Scenarios of Technological Prospective of 0.985 and the training of Software Developers with 0.811, close to 1 [26] (Mateus-Galeano & Céspedes- Cuevas, 2016), allow us to affirm that the reliable instruments for application in the study sample.

IV. RESULTS AND DISCUSSIONS

After the field work that consisted of the application of the instruments, the data indicated below was organized, systematized and processed, in a first stage the descriptive analysis and inferential results

Table 2
Perception levels of the design of future scenarios and software development

Level futuristic scenarios	po%	Software development level	po%
Very Low (Extreme Uncertainty)	44.53%	Very low Capacities	20.00%
Low (High Uncertainty)	28.67%	Low Capacities	32.22%
Averange (Relative Uncertainty))	25.73%	Medium Capacities	37.78%
High Low (Uncertainty)	1.07%	High Capacities	10.00%
Very High (Insignificant Uncertainty)	0.00%	Very High Capacities	0.00%
Totals	100%		100%

Data Processing Results - IBM - SPSS Statics

The results shown with respect to the levels of perception of uncertainty about the future scenarios of technological foresight, is of a very low level of extreme uncertainty, which implies that organizations need to be more reflective about technological changes to respond to needs. current international [27] (Leduc & Ponge, 2018), should have greater interest in those new technologies to show the world and have more timely solutions since higher education schools in their virtual modality manage to integrate a series of diverse knowledge and are of interest to many people in the world, decentralizing teaching achieving benefits to students and improving diversity, inclusion and equity, the result of the study shows little encouraging regarding the level of software developers since 37.78% of those surveyed they present average levels of abilities, without thier in the study io of the new technologies of [2] (Amorós & García, 2015), also shows threatening areas since the advertising context is a way of manipulating and generating speculation for the population that is associated with the future scenarios of technological foresight that influence at the level of uncertainty of software developers, that is, the strategic actors do not show the future trend in technology to contribute to new institutional strategic plans that affect the academic service of the training of software developers, in addition it is observed that the predominant perception of the level of software development is medium capacity with a percentage of 37.78% implies that the majority of graduates do not achieve an expected capacity (High capacity), to determine that the student is highly competent in their spatiality.

As for the study by [3] Rodríguez (2015), he states that it is feasible to design scenarios that improve the management of public policies, which are aimed at closing the differentiation that exists in Peru with respect to Latin American countries and with others worldwide; applied the Delphi method, who manages to optimize the management of science, technology and innovation, however in the study only a small percentage presents this perspective knowing that it is necessary to design these scenarios of technological prospective is at the forefront of needs and respond At the national and international level, these arguments respond to changes in models that are not only responding to the needs of the day but have holistic visions to undertake teaching-learning models that help train software developers to obtain the capabilities desired by the institution, also 19.72% of the respondents, considers that the student obtains a very low perception of the future designs that could be presented in the future and the software developers to enter the technological field, in this regard [5] (Amezcua-Allieri et al., 2019) fosters the form of future production and extraction of product s and its derivatives thereof, likewise to the use of alternative carbon energy, in this direction it is described that the study is influenced by the design of future scenarios of technological foresight in the training of software developers, finding that 18.4% in the level of uncertainty, a result that must be kept in mind by software construction companies and by inertia, also higher education institutions to train specialists, however, in the arguments of [8] (Astarriaga, 2016) exposes approaches to the processes of strategic reflection and planning, planning or planning to the new future challenges in the social, transport, technological, communication, culture and other fields, which should be taken into account in its strategy and uncertain planning process, which will be possible for developers.

According to the study design and the objective of the research associated with the hypothesis, the inferences are shown below. For this purpose, we have the previous statistician, who allowed the follow-up of docimasia.

Table 3
Fitting Ordinal Logistic Regression Models of Futuristic Scenario Design and Achieving Capabilities for Quality Software Development

Model	Logarithm of Likelihood-2	Chi - squared	gl	Sig.
Intersection Only	20.597	15.899	2	0.000
Final	4.698			

Link function: Logit.
Source: IBM SPSS Statics results.

The results shown in the table have the statistic of the independence test, allowing us to affirm that future scenarios of technological foresight are not independent of the level in the training of software developers, which shows that the study variables are associated, since the Chi-square is 15,899 with a p_value of 0.00 at a statistical significance level of 0.05, which shows that the immediate opportunities to generate future designs are associated with the needs of software developers to be able to uncertainty when On the other hand, [9] (Montoya & Julieth, 2016) associates arguments where the policies to be taken into account in the long term in strategic plans are involved in technological surveillance for possible or “future futures” "Without falling into fantasy but into the imaginary world, under the argument [11] (Espinal, 2015), proposes an agile XP process for the development of software for robots on educational platforms, based on lines of code in the Python language that demonstrate good code quality practices in software development with the use of the Useful paradigm for educational and research projects.

