User's Manual

COMPUTER-AIDED SCENARIO CREATION PROCESS USING FORESIGHT



FORHESIT FORESIGHT-ORIENTED IT SYSTEM SUPPORTING HIGHER EDUCATION AND CAREER DEVELOPMENT

EOG/21/K4/W/0118

Computer-aided scenario creation process with the use of foresight

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The publication presents the foresight methodology aimed at application in the context of the labor market and the result of its operationalisation in the form of the IT tool "Create the Future". Detailed guidelines have been formulated to enable user groups (teachers, lecturers, career advisors, students) to properly and effectively use the results of the FORhesIT project. A valuable supplement and inspiration for future users are sample scenarios of workshops (individual and group sessions), carried out in Poland and Norway using developed methodological and IT tools.

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INTRODUCTION

In an era marked by unprecedented social, economic, and technological transformations, the world of work is undergoing significant changes. Traditional career paths, which once led individuals along predictable routes, have given way to a complex mosaic of opportunities and challenges. The changing nature of the global landscape, influenced by factors such as socio-cultural changes, technological advancements, environmental issues, geopolitical dynamics, demographic shifts, and evolving societal values, has increased the need for a more adaptive approach to career guidance.

In the last decade, there has been a rapid development of scientific research analysing the complexities of the future world of work¹. A multitude of factors encapsulated in the acronym STEEPVL (social, technological, economic, environmental, political, values-related, and legal factors) underscores the complexity and interconnections of the forces shaping our career destinies. To navigate this ever-changing world, individuals must not only develop resilience and adaptability but also actively engage in strategic planning to safeguard their careers in the future.

The aim of this handbook is to illuminate the potential of foresight methods in the field of career counseling through the utilization of IT tools. Foresight, as a scientific discipline, involves systematic examination of future possibilities to support decision-making. In contrast to forecasting, its primary role is to comprehend the future and prepare for its various scenarios².

This handbook is the result of an international project *Foresight-oriented IT system supporting higher education and career development* (*FORhesIT*), implemented under the Education Programme, with financial support from the European Economic Area funds for 2014-2021³. The FORhesIT project was a continuation and extension of the work carried out as part of the "Horizons of the Future" project (*Horyzonty Przyszłości*⁴). The authors have made every effort to explore the essence of foresight and its diverse applications in creating alternative career paths, based on the latest publications and observations of leading experts in these fields. This manual is also a supplement to the manual developed as part of Future Horizons entitled: "Career advisor as the designer of the future" ("Doradca zawodowy projektantem przyszłości"⁵).

The use of the "Create the Future" IT tool enables the adoption of a mindset based on continuous adaptation and readiness for change. It has been designed to allow users to utilize it individually and in groups. This tool fills a gap in career counseling methodology, which has traditionally focused on

¹ Kraus, S., Ferraris, A., & Bertello, A. (2023). The future of work: How innovation and digitalization re-shape the workplace. Journal of Innovation & Knowledge, 8(4).

² Gudanowska A. (2021), *Metodyka mapowania technologii w badaniach foresight*. Białystok, Oficyna Wydawnicza Politechniki Białostockiej, s. 33.

³ Projekt FORhesIT korzysta z dofinansowania o wartości 148.620,00 EUR otrzymanego w 85% od Islandii, Lichtensteinu i Norwegii w ramach Funduszy EOG oraz w 15% z budżetu państwa (nr projektu: EOG/21/K4/W/0118).

⁴ Program DIALOG Ministerstwa Nauki i Szkolnictwa Wyższego. Projekt realizowany w latach 2018-2020.

⁵ Pająk A., Gudanowska A. (red), (2021), Doradca zawodowy projektantem przyszłości. Zastosowanie studiów nad przyszłością w doradztwie zawodowym. Radom, Sieć Badawcza Łukasiewicz – Instytut Technologii Eksploatacji.

aspects related to the past and present, while factors associated with the future have been marginalized.

Foresight offers a unique perspective, enabling career advisors to better prepare for uncertainty, prompting individual users to reflect, and guiding leaders to identify emerging opportunities and mitigate potential threats in the ever-changing world of work.

The handbook placed in your hands integrates the results achieved within the FORhesIT project.:

- Foresight methodology for future-oriented labour market developed for the implementation of the IT tool, aimed at application in the context of analyses of the future labour market, including a description of the methods (e.g. STEEPVL, SWOT, trend analysis, scenario method), indicating the principles of their application and possible limitations and examples of good practice.
- 2. <u>'Create the Future'</u> IT tool to support the process of creating alternative career scenarios, including, inter alia:
 - a module for identifying factors influencing the chosen area of analysis, e.g. the labour market (STEEPVL analysis);
 - the future development scenarios building module,
 - the SWOT analysis module, which makes it possible to value the previously identified factors in terms of strengths, weaknesses, opportunities and threats;
 - a career development pathway module (for the individual option of the tool).

The authors of the handbook aimed to familiarize readers with the methodology, explain the functionality of the *"Create the Future"* IT tool, and propose sample scenarios for group and individual sessions. Therefore, this publication has been divided into three parts:

- I. THEORETICAL-METHODOLOGICAL PART, containing a description of the foresight methodology and characteristics of the stages of the foresight scenario generation process.
- II. PRACTICAL PART, containing sample scenarios of individual and group sessions, implemented both in Poland and Norway using developed methodological and IT tools.
- III. INSTRUCTIONS FOR USING THE "Create the Future" IT TOOL.

Both this handbook and other results of the FORhesIT project are specifically directed towards career advisors and teachers (including academic ones), pupils, students, high school and university graduates, as well as anyone interested in the topic of the future and the factors shaping it.

I. THEORETICAL-METHODOLOGICAL PART

1. Foresight methodology aimed at application in the context of the future job market⁶

1.1. Introduction

This methodology has been developed as part of the project *Foresight-oriented IT system supporting higher education and career development (FORhesIT),* implemented under the EDUCATION program, with financial support from the European Economic Area funds for 2014-2021.

The FORhesIT project builds upon and expands upon the work of the "Horizons of the Future" project (*Horyzonty Przyszłości*) carried out between 2018 and 2020 under the Ministry of Science and Higher Education's DIALOG program. The experiences gathered by the team during that time have allowed for the proposal of new solutions aimed at enhancing the competitiveness and effectiveness of the career counseling system and career planning processes using foresight methods.

The presented methodology is the result of intellectual work within IO1 of the FORhesIT project (Foresight methodology for future-oriented labour market), whose overarching goal is to implement the "Create the Future" IT tool. This tool supports the process of creating career development scenarios by students and graduates of higher education institutions. We hope that it will serve as a practical tool for career advisors and academic teachers to conduct workshops focused on the future. Additionally, it can be utilized individually for the analysis of individual career paths and personal development needs of students and graduates of higher education institutions..

The foresight methodology has been tailored for two levels of application – individual and group use by career advisors and academic teachers. The methodology for group and individual use in the context of the future job market encompasses the implementation of stages I-III. The methodology for individual use in the context of career development encompasses the implementation of stages I-IV.

The first stage involves analysing trends and identifying factors influencing the chosen area of analysis (e.g., the job market) within a selected time frame. These factors can be of a social, technological, economic, environmental, political, legal, or values-related nature. It also allows for assessing the importance and uncertainty of these factors. The second stage entails developing four scenarios for the future development of the job market (or another area), while the third stage involves analysing the strengths, weaknesses, opportunities, and threats associated with implementing the chosen development scenario. The fourth stage is dedicated to developing an action plan necessary for achieving a specific career goal within the selected scenario of career development.

⁶ Metodyka foresight ukierunkowana na zastosowanie w kontekście przyszłego rynku pracy (rezultat IO1 projektu FORhesIT): <u>https://forhesit.eu/wp-content/uploads/2023/04/FORhesIT-IO1-Metodyka-Foresight_PL.pdf</u> [dostęp: 10.01.2024]

1.2. Methods and the process of their selection in foresight research

Foresight projects are carried out using a variety of methods. These methods are both typically scientific and heuristic, i.e. based on the intuition of experts and stakeholders. The best-known classification of methods in the literature was developed by R. Popper. It is referred to as the methodological diamond of foresight (Fig. 1). It includes four dimensions ⁷:

- creativity methods focused on creative thinking;
- expertise methods focused on the skills and knowledge of experts in a given field;
- interaction methods aimed at acquiring new knowledge with the involvement of a wide range of stakeholders;
- evidence methods aimed at understanding the current state of the research area.