Table 4
Model parameter estimates and coefficients of Pseudo r^2

Variable	Niveles	Parameter estimates					Confidence interval 95%	
		Estimate	Desviation Error	Wald	gl	Sig	Lower limit	Upper limit
Threshold	Developing:1	-2.044	0.737	9.678	1	0.006	3.490	-0.599
	Developing:2	2.044	0.737	4.014	1	0.021	0.599	3.490
Location	Design:1	-0.320	0.865	7.012	1	0.012	-1.376	2.015
	Design:1	0[a]	.	.	0			
Cox y Snell 0.302		Nagelkerke 0.461			McFadden 0.383			

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The results and values shown in the table obey the non-parametric statistic of the logistic regression; since the data present an ordinal scale [28] (Silva Abreu et al., 2009); In this regard, the determination statistic, Nagelkerke's pseudo R2 represents that 46.1% of the variability in the achievement of capacities for the development of quality software is due to the design of future scenarios of technological foresight, in addition the exp (-0.320 = 0.7261) 72.61% of the interviewees who perceive a low level of uncertainty regarding futuristic designs show a medium level of capacity in the development of quality software; this proposition is endorsed Wald statistics> 4.00 and p_value <0.05 also show protectors for decision-making processes. In this regard, in the study [4] Rodríguez (2016), he states that the Delphi method allows scenarios to be optimized to optimize the management of science, technology and innovation by 2040, these arguments are incentive to insert the arguments indicated above in the research, since the application of well-defined prospective methods positively influences the planning of strategies for the training of new professionals in this field of knowledge, in addition to their study by [29] Ventura et al. (2015), generates reflections on the future of new software systems to be increasingly larger and complex that can meet the greater needs of organizations, which requires that professionals in this area are in constant training, the authors applying a Forward-looking analysis to recognize the future scenarios, these arguments could be complemented with the result of the empirical study carried out in the scenario of specialized technological training leading to formative education

.

Finally, the ordinal logistic model for the design of future scenarios of Technological Prospective and the achievement of capacities for the development of quality software is shown in the following equation, product of the results obtained.

$$P(niv_{d1} \leq x) = \frac{1}{1 + \exp[-(\delta_x - \beta_1 V1)]}$$

$$P(niv_{d1} \leq 1) = \frac{1}{1 + \exp[-(-2.044 - (0.320V1)]}$$

The model responds to the probability of the achievements of the capacity for the development of software detected by levels is represented by the levels of the designs of future scenarios of technological foresight, since the exp (-0.320 = 0.7261) 72.61% of the interviewees who perceive that the conditions of uncertainty are low in relation to the futuristic designs show a medium level of capacity in the development of quality software, this result is favorable in the structural conditions that we find, surely if more attention was paid to organizations and international corporations regarding future possibilities in the future will be reinvested as necessary and know the future scenarios that incorporate the complexity of various areas, which are

implemented as functional and non-functional requirements that determine the quality of the software developed, robustness, scalability , responsiveness, maintainability, verificability, security and disaster recovery in order to meet the needs of dynamic technological changes in the future in this regard [22] (Porras Martínez, 2002), applying scientific and engineering principles that solve the immediate needs for information and knowledge

V. CONCLUSION

It is concluded that the design of future scenarios of technological foresight shows incidence in the level of uncertainty for the training of software developers in the higher technological institute according to the perceptions of those involved in the study, since it contributes significantly in planning strategies reaching higher levels of effectiveness and efficiency of the educational service so that the software development professional is more competitive, sustainable based on international models and standards, providing greater reliability and better productivity in accordance with the technological requirements of a country or region. These results provide a clear view of trends and technological changes, which help to select the most reliable resources that help reflective analysis and the selection of best solution alternatives. Finally, we recommend replicating the study to other uncertainty problems that influence the decision to select future scenarios, in order to take advantage of the information provided by these global environments, on the technological trends that allow organizations to improve their competitiveness, productivity and sustainability, specifically those that provide technology education services.

REFERENCES

[1] Leduc, S., & Ponge, L. (2018). Digital evolution and organizational changes: what responses of ergonomics? To digital transformation and organizational changes: what responses does ergonomics give? Transformation numérique et changements organizations: quelles réponses de l'ergonomie? *Laboreal, 14 (2), 0–22.* https://doi.org/10.4000/laboreal.609

[2] Amorós Pons, A., & García González, A. (2015). Technological changes in the advertising context: Dynamics and trends in research Presentation. *ICONO14 Magazine Scientific Journal of Communication and Emerging Technologies, 13 (1), 1–8.* https://doi.org/10.7195/ri14.v13i1.772

[3] Rodríguez, C. M. (2015). Prospective thinking: systemic vision of the construction of the future. *Analysis, 46 (84), 89.* https://doi.org/10.15332/s0120-8454.2014.0084.05

[4] Rodríguez Figueroa, J. J. (2016). Prospective Design of Scenarios for Science, Technology and Innovation by 2040. *Industrial Data, 16 (2), 92.* https://doi.org/10.15381/idata.v16i2.11927

[5] Amezcua-Allieri, MA, Martínez-Hernández, E., Anaya-Reza, O., Magdaleno-Molina, M., Melgarejo-Flores, LA, Palmerín-Ruiz, ME, Eguía-Lis, JAZ, Rosas-Molina, A ., Enríquez-Poy, M., & Aburto, J. (2019). Techno-economic analysis and life cycle assessment for energy generation from sugarcane bagasse: Case study for a sugar mill in Mexico. *Food and Bioproducts Processing, 118, 281–292.* https://doi.org/10.1016/j.fbp.2019.09.014