Figure 1. Futures methodological diamond

Source: Futures Diamond, https://www.futuresdiamond.com/the-diamond [12.04.2022].

⁷ Futures Diamond, https://www.futuresdiamond.com/the-diamond [12.04.2022].

The studied phenomenon or research object can be characterized by numerical parameters thanks to the use of quantitative methods. Complex and difficult-to-quantify phenomena can be described using qualitative methods. Thanks to the use of indirect methods, it is possible to present complex phenomena. R. Popper points out that an effective research methodology can be designed by selecting methods from each vertex of the methodological foresight diamond ⁸.

The most comprehensive and multi-context classification of methods was developed by A. Magruk. He noted that the available classifications often do not take into account a number of foresight research methods⁹. Therefore, he developed a classification based on phenetic analysis, presenting a common meaning ground of methods from a specific group and using similar research tools (Tab. 1).

Class	Methods	Features
Consultative	voting, polling, survey, interviews, expert panels, essays, conferences, workshops, citizen panels, brainstorming	collecting and analysing (possible at every stage of the research) opinions of the widest possible group of stakeholders (experts) on the researched area and related factors, particularly important in the social context
Creative	wild cards, weak signals, mindmapping, lateral thinking, futures wheel, role play, business wargaming, synectics, speculative writing, visualization, metaphors, assumption reverse	based on creativity, spontaneity, flexibility – addressed to a wide range of people – system analysis, outlining the vision of the examined reality and at the same time capturing the related consequences, e.g. economic, social
Prescriptive	relevance trees, morphological analysis, rich pictures, divergence mapping, Coates and Jarratt, future mapping, backcasting, SRI matrix, science fiction analysis, incasting, genius forecasting, futures biographies, TRIZ, future history, alternative history	based on creativity, heuristics and defining development visions, a group of formalized expert methods closely related to anticipating the future
Multicriterial	key technologies, source data analysis, migration analysis, shift- share analysis, factor analysis, correspondence analysis, cluster analysis, sensitivity analysis, priorization, SMART, PRIME, AHP	measurement of mutual relations between a large group of variables and criteria characterizing the tested objects as well as classification and selection of alternatives for action, with a large number of decision criteria
Radar	scientometrics, webometrics, patent analysis, bibliometrics, technological substitution, life cycle analysis, technology mapping, analog forecasting	monitoring, detecting and analysing important signals and resulting opportunities and threats regarding the latest research and technological discoveries, potential innovations that may be related to the tested object

Tab. 1. Classification of the foresight research	n methods
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⁸ R. Popper, M. Keenan, I. Miles, M. Butter, G. Sainz, *Global Foresight Outlook 2007*, The European Foresight Monitoring Network 2007, s. 20.

 ⁹ A. Magruk, *Innovative classification of technology foresight methods*, "Technological and Economic Development of Economy" 2011, vol. 17(4), pp. 700-716.

Simulation	probabilistic trees, trend extrapolation, long-term analysis, time series analysis, stochastic forecasting, classification trees, modeling and simulation, systems dynamics, agent modeling	analytical, using expert knowledge, based on statistical inference, working in a virtual environment, using the properties of synthesis and modeling, forecasting and simulation methods
Diagnostic	object simulation, force field analysis, Word Diamond, SWOT, word diamond, SWOT, STEEPVL, institutional analysis, DEGEST, Trial&Error, needs analysis, constraint management, problem management, ANKOT	qualitative and quantitative system and strategic identification, assessment of the current state of the tested object and management of the development of the tested object, possible problems, limitations and related risks, using, among others, solutions from other systems, objects
Analytical	future index status, stakeholder analysis, critical impact analysis, trend impact analysis, structural analysis, megatrend analysis, cross impact analysis, technology barometer, profit & loss analysis, technology scouting, technology watch, sustainability analysis, environment scanning, content analysis, root cause analysis and effects of defects, risk analysis, comparative analysis according to the pat tern	objective, indirectly referring to the future, research on development trends, driving forces, variants of change, the structure of the studied reality, society, as well as potential stakeholders
Survey	web research, desk research, technology assessment, social network analysis, literature review, retrospective analysis, macrohistory, back-view mirror analysis, experience- based future	time-consuming review and evaluation of data on past activities, results in the analysed research field, and spatiotemporal studies of social systems in the researched social area
Strategic	technology roadmapping, technology positioning, Delphi, scenarios, social impact assessment, strong portfolio modelling, technological scanning, multiple perspectives assessment, causal layered analysis, MANOA, action learning	evidence-based cognitive, insightful projection of studied complex objects into the future, planning, scenario building, solving complex decision problems and managing change

Source: own elaboration on the basis A. Magruk, Innovative classification ..., op. cit., pp. 700-715; A. Magruk, Hybrydowa metodyka badawcza foresightu technologicznego, doctoral dissertation, Wydział Inżynierii Zarządzania, Politechnika Poznańska, Poznań 2012, pp. 12-13.

R. Popper points out that in the process of constructing the methodology of foresight research, the methods should be chosen flexibly and should be consistent with the purpose of the planned research¹⁰. The selection of research methods should definitely not be based on copying them from previous research¹¹. Only a well-thought-out combination of methods can bring the desired result, including a properly conducted research process¹².

¹⁰ R. Popper, *How are foresight methods selected*?, "Foresight" 2008, vol. 10(6), s. 62-89.

¹¹ A. Eerola, I. Miles, *Methods and tools contributing to FTA: A knowledge-based perspective*, "Futures" 2011, vol. 43(3), s. 265-278.

¹² M. Aaltonen, T.I. Sanders, *Identifying systems new initial conditions as influence points for the future*, "Foresight" 2006, vol. 8(3), s. 28-35.

When choosing methods, it is important to keep the principle of triangulation. It consists of evaluating the studied phenomenon from different perspectives in order to better understand it ¹³. The following types of triangulation should be highlighted¹⁴:

- data triangulation includes the use of data from various sources, both secondary and primary, for research;
- researchers triangulation involving in the study the participation of many researchers representing various environments, e.g.: scientific, business, political, administration, business environment institutions, etc.;
- theoretical triangulation involving the use of various theories to interpret the collected material;
- methodological triangulation involving the use of many research methods to assess a specific phenomenon.

When selecting research methods, the following issues should be taken into account: the purpose of the research, available funds, duration and time horizon of the research, involvement and number of stakeholders, the possibility of making connections with other methods, and the competences and skills of the project team ¹⁵.

The selection of research methods was initially focused on three phases of foresight, defined as: preforesight, foresight and post-foresight¹⁶. With the development of interest in foresight, the research phases were refined and supplemented with further elements¹⁷.

J. Nazarko distinguished 8 research phases of the foresight process: initial, scanning, recruitment, knowledge generation, anticipation, action, evaluation and renewal¹⁸.

The initial phase involves defining the rationale, scope and objectives of the study. The available resources, duration and time horizon of the research are identified. Moreover, the factors influencing the research methodology are identified. The research methodology and research plan are also pre-defined. In this phase, methods belonging to the consultative, radar, analytical and survey classes are recommended¹⁹.

The scanning phase involves the identification and analysis of trends and changes over time that may affect the future of the processes and facilities under study. In this phase, it is recommended to use methods belonging to the following classes: diagnostic, radar, survey and analytical²⁰.

¹³ K. Jonsen, K. A. Jehn, Using triangulation to validate themes in qualitative studies, "Qualitative Research in Organizations and Management: An International Journal" 2009, vol. 4(2), s. 125.

¹⁴ A. Kononiuk, J. Nazarko, *Scenariusze w antycypowaniu i kształtowaniu przyszłości*, Wolters Kluwer SA, Warszawa 2014, s. 84.

¹⁵ R. Popper, Foresight Methodology [in:] L. Georghiou, J. Cassingena Harper, M. Keenan, I. Miles, R. Popper (red.), The Handbook of Technology Foresight: Concepts and Practice, Prime Series on Research and Innovation Policy, Edward Elgar, Cheltenham, Northampton 2008, s. 80.

¹⁶ B.R. Martin, J. Irvine, *Research Foresight: Priority–Setting in Science*, Pinter Publishers, London 1989, s. 35.

¹⁷ D. Szpilko, Foresight jako narzędzie doskonalenia zarządzania turystyką w regionie, Oficyna Wydawnicza Politechniki Białostockiej, Białystok 2016, s.172-173.

¹⁸ J. Nazarko, *Regionalny foresight ...*, op. cit., s. 63-67.

 ¹⁹ A. Magruk, *Hybrydowa* ..., op. cit.; J. Nazarko, J. Ejdys (red.), *Metodologia i procedury badawcze w projekcie Foresight technologiczny* «*NT FOR Podlaskie 2020*» *Regionalna strategia rozwoju nanotechnologii*, Oficyna Wydawnicza Politechniki Białostockiej, Białystok 2011.
 ²⁰ Ibidem.

The recruitment phase consists of identifying and inviting foresight project stakeholders and domain experts to the project. The project team/research panels are also identified during this phase. The recruitment phase uses methods from the consultative, analytical and survey classes²¹.

The knowledge generation phase involves obtaining, processing, analysing and synthesising existing knowledge in order to generate new knowledge in the area of the study. This phase should ensure the identification and analysis of the key factors, trends and driving forces shaping phenomena in the area, and an understanding of the context created by stakeholders for the research being conducted²². In this phase, it is recommended to use methods mainly from the following classes: creative, consultative, prescriptive, strategic, simulation, analytical and multicriterial²³.

The anticipation phase consists of predicting possible future states of the studied processes and objects. The result of this phase should be e.g.: alternative scenarios, recommendations/policies of economic, social, political, legal nature, established lists of priorities. Methods from the strategic, prescriptive, creative, simulation, consultative and multicriterial classes correspond primarily with this phase²⁴.

The action phase consists of transforming the results of the study from the anticipation phase into concrete practical action. Possible options, strategies and plans should be proposed at this stage, enabling the best possible course of action to be taken²⁵. In this phase, it is advisable to use methods from the following classes: strategic, consultative, simulation, diagnostic, creative, prescriptive and analytical.

The evaluation phase is aimed at verifying the extent to which the actions identified in the previous phase have fulfilled the objectives²⁶. It should provide reliable and useful information to support the decision-making process. This phase is also intended to assess the relevance of the actions identified and their validity²⁷. Methods from the consultative, diagnostic, analytical and survey classes correspond primarily with this phase.

The resumption phase involves starting of work on reactivating the foresight cycle on the basis of the evaluation results from the previous phase. It should take place after a certain period of time (e.g. several years) after the completion of the current project. The main objective of this phase is to develop success factors on which the initial phase of the new research cycle can be based²⁸. In the resumption phase, methods from the consultative and diagnostic class are mainly used.

²¹ Ibidem.

²² L. J. Krzyżanowski, O podstawach kierowania organizacjami inaczej: paradygmaty, modele, metafory, filozofia, metodologia, dylematy, trendy, PWN, Warszawa 1999, s. 286-291.

 ²³ A. Magruk, *Hybrydowa metodyka*..., op. cit.; J. Nazarko, J. Ejdys (red.), *Metodologia i procedury*..., op. cit.

²⁴ Ibidem.

²⁵ J. Nazarko, *Regionalny foresight gospodarczy...*, op. cit., s. 66.

²⁶ Ibidem.

²⁷ J. Nazarko, J. Ejdys, A. Gudanowska, A. Kononiuk, A. Magruk, Ł. Nazarko, *Ekspertyza Badanie ewaluacyjne realizowanych w Polsce projektów foresight*, Białystok 2010, s. 13-14.

²⁸ J. Nazarko, *Regionalny foresight gospodarczy...*, op. cit., s. 66.

The indicated research phases of the process are the basis for the methodology of designing hybrid systems developed by A. Magruk. It includes 4 stages²⁹:

- determination of factors influencing foresight research methodology;
- selection of foresight research methods in accordance with the classification, research context and stages of the foresight process;
- selection of methodical hybrids;
- construction of a hybrid system.

The first stage is to determine the factors influencing the research methodology. Among the key factors determining the selection of specific research methods, the following can be distinguished: access to quantitative and qualitative data, methodological competences, key attributes of methods, the legitimacy of combination with other methods, as well as their cognitive nature³⁰.

The second stage involves the selection of research methods in accordance with the classification, research context and stages of the foresight process. The selection can be made from among the 10 classes of methods presented in Table 1. When designing the methodology, special attention should be paid to the strength of linking the 10 classes of methods with the 8 phases of foresight research implementation and their assignment to the research contexts: cognitive, social, technological and economic (Fig. 2)³¹.



Figure 2. The strength of connecting a given class of methods at particular stages in the foresight process, in the context of the economic, social, technological and cognitive aspects

Source: J. Nazarko, Regionalny foresight ..., op. cit., s. 59.

³⁰ A. Magruk, Kluczowe czynniki kształtujące metodykę badawczą projektów foresightowych, "Przegląd Organizacji" 2013, nr 9, s. 3-9.

²⁹ A. Magruk, *Referencyjna metodyka projektowania systemów hybrydowych w badaniach przyszłości, "Zeszyty Naukowe Politechniki Śląskiej. Seria: Organizacja i Zarządzanie" 2014, nr 73, s. 388.*

³¹ J. Nazarko, *Regionalny foresight* ..., op. cit., s. 59.

In order to design the correct methodology to achieve the synergy effect, methods from different classes should be selected. Methods from only one class should not be used, as this may result in generating results in a similar way³². t the same time, care should be taken to ensure a strong reference to all research contexts (economic, social, cognitive), so as not to lead to domain domination by too strong reference to one of them³³.

The third stage is the selection of methodological hybrids. Hybrids have the structure:

- sequential the output values from the first method are the input values in the second method. Its use is justified when the results of the method from one stage of foresight are input to the next stage;
- loosely coupled information obtained from the application of specific methods is exchanged between individual methods, although each of them works separately;
- nested they are highly integrated. There is frequent interweaving and exchange of information between the methods used (multiple feedback). In this structure, the main and auxiliary methods can coexist, and the flow of information will take place in both directions;
- operating on the principle of support they are divided into basic and auxiliary methods. The secondary method (not always active) may use the same input as the primary method. In contrast, the results of the auxiliary method definitely need to be processed by the primary method³⁴.

The fourth stage consists in designing a hybrid system in which skillfully selected methods can achieve a synergistic effect ³⁵.

The presented methodology of designing hybrid systems was used to develop research methodology for the implementation of the project "Foresight-oriented IT system supporting higher education and career development" (FORhesIT).

1.3. The characteristics of selected foresight methods

Trend analysis

The concept of a trend is often used in the social sciences, in particular in sociology, economics and management, but in each of these fields of science it is defined slightly differently. In the literature on sociology, a social trend is "a noticeable pattern of changes over time, illustrated by a social indicator or index³⁶. In economic science, a trend is defined as "a relatively benign and undirected pattern seen in data that arises from the accumulation of information over time. Many of the time series in economics and other social sciences show mild upward or downward trends"³⁷. The PWN Dictionary of the Polish Language defines the concept of a trend quite generally as "a direction of development in some field existing at a given moment"³⁸. An example of a trend that will significantly affect the labor market in the future may be: a change in wages in a specific sector of the economy, an increase in demand for employees with digital competences.

³² A. Magruk, *Referencyjna metodyka projektowania* ..., op. cit., s. 390.

³³ Ibidem, s. 395.

³⁴ Ibidem, s. 391-392.

³⁵ Ibidem, s. 392.

³⁶ G. Marshall, *Dictionary of Sociology*, Wydawnictwo Oxford Paperbacks, Oxford 1998.

³⁷ G. González-River, International Encyclopedia of the Social Sciences, Wydawnictwo Macmillan, New York 2008.

³⁸ L. Drabik, A. Kubiak-Sokół, E. Sobol, *Słownik języka polskiego PWN*, Polskie Wydawnictwo Naukowe, Warszawa 2021.

Megatrends can be defined as permanent economic, social, political and cultural trends, phenomena arising in the process of civilizational development of society, with various conditions affecting humanity beyond national borders and continents, covering the entire globe and conditioning the main directions and goals of the prospective development of humanity³⁹. Global megatrends have an increasing, but difficult to predict, impact on our reality. The main trends and megatrends that currently and in the near future affect the development of society and the global economy include: urbanization, migration, aging of the population, globalization, circular economy, digitization and digital society, automation and robotization⁴⁰.