[6] Inche Mitma, J., & Chung Pinzás, A. (2014). Prospective study for virtual higher education by 2030. *Industrial Data, 15 (1), 120.* https://doi.org/10.15381/idata.v15i1.6260

[7] Armijos, L. (2017). *Main contributions of the prospective approach to the management of higher education institutions N ° 11: July - September 2017 Gómez González, José Adrián; Armijos Robles, Lorenzo Adalid University of the Armed Forces - ESPE Sangolquí, Ecuado. July.*

[8] Astarriaga, E. (2016). Strategic Foresight: origins, key concepts and introduction to its practice. *Central American Journal of Public Administration, 71, 13–29*

[9] Zapata, F. C., Andrick, J., & Valencia, P. (2015). *Evaluation of cooperation mechanisms between generations of developers in the free software development process. 2351, 49–58.*

[10] Montoya, M., & Julieth, N. (2016). *Review of the methods of technological foresight for the adaptation of a prospective model applicable to the "Medellín Espacial" program - Ruta N.*

[11] Espinal, E. (2015). *Ecology of the Future: An ontological look for the design of the future. Buenos Aires:* Ediciones Granica S.A. Retrieved from https://books.google.com.pe/books?id=_4rMCgAAQBAJ&printsec=frontcover&hl=es&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

[12] Jiménez, J., Ramírez, D., & Branch, J. (2019). Software development methodology for robotic educational platforms using ROS-XP. *Polytechnic Magazine, 15 (30), 55–69.* https://doi.org/10.33571/rpolitec.v15n30a

[13] Anaya, R. (2006). A vision of the teaching of Software Engineering to support the improvement of software companies. *EAFIT University Magazine, 60-76.*

[14] Ortega, F. (2008). The Prospective: An indispensable planning tool in an era of change. *2008.*

[15] Berger, A., & Loutre, M. F. (1991). Insolation values for the climate of the last 10 million years. *Quaternary Science Reviews, 10 (4), 297–317.*https://doi.org/10.1016/0277-3791(91)90033-Q

[16] Enciso, B. (2018). General Systems Theory*: The Library, BiblioSystematics and Information, 47–84.* https://doi.org/10.2307/j.ctv51307z.7

[17] Johansen, O. (2013). *Introduction to General Systems Theory (Oscar Johansen).*

[18] Medina Vásquez, J. (2006). Manual of foresight and strategic decision: theoretical bases and instruments for Latin America and the Caribbean. *Latin American and Caribbean Institute for Economic and Social Planning, 438*

[19] THE OECD. (2009). The OECD. *In Organization for Economic Cooperation and Development*

[20] Migueláñez, S. O., & Conde, M. J. R. (2011). *Technological perspective of educational assessment in university studies. Theory of Education, 23 (1),* 131–157. https://doi.org/10.14201/teri.8581

[21] Siemens, G., Onderwijsdagen, S., Age, D., Design, E., Downes, S., & Verhagen, P. (2005). Connectivism: a new learning theory? *Journal of Instructional Technology and Distance Learning, 2 (1), 1–5.*

[22] Porras Martínez, J. (2002). Technological change and organizational change. The network organization. *Cops. Latin American Magazine, 2.*

[23] Sánchez, F. A. (2019). Epistemic Foundations of Qualitative and Quantitative Research: Consensus and Dissent. *Digital Journal of Research in University Teaching, 13, 101–122.*https://doi.org/10.19083/ridu.2019.644

[24] Otzen, T., & Manterola, C. (2017). Sampling Techniques on a Study Population. *International Journal of Morphology, 35 (1), 227–232.* https://doi.org/10.4067/S0717-95022017000100037

[25] Salvatierra, A. (2018). *Statistics applied to social research* (Apogeo).

[26] Mateus-Galeano, E. M., & Céspedes-Cuevas, V. M. (2016). Validity and reliability of the instrument "Measurement of self-efficacy perceived in apneia do sono" - SEMSA. Versão em espanhol. *Aquichan, 16 (1), 67–82.*https://doi.org/10.5294/aqui.2016.16.1.8

[27] Leduc, S., & Ponge, L. (2018). Digital evolution and organizational changes: what responses of ergonomics? To digital transformation and organizational changes: what responses does ergonomics give? Transformation numérique et changements organizations: quelles réponses de l'ergonomie? *Laboreal, 14 (2), 0–22.* https://doi.org/10.4000/laboreal.609

[28] Silva Abreu, M. N., Siqueira, A. L., & Caiaffa, W. T. (2009). Ordinary logistic regressão in epidemiological studies. *Magazine de Saude Publica, 43 (1), 183–194.* https://doi.org/10.1590/S0034-89102009000100025

[29] Ventura, R., Hernández, R., Salinas, J. M., & López, A. (July 2015). The complexity of understanding and facing the training of future software developers. *Ergo Sum Science, 153-159. doi: ISSN: 1405-0269*