Trend analysis is particularly important in the context of high uncertainty and volatility of the environment that affect modern society and economy. Understanding the mechanisms of the functioning of trends can be an important element in the process of better preparation for future phenomena, as well as predicting the future. In terms of futures studies, the most important aspect of trend analysis is the ability to explore the future based on undermining one's own and obvious assumptions and critically assess emerging trends and signals of change⁴¹.

Trend analysis includes the following steps:

- Observing the environment the knowledge about the trends directly shaping the researched area should be checked and updated, as well as those that may indirectly affect it. Regularities and changes in the researched area, as well as in the wider social, technological and economic macro-environment, should be taken into account.
- 2. Search for additional information the observed trends should be subjected to critical verification using additional sources of information: whether the observed changes signal the development of a significant trend, what factors shape the trend and whether they are related to other phenomena. The source of additional information collected in the verification process may be in particular: industry magazines and newspapers, statistical data (GUS, Eurostat), market research, conversations with specialists in specific fields and experts, statistics of page views.
- 3. Identifying regularities at this stage of the analysis, it is necessary to verify how the identified trends develop and what type of trend is presented (seed, growth, mature, declining trends) and whether similar changes have been observed in the past. Point out the similarities and differences between the present and the past.
- 4. Exploring the future based on the collected data, an attempt to explore the future can be made. The following may be used in particular to formulate variants of trend development:
 - rend extrapolation;
 - looking for analogies verifying how the factors responsible for the trend may change, specifying the conditions under which they will change and what it will mean;
 - looking for discontinuities checking what may cause a given trend to reverse, collapse or intensify and what will be the consequences.

³⁹ S. Marek, M. Białasiewicz (red.), Podstawy nauki o organizacji. Przedsiębiorstwo jako organizacja gospodarcza, Polskie Wydawnictwo Ekonomiczne, Warszawa 2011, s. 389.

Wzrost Populacji Świata i Jego Konsekwencje [MEGATRENDY 2050], Polskie Towarzystwo Studiów nad Przyszłością, https://ptsp.pl/wzrost-populacji-swiata-i-jego-konsekwencje-megatrendy-2050/ [19.06.2022]; Cyfryzacja i Automatyzacja Pracy [MEGATRENDY 2050], Polskie Towarzystwo Studiów nad Przyszłością, https://ptsp.pl/automatyzacja-pracy-megatrendy/ [19.06.2022].

⁴¹ A. Gudanowska, A. Kononiuk, A. Magruk, A. Pająk, E. Rollnik-Sadowska, A. Sacio-Szymańska, Doradca zawodowy projektantem przyszłości. Zastosowanie studiów nad przyszłością w doradztwie zawodowym, https://horyzontyprzyszlosci.itee.radom.pl [17.06.2022].

Attention should be paid to any signals and factors of change that may affect the maintenance or change of identified trends. It is worth observing these elements in order to react early to changes in the future.

5. Controlling the change – it is recommended to search for information over time and check whether any of the defined changes that may affect the course of trends are actually being implemented. It should be verified whether this will have a direct or indirect impact on the study area.

Examples of good practice in applying trend analysis in foresight projects include:

- "Horizons of the Future", a project implemented under the program of the Minister of Science and Higher Education under the name "DIALOG" in 2018-2020⁴²;
- "The reasons for the diversification of poviat labor markets in the Podlaskie Voivodship", a project commissioned by the Voivodeship Labor Office in Białystok⁴³;
- "Mazowieckie Center of Economic Information. Regional economic foresight" (MCIG), a project implemented by the Association of Employers of Warsaw and Mazovia co-financed by the European Union under Sub-measure 8.1.2 of the Human Capital Operational Program⁴⁴;
- "NT FOR Podlaskie". Regional strategy for the development of nanotechnology, a project implemented under the Operational Program Innovative Economy Project, 2007-2013, Priority I. Action 1.1. Action 1.1.1⁴⁵;
- Economic foresight study on industrial trends and the research needed to support the competiveness of European industry around 2025⁴⁶.

STEEPVL method

The STEEPVL analysis is an expert method for identifying social (S), technological (T), economic (E), ecological (E), political (P), related to values (V) and legal (L) factors that affect the development of a given research area⁴⁷. It is an extension of the analysis:

- PEST taking into account political, economic, social and technological factors;
- STEEP including social, technological, economic, environmental or ecological and political factors⁴⁸;
- STEEPV STEEP analysis enriched with value factors analysis⁴⁹.

 ⁴³ Przyczyny zróżnicowania powiatowych rynków pracy w województwie podlaskim, http://wupbialystok.praca.gov.pl/documents/102984/5933864/Przyczyny%20zroznicowania%20powiatowych%20rynk%C3%B3w%20pra cy%20wojew%C3%B3dztwa%20podlaskiego/53493f56-ca7b-4481-b3b1-8cc03ab7eea0?t=1513583916205 [28.06.2022].

⁴² A. Gudanowska, A. Kononiuk, A. Magruk, A. Pająk, E. Rollnik-Sadowska, A. Sacio-Szymańska, *Doradca zawodowy…*, op. cit.

⁴⁴ J. Nazarko, *Regionalny foresight ...,* op. cit.

⁴⁵ Nazarko J., Ejdys J. (red.), NT FOR Podlaskie. Regionalna strategia rozwoju nanotechnologii, https://depot.ceon.pl/bitstream/handle/123456789/7512/Uwarunkowania_rozwoju_nanotechnologii_w_wojew%C3%B3dztwie_podlask im_Wyniki_analiz_STEEPVL_i_SWOT.pdf?sequence=1&isAllowed=y [29.06.2022].

⁴⁶ Economic foresight study on industrial trends and the research needed to support the competiveness of European industry around 2025, Fraunhofer Society with participating institutes, European Union 2012, http://ec.europa.eu/research/ industrial_technologies/pdf/economic-foresight-on-rd_en.pdf [30.06.2022].

 ⁴⁷ G. Ringland, UNIDO Technology Foresight for Practitioners. A Specialised Course on Scenario Building, 5-8 November 2007, Prague; D. Szpilko, Foresight as a Tool for the Planning and Implementation of Visions for Smart City Development, "Energies" 2020, vol. 13, p. 10; J. Ejdys, A. Gudanowska, K. Halicka, A. Kononiuk, A. Magruk, J. Nazarko, Ł. Nazarko, D. Szpilko, U. Widelska, Foresight in Higher Education Institutions: Evidence from Poland, "Foresight and STI Governance", 2019, vol. 13, p. 77.

⁴⁸ A. Kononiuk, Analiza STEEPVL na przykładzie projektu Foresight technologiczny. "NT FOR Podlaskie 2020" Regionalna strategia rozwoju nanotechnologii, "Ekonomia i Zarządzanie" 2010, vol. 2(4), s. 105-106.

Extending the PEST analysis area to seven dimensions of STEEPVL allows for more accurate identification of development factors of the analysed area that could be omitted in the case of traditional PEST analysis⁵⁰. The STEEPVL analysis is primarily used to identify the potential driving forces of the scenarios. It also allows you to capture an unprecedented event that can cause trends to break down⁵¹. The results of the method can be a valuable input material for other analyses, such as a SWOT analysis, in order to facilitate the identification of opportunities and threats⁵².

The limitations of using the STEEPVL method are:

- labor consumption in identifying factors for analysis based on many literature items;
- in many cases, the need to involve a number of experts to conduct the study;
- difficulty in engaging respondents with an extensive list of factors in 7 thematic groups;
- a possible large discrepancy of opinion on the assessed factors.

When carrying out research using the STEEPVL analysis, supporting methods are used, including: analysis of existing sources, an expert panel and surveys.

The method of examining existing sources, also known as desk research, is used to make an initial characterization of a research problem on the basis of already existing information⁵³. It consists in searching, collecting and analysing knowledge on a specific topic. This knowledge can be obtained from the following sources: compact publications, magazines, reports, expert opinions, bulletins, databases, catalogues, publications posted on websites. The acquired knowledge should definitely be verified by the researcher in terms of credibility and reliability. The advantages of the method include: relatively short research time, low cost and avoiding the time-consuming and cost-intensive process of data production. The disadvantages include limited access to data and their obsolescence⁵⁴.

The idea of the brainstorming method manifests itself in generating new ideas, based on associations, by arousing creativity in team members⁵⁵. It is used to collect as many ideas as possible to solve a specific problem in a short time⁵⁶. Brainstorming is a key component in foresight research.

⁴⁹ D. Loveridge, *The STEEPV acronym and process - a clarification*, Ideas in Progress, Paper Number 29, The University of Manchester, PREST Policy Research in Engineering. Science and Technology. Manchester 2002. p. 2.

https://php.portals.mbs.ac.uk/Portals/49/docs/dloveridge/steepv_wp29.PDF [16.04.2022].

⁵⁰ G. Ringland, UNIDO Technology ..., op. cit.; D. Szpilko, E. Glińska, J. Szydło, STEEPVL and Structural Analysis as a Tools Supporting Identification of the Driving Forces of City Development, "European Research Studies Journal", 2020, vol. 23, p. 342.

⁵¹ S. Mendonça, M.P. e Cunha, J. Kaivo-oja, F. Ruff, Wild cards, weak signals and organisational improvisation, "Futures" 2004, vol. 36(2),

pp. 206-207. ⁵² J. Nazarko, Z. Kędzior (red.), *Uwarunkowania rozwoju nanotechnologii w województwie podlaskim. Wyniki analiz STEEPVL i SWOT*, Oficyna Wydawnicza Politechniki Białostockiej, Białystok 2010, s. 11.

⁵³ J. Nazarko, *Regionalny foresight* ..., op. cit., s. 38.

⁵⁴ Innowacyjny model współpracy dla instytucji pomocy społecznej i rynku pracy, Raport Diagnostyczny, BD CENTER, Rzeszów 2011, s. 8, http://www.wspolpraca.bdcenter.pl/images/pliki/RAPORT%20DIAGNOST CZNY.pdf [14.05.2022].

⁵⁵ Z. Martyniak, *Wstęp do inwentyki*, Akademia Ekonomiczna w Krakowie, Kraków 1997, s. 39.

⁵⁶ K. Borodako, *Foresight w zarządzaniu strategicznym*, Wydawnictwo C.H. Beck, Warszawa 2009, s. 86.

Its use can take the form of free discussion⁵⁷. Work using this method can proceed in the following stages⁵⁸:

- Stage I a research problem is formulated and activities related to the organization of the meeting are carried out;
- Stage II during the meeting, participants are presented with a research problem, and then ideas are collected on the basis of associations (without subjecting them to criticism). The quality of the proposals is not important, but generating the largest number of them.
- Stage III includes discussion and evaluation of ideas and their grouping.

Survey research is a well-known and often used method of foresight research. Most surveys are based on questionnaires, currently mostly online⁵⁹. The quality of survey results depends on the size of the sample⁶⁰. Among the survey techniques, the following should be distinguished: direct individual questionnaire interview (*Paper & Pen Personal Interview – PAPI*), computer-assisted interview via a website (*Computer Assisted Web Interview – CAWI*), computer-assisted telephone interview (*Computer Assisted Telephone Interview – CATI*) a self-filled paper questionnaire (*Personal Self-Administered Questionnaire – PSAQ*). Among the advantages of conducting surveys, the simplicity of their form and the ability to easily and fairly quickly reach the respondents should be pointed out. The main disadvantage is the inability to deepen the researched problem, due to the rigidly defined set of questions in the survey⁶¹.

Examples of good practice in using STEEPVL analysis in foresight projects include:

- "Digital Foresight 2035. 12 Scenarios for Poland", a project implemented by the Polish Economic Institute⁶²;
- "Scenarios for the development of small towns", a project implemented by the Polish Economic Institute⁶³;
- "Horizons of the Future", a project implemented under the program of the Minister of Science and Higher Education under the name "DIALOG" in 2018-2020⁶⁴;
- "The reasons for the diversification of poviat labor markets in the Podlaskie Voivodship", a project commissioned by the Voivodeship Labor Office in Białystok⁶⁵;
- "Mazowieckie Center of Economic Information. Regional economic foresight" (MCIG), a project implemented by the Association of Employers of Warsaw and Mazovia co-financed by the European Union under Sub-measure 8.1.2 of the Human Capital Operational Program⁶⁶;

 ⁵⁷ R. Popper, *Foresight Methodology*, [in:] L. Georghiou, J. Cassingena Harper, M. Keenan, I. Miles, R. Popper, *The Handbook of Technology Foresight: Concepts and Practice, Prime Series on Research and Innovation Policy*, Edward Elgar, Cheltenham, Northampton 2008, pp. 47-48.

⁵⁸ Narzędzia i strategie trenerskie w sytuacjach trudnych. Burza mózgów, Helsińska Fundacja Praw Człowieka, http://www.hfhr.org.pl/wezkurs/e-podrecznik/index.php?option=com_content&view=article&id=225%3Aza lacznikhttp://www.hfhr.org.pl/wezkurs/e-podrecznik/index.php?option=com_content&view=article&id=225%3Aza lacznik-

^{69&}amp;catid=19%3A051-metody-pracy-edukacyjnej&Itemid=98 [25.02.2022].

⁵⁹ R. Popper, *33 Foresight Methods – Expert Panels*, https://rafaelpopper.wordpress.com/foresight-methods/# Expert-Panels [08.03.2022].

⁶⁰ E. Babbie, *Badania społeczne w praktyce*, Wydawnictwo Naukowe PWN, Warszawa 2004, s. 301.

⁶¹ Ibidem, s. 301-302.

⁶² Foresight cyfrowy 2035. 12 scenariuszy dla Polski, https://pie.net.pl/wp-content/uploads/2021/05/PIE-Raport_Foresight_cyfrowy.pdf [25.06.2022].

⁶³ Scenariusze rozwoju małych miast, https://pie.net.pl/wp-content/uploads/2019/12/PIE-Raport_scenariusze_male.pdf [25.06.2022].

⁶⁴ Horyzonty przyszłości, https://horyzontyprzyszlosci.itee.radom.pl/wp-content/uploads/2021/02/HP_podrecznik_A4_calosc.pdf [25.06.2022].

⁶⁵ *Przyczyny zróżnicowania powiatowych …,* op. cit.

⁶⁶ J. Nazarko, *Regionalny foresight ...*, op. cit.

"NT FOR Podlaskie". Regional strategy for the development of nanotechnology, a project implemented under the Operational Program Innovative Economy Project, 2007-2013, Priority I. Action 1.1. Action 1.1.1⁶⁷.

SWOT analysis

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths and weaknesses as well as opportunities and threats of any entity or phenomenon. The name of the method is an acronym of English words: strengths, weaknesses, opportunities (potential opportunities or existing in the environment) and threats (probable or existing threats in the environment). It is one of the basic methods of strategic analysis of a company, organization (or any event in their activity), although the object of analysis can also be, for example, a university, project, investment, student or employee. Thus, a SWOT analysis can be carried out for both professional and personal purposes.

The purpose of conducting an organization's SWOT analysis is to search, collect and organize data on determinants, and present them in a clear and legible form. To make this possible, the procedure begins with the identification of the most important and mutually exclusive factors affecting the object under analysis. Then, the identified conditions should be classified into groups forming a matrix consisting of four fields that include the following factors⁶⁸:

- strengths, i.e. features of the examined object, constituting its asset (internal determinants);
- weaknesses, i.e. features of the analysed object, constituting its defects and limitations (internal determinants);
- opportunities, ie features of the environment affecting the tested object, enabling the achievement of the assumed goal (external factors);
- threats, ie external conditions hindering the operation of the analysed facility, constituting a barrier to achieving the assumed goal.

The main stages of the analysis are presented in the figure 3.

Characteristics of the organization and determination of the purpose of the SWOT analysis

Presentation of the analysis procedure to the study participants Developing a list of strengths and weaknesses as well as opportunities and threats as extensive as possible

Selection of the most important conditions and development of the SWOT matrix Development of plans and variants of actions in the future

Figure 3. Basic stages of SWOT analysis

Source: opracowanie własne na postawie Chermack T.J., Kasshanna B.K., 2007, The Use and Misuse of SWOT Analysis and Implications for HRD Professionals, "Human Resource Development International" 2007, vol. 10, no. 4; M. Nowicki, Analiza SWOT, [in:] Kompendium metod i technik zarządzania. Technika i ćwiczenia, Wydawnictwo Oficyna a Wolters Kluwer Business, Warszawa 2015, s. 325-354.

⁶⁷ Nazarko J., Ejdys J. (red.), NT FOR Podlaskie..., op. cit.

⁶⁸ M. Nowicki, Analiza SWOT, [w:] Kompendium metod i technik zarządzania. Technika i ćwiczenia, Wydawnictwo Oficyna a Wolters Kluwer Business, Warszawa 2015, s. 325-354.

In practice, this analysis consists in identifying four groups of factors relating to the considered entity or phenomenon, determining their impact on the development of the entity in the future and their proper use in order to introduce improvements or even radical changes⁶⁹. However, it is difficult to take into account uncertain or bilateral factors, i.e. factors that can be considered both a strength and a weakness at the same time⁷⁰. The limitations of using the SWOT analysis are also related to the following aspects⁷¹:

- general perspective of the analyses;
- many factors are identifiable but not prioritized or targeted in detail;
- solutions to problems are not provided or alternative decisions are indicated;
- it is possible to generate too many ideas and therefore it is difficult to choose the best one;
- it is possible to generate a lot of information, but not all of it is useful.

SWOT analysis is also used in foresight projects, in which it can be treated as an analytical tool for categorizing important factors determining the development of various entities or phenomena (organisations, enterprises, industries or a region or country), facilitating the determination of the desired and most important directions of action. In this sense, this analysis is a good starting point for discussing current and future challenges and the right way to map key success factors⁷². Examples of good practice in applying SWOT analysis in foresight projects are, among others:

- "National Foresight Program implementation of results" synthesis of NPF results in terms of fields, scenarios and SWOT analysis, project implemented by the Białystok University of Technology⁷³;
- National Foresight Program "Polska 2020" Technological foresight "NT FOR Podlaskie 2020".
 Regional strategy for the development of nanotechnology, a project implemented by the Białystok University of Technology⁷⁴;
- "ERA-LEARN 2020 Strengthening joint programming in Europe" SWOT analysis f alignment modalities, a project implemented by the University of Manchester⁷⁵;
- "The T&T Foresight Project", NIHERST, Sector Foresight Project: TOURISM, a project implemented by the Ministry of Education in Trinidad⁷⁶.

The SWOT analysis is also a summary and a starting point for developing a strategy for operating on the labor market⁷⁷. Increasingly, this method is also used for personal/professional/employee/people analysis, and can even be treated as a tool to help achieve a state of personal well-being⁷⁸. A SWOT

⁶⁹ ISO, https://www.iso.org.pl/uslugi-zarzadzania/wdrazanie-systemow/zarzadzanie-strategiczne/analiza-swot/ [8.09.2022].

⁷⁰ Queensland Government, https://www.business.qld.gov.au/starting-business/planning/market-customer-research/swotanalysis/benefits-limitations [28.08.2022].

⁷¹ E. Gürel, M. Tat, *SWOT analysis: a theoretical review*, "Journal of International Social Research" 2017, vol. 10, s. 51.

⁷² J. Nazarko, J. Ejdys, K. Halicka, A. Magruk, Ł. Nazarko, A. Skorek, Application of Enhanced SWOT Analysis in the Future-oriented Public Management of Technology, "Procedia Engineering" 2017, vol. 182, s. 482-490.

 ⁷³ J. Nazarko, J. Ejdys, K. Halicka, A. Kononiuk, A. Olszewska, U. Glińska, A.E. Gudanowska, E. Krawczyk-Dembicka, N. Brzostowski, Ł. Nazarko, Ł. Prusiel, Synteza rezultatów NPF w zakresie pól, scenariuszy oraz analizy SWOT. Narodowy Program Foresight – Wdrożenie wyników, Białystok 2013.

 ⁷⁴ Narodowy Program Foresight, https://ntfp2020.pb.edu.pl/ [28.08.2022].

⁷⁵ SWOT analysis on alignment modalities, The University of Manchester, United Kingdom 2017, ERA-LEARN%20Del%204.4_SWOT%20alignment_FINAL.pdf [7.09.2022].

⁷⁶ NIHERST, https://www.niherst.gov.tt/resources/publications/tourism-sector-chpt2.pdf [8.09.2022].

 ⁷⁷ H. Sobocka-Szczapa, Analiza SWOT w strategicznej ocenie lokalnego rynku pracy m. st. Warszawy, Instytut Pracy i Spraw Socjalnych, 2015.

⁷⁸ E. Pluchevskaya, Application of the SWOT-analysis as an evaluation tool to achieve state of personal well-being, III International Scientific Symposium on Lifelong Wellbeing in the World, 2017.

analysis of one's own professional career can make pupils, students or professionally active people aware of the situation in which they find themselves. In addition, it creates the opportunity to make plans or dreams come true, helps to set directions for action and teaches to see opportunities in terms of one's own development. It is a tool that can be successfully used in the future in private and professional life. It gives you the opportunity to independently choose your professional career and take responsibility for your life choices⁷⁹.

Scenario method

Scenario method is the logical and formal construction of alternative visions of the desired future based on the involvement of heterogeneous (diverse) groups of experts, taking into account a thorough knowledge and understanding of the factors determining the studied phenomenon and enabling rational decisions about the future⁸⁰.

The construction of scenarios is both a way of exploring the future and a field of application of knowledge gained in earlier stages of the foresight process, as well as a tool for supporting strategic decisions, presenting possible choices and their potential consequences.

Considering the variety of techniques for building development scenarios, it is recommended for organisations to elaborate the development scenarios as a result of an expert scenario workshop. An exemplary method used for scenario building is based on scenario axes78. At the beginning, it includes two factors that emerge as a result of step one e.g. the STEEPVL analysis⁸¹. The choice of factors is determined by the criterion of importance and uncertainty. The identified factors are plotted on two axes. Thus, a matrix is formed, in which the upper right field is given a positive colour, while the lower left field is given a negative colour. The other two boxes take the positive and negative values of the first or second factor respectively. In result, four scenarios are created, which represent different perspectives of future of the study area development. The alternative future states developed on the scenario axis technique should form a coherent, reliable image of events development (Fig. 4).

⁷⁹ M. Ciesielka, Osobista analiza SWOT narzędziem motywowania i planowania wyborów edukacyjno-zawodowych młodzieży, "Edukacja – Technika – Informatyka" 2019, nr 4(30).

⁸⁰ A. Kononiuk, *Metoda scenariuszowa w antycypowaniu przyszłości* (na przykładzie Narodowego Programu Foresight "Polska 2020"), Uniwersytet Warszawski, Warszawa 2011, s. 314.

⁸¹ S.A. Klooster, M.B.A. Asselt, *Practising the scenario-axes technique*, "Futures" 2006, vol. 38, pp. 15-30.



Figure 4. Distribution of scenarios based on key factors X and Y Source: own study.

The advantage of this method is that an infinite number of potential future options (scenarios) can be built, from which a number of manageable options can be selected in a specific time frame. On the other hand, its main disadvantage is the difficulty in transforming the developed scenarios into concrete decisions and actions, especially if they are very general⁸².

Among examples of good practices in the scenario method in foresight projects are among others:

- "Digital Foresight 2035. 12 scenarios for Poland" project carried out by the Polish Economic Institute⁸³;
- "Foresight on competencies of the future" project implemented by the Polish Economic Institute⁸⁴;
- "Scenarios for small town development" project implemented by the Polish Economic Institute⁸⁵;
- "Horizons of the Future" project implemented within the framework of "DIALOGUE" programme of the Minister of Science and Higher Education in 2018-2020⁸⁶;
- "Causes of differentiation of district labour markets in Podlaskie Voivodeship" project commissioned by the Voivodeship Labour Office in Bialystok⁸⁷;
- "Mazovian Centre for Economic Information. Regional Economic Foresight" (MCIG) project implemented by the Union of Employers of Warsaw and Mazovia co-financed by European Union funds under sub-action 8.1.2 of Human Capital Operational Programme⁸⁸;

⁸² K. Borodako, *Foresight w turystyce. Bariery wykorzystania i rozwoju*, Wydawnictwo C.H. Beck, Warszawa 2011, s. 86.

⁸³ Foresight cyfrowy 2035..., op. cit.

⁸⁴ Foresight kompetencji przyszłości, https://pie.net.pl/wp-content/uploads/2022/05/Foresight-kompe...20.07.2022-kopia.pdf [24.06.2022].

⁸⁵ *Scenariusze rozwoju małych miast,* op. cit.

⁸⁶ Horyzonty przyszłości, op. cit.

⁸⁷ *Przyczyny zróżnicowania powiatowych ...,* op. cit.

- "FUTURES Future laboratories for professional and personal development" project funded by Erasmus+ programme, contractors: Middlesex University, FORTH, Valuedo, Hanze University, Bialystok University of Technology and Łukasiewicz Research Network –Institute for Sustainable Technologies⁸⁹;
- "beFORE Becoming Future-Oriented Entrepreneurs in universities and companies" project funded by Erasmus+ programme, contractors: Łukasiewicz Research Network – Institute for Sustainable Technologies, Bialystok University of Technology, University of Pisa, Mondragon University – Faculty of Business Studies, Free University Berlin – FuturInstitute, Valuedo, 4CF, Errequadro, Prospektiker i Aveniture⁹⁰.

Technology roadmapping

Technology roadmapping (TRM) method is a comprehensive approach to strategic planning, which integrate science and technology into business practice and identify opportunities in the development of new technologies⁹¹. On a corporate level, the method allows to visualize the future, within a defined time horizon, taking into account all relevant business aspects⁹². The final roadmap enables the research team to know and understand the company goals and how to achieve them⁹³ (Fig. 5).



Figure 5. Example of roadmapping

Source: R. Phaal, C.J.P. Farrukh, D.R. Probert, *Technology roadmapping – A planning framework for evolution and revolution,* "Technological Forecasting and Social Change" 2004, vol. 71, p. 10.

⁸⁸ J. Nazarko, *Regionalny foresight* ..., op. cit.

⁸⁹ FUTURES – Future laboratories for professional and personal development, https://futuresproject.pb.edu.pl/download/ [21.06.2022].

⁹⁰ beFORE - Becoming Future-Oriented Entrepreneurs in universities and companies, http://futureoriented.eu/ [20.06.2022].

⁹¹ T.U. Daim, T. Oliver, *Implementing technology roadmap proc ess in the energy services sector: A case study of a government agency,* "Technological Forecasting & Social Change" 2008, vol. 75.

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⁹³ A. Gudanowska, *Roadmapping jako narzędzie wspomagające zarządzanie rozwojem regionu*, "Zarządzanie i Finanse" 2012, nr 2.

A properly executed roadmap is a document presenting several layers with different levels of detail, as well as a tool to support the development process⁹⁴. Considering the construction of a roadmap, visualisations can be created in the context of: strategic planning, long-term planning, product, opportunity, knowledge capital, programme, process or integration⁹⁵.

The term *roadmapping* is not only important in terms of technology⁹⁶. It can also be applied to career path planning. Roadmapping, including analysis, visualisation and development planning, is otherwise a work plan, a precise description of activities in an appropriate order⁹⁷. he construction of roadmap is linked to fundamental questions that arise in any strategic context: Where are we going? Where are we now? How can we get there? Why do we need to act? What should we do? How will we do it? Till when? The general character of this approach indicates the flexibility of the whole process, which can be adapted to a wide range of objectives and contexts⁹⁸.

Preparing a roadmap allows to visualise the setting goal and shows how to get there from where you are. Two essential and related functions of roadmaps in foresight studies can be distinguished⁹⁹:

- roadmaps are usually presented in graphical form, where the "nodes" (past, present or future states of studied object development) are connected to each other according to the criterion of causality or co-occurrence over time;
- graphic representations are very practical tool, as they outline what steps need to be taken and support the identification of future options. Therefore, the roadmaps also have a planning function.

The result of this method is a time chart consisting of several layers, which usually cover different perspectives. A roadmap is a visualisation of the implementation of planned strategies. It transforms the formulated objectives and strategies into concrete actions, enriching them with specific dates, linking them to important moments in time, often indicating the key functions of these actions and their interconnections.

The undoubted advantage of this method is the possibility to indicate the normative direction of development in the context of the key resources required for this development, which in effect allows to make recommendations for development, investment and financial allocation decisions. It should be emphasised that an image is much quicker assimilated by the human eye than a comprehensive text. In a synthetic way, it can present the development direction of particular market, its sector, a specific professional group or one's own career path. In the last mentioned area of application, it allows to define an action plan that will lead to the realisation of the defined vision. The main disadvantage of this method is the difficulty in objective assessment of resources that later are transformed into effective action. In addition, external conditions may cause a redefinition of layers or resources modification.

⁹⁴ J. Nazarko, J. Ejdys, A. Gudanowska, A. Kononiuk, A. Magruk, Ł. Nazarko, *Badanie ewaluacyjne …*, op. cit.

⁹⁵ J. Nazarko, J. Ejdys, A. Gudanowska, K. Halicka, A. Kononiuk, A. Magruk, Ł. Nazarko, *Roadmapping in Regional Technology Foresight: A Contribution to Nanotechnology Development Strategy*, "IEEE Transactions on Engineering Management" 2022, vol. 69, nr 1, pp.179-194.

 ⁹⁶ A. Kononiuk, A. Gudanowska (red.), *Kierunki rozwoju nanotechnologii w województwie podlaskim*. Mapy. Marszruty. Trendy, Oficyna
 Politechniki Białostockiej, Białystok 2013.

 ⁹⁷ A. Pająk, A. Gudanowska (red.), Doradca zawodowy projektantem przyszłości: zastosowanie studiów nad przyszłością w doradztwie zawodowym, Sieć Badawcza Łukasiewicz - Instytut Technologii Eksploatacji, Radom 2021.

⁹⁸ R. Phaal, C.J.P. Farrukh, D.R. Probert, *Technology roadmapping – A planning framework for evolution and revolution*, "Technological Forecasting and Social Change" 2004, vol. 71, pp. 5-26.

⁹⁹ A. Pająk, A. Gudanowska (red.), Doradca zawodowy projektantem przyszłości: zastosowanie studiów nad przyszłością w doradztwie zawodowym, Sieć Badawcza Łukasiewicz - Instytut Technologii Eksploatacji, Radom 2021.

When carrying out research using the technology roadmapping method, a backcasting is used. Backcasting is a method of analysing alternative futures. It focuses on how the desired future might be achieved. The method is distinguished by an inverted logic of inference. It starts by defining a vision of the future that is desired to be achieved, then step-by-step backcasting all the way to the present day. The target horizon usually extends up to 50 years into the future. The method is most often used to create prescriptive scenarios and determine their feasibility and possible consequences¹⁰⁰.

Among examples of good practice in the application of roadmapping method in foresight projects are among others:

- "Horizons of the Future" project implemented within the framework of the programme of the Minister of Science and Higher Education called "DIALOGUE" in 2018-2020¹⁰¹;
- "FUTURES Future laboratories for professional and personal development", project funded by Erasmus+ programme, contractors: Middlesex University, FORTH, Valuedo, Hanze University, Bialystok University of Technology and Łukasiewicz Research Network – Institute for Sustainable Technologies¹⁰²;
- "beFORE Becoming Future-Oriented Entrepreneurs in universities and companies" project funded by Erasmus+ programme, contractors: Łukasiewicz Research Network – Institute for Sustainable Technologies, Bialystok University of Technology, University of Pisa, Mondragon University – Faculty of Business Studies, Free University Berlin – FuturInstitute, Valuedo, 4CF, Errequadro, Prospektiker and Aveniture¹⁰³.

1.4. Foresight methodology to apply in the context of the future labour market (or other area)

The research methodology was constructed to plan and implement a vision for the development of specific research area with reference to three key areas: the stages of the foresight process, the research context and the classification of methods. The selected methods belong to six different classes and relate to three contexts (economic, social and cognitive), so that they remain complementary. Three types of hybrids are also used in the methodology: sequential, embedded and supportive.

The methods were chosen to keep the balance between reference to the contexts associated with the research area and the eight phases of foresight. The cognitive context was ensured by the methods: desk research, web research, SWOT analysis, backcasting and workshops. The social context was expressed through: trend analysis, surveys, brainstorming, workshops. The economic context is linked to the STEEPVL analysis, scenario method and roadmaps (Fig. 6).

¹⁰⁰ Foresight Platform, http://foresight-platform.eu/community/forlearn/how-to-do-foresight/methods/roadmap/backcasting/ [20.03.2023].

¹⁰¹ *Horyzonty przyszłości,* op. cit.

¹⁰² *FUTURES – Future laboratories ...*, op. cit.

¹⁰³ *beFORE - Becoming ...,* op. cit.

Knowledge Phase Preliminary Recruitment Anticipation Action Evaluation Scanning Resumption generation Context STEEPVL analysis scenario method roadmapping5] [6] [6] Economic 2 trend analysis brainstorming brainstorming [6] brainstorming [5] brainstorming ¥ • brainstorming [5] [4] [5] ¥., [5] Social workshops [5] workshops [5] workshops [5] workshops [5] workshops [6] ۲ ¥ brainstorming survey [6] survey [5] ÷ survey [5] [5] desk 💊 SWOT analysis [5] backcasting [5] research workshops [6] workshops [6] [5] Cognitive ÷ web 1 research [5] Classes Review Analytical Strategic Diagnostic Consultative Prescriptive Relation Sequential Embedded **4**..... Supportive Strength of relation: 1 - zero or very low, 2 - low, 3 - medium, 4 - high, 5 - strong, 6 - very strong

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Figure 6. Foresight methodology to apply in the context of the future labour market (or other area) *Źródło:* own study. The trend analysis carried out on the basis of desk research and web research allows to gather the necessary theoretical knowledge about the conditions of study area development. It can also be carried out in the form of workshop using brainstorming (preliminary phase). Within the framework of sequential hybrids, the trend analysis is the introduction to the brainstorming workshop and the survey research (scanning phase) in the form of STEEPVL analysis. STEEPVL analysis is primarily a tool to facilitate the identification of driving forces for the future scenarios of study area. The workshop method combined with surveys and brainstorming in embedded hybrid (knowledge generation phase) within the framework of supportive hybrid provides input to the scenario method (anticipation phase). Workshop method is also a part of another supportive hybrid, providing also information to SWOT analysis. Scenario method indicating the assumptions and conditions for the construction of future vision, provides input to the roadmapping of analysed area. Also, the backcasting method within the framework of supportive hybrid provides input to the roadmapping of analysed area (action phase). The last two phases of the process – evaluation and resumption – should be initiated at a certain interval in order to compare how the study area might develop differently with time and changes in the environment. The sequential hybrid in this case is based on an evaluation workshop.

The presented methodology has been developed on the basis of good practices and examples of labour market-related foresight projects available in the literature, as well as the authors' personal experience gained during the implementation of foresight projects.

1.5. Operationalisation of a foresight research methodology to apply in the context of the future <u>labour market (or other area)</u>

The foresight methodology has been adapted to 2 levels – individual and group application conducted by counsellors and academics. The proposed foresight methodology is quite universal and has potential to be applied also to other parts of socio-economic area than only labour market.

Methodology for group and individual application in the context of future labour market (or other area) includes the implementation of stages I-III. The methodology for individual application in the context of participant's career development includes the implementation of stages I-IV (Fig. 7).

The methodology consists of four stages:

- Stage I Objective: to gather the necessary knowledge on the trends and conditions of the future labour market (or other area¹⁰⁴), identification and classification of factors influencing the development of future labour market (or other area)
 - main methods: trend analysis, STEEPVL analysis;
 - supporting methods: desk research, web research, brainstorming, surveys, workshops.
- **Stage II –** Objective: to develop possible future scenarios of labour market (or other area)
 - main methods: scenario method;
 - supporting methods: brainstorming, workshops, survey method.
- Stage III Objective: to identify the factors (strengths and weaknesses, opportunities and threats) associated with the implementation of selected future labour market scenario (or other area) / to identify the factors (strengths and weaknesses) associated with the implementation of user's chosen career scenario
 - main method: SWOT analysis;

¹⁰⁴ Sformułowanie "inny obszar" w dalszej części opracowania obejmuje również rozwój kariery zawodowej.

- supporting methods: brainstorming, workshops, survey method.
- **Stage IV** Objective: to develop a plan of actions necessary to be implemented in order to achieve a specific career scenario
 - main method: roadmapping;
 - supporting methods: brainstorming, backcasting, workshops.



Figure 7. General scheme of the methodology *Source:* own study.

The structural and methodological complexity of the research process required to operationalise the research methodology in order to plan its particular elements.

Operationalisation of stage I

The diagram of the operationalisation of stage I in the research process is presented in Figure 8, including 3 tasks in accordance to the particular research methods.



Figure 8. Diagram of the operationalisation of stage I in the research methodology *Source:* own study.

Within task 1.1, a participant or a group of participants will identify the determinants of the development of future labour market (or other area) based on desk research, web research and trend analysis. The outcome of this task will be a set of identified factors classified within seven areas of STEEPVL analysis: social (S), technological (T), economic (E), ecological (E), political (P), value-related (V) and legal (L).

The aim of the activities undertaken as part of Task 1.2 is to identify the main factors in each group of STEEPVL analysis factors. Their selection should be made by a participant or a group of participants, using Computer-Assisted Web Interview (CAWI) technique, by indicating three most important factors in each group. The outcome of this task is a list of the main factors in STEEPVL analysis.

During Task 1.3, the list of main factors in STEEPVL analysis should be assessed in terms of their importance and predictability in terms of the development of future labour market (or other area). The assessment should be made taking into account a specific time perspective. In case of foresight studies, it is usually set at 10-20 years, although longer periods up to 30-40 years also occur. The

assessment shall be made using a 7-point Likert scale and a research form of CAWI technique. This approach primarily serves to identify the most relevant factors that are potential driving forces of scenarios.

Operationalisation of stage II

The diagram of the operationalisation of stage II in the research process is presented in Figure 9, including 3 tasks in accordance to the particular research methods.



Figure 9. Diagram of the operationalisation of stage II in the research methodology *Source:* own study.

Task 2.1 involves selecting two factors from the key factors identified as a result of Task 1.3 from the first stage of the research process. The selection is made by a participant or a group of participants using the CAWI technique.

Task 2.2 includes development scenarios for future labour market (or other area). Scenarios will be built on the basis of the two key factors selected in Task 2.1. By assigning the highest values to these factors, four scenarios of future labour market (or other area) development are identified. Within the framework of this task, a participant or a group of participants focus on naming and selecting the graphical characteristics of the individual scenarios. In addition, descriptive characteristics of 4 scenarios of future labour market (or other area) development can also be drawn up.

During task 2.3, a participant or group of participants select the most desirable or most likely future labour market (or other area) scenario for further analysis. It is also possible to select any other scenario for further analysis.

Operationalisation of stage III

The diagram of the operationalisation of stage III in the research process is presented in Figure 10, including 3 tasks in accordance to the particular research methods.



Figure 10. Diagram of the operationalisation of stage III in the research methodology *Source:* own study.

As part of Task 3.1, a participant in the study or a group of participants will identify the strengths (S), weaknesses (W), opportunities (O) and threats (T) associated with the realisation of selected in Stage II future labour market scenario (or other area). The outcome of the task will be a set of identified factors within four areas of SWOT analysis. In case of career development, provision is made for the identification of strengths (S) and weaknesses (W) associated with the user's chosen career development scenario.

The aim of the activities undertaken within Task 3.2 is to select the main factors in each of the identified groups of SWOT/SW analysis factors. Their selection should be made by a research participant or a group of participants, using an electronic form (CAWI), by indicating a specific number of factors (e.g. from 2 to 20 in total in a specific group of factors).

During Task 3.3, the list of main factors of SWOT/SW analysis should be assessed in terms of their importance now (in the current year) and in a defined time perspective (e.g. 2040). The assessment will be made using a 7-point Likert scale via the CAWI form. This approach primarily serves to identify SWOT key factors necessarily related to the implementation of the selected future labour market

scenario (or other area) or SW key factors related to the implementation of the user's chosen career scenario.

Operationalisation of stage IV

The diagram of the operationalisation of stage IV in the research process is presented in Figure 11.

Zadanie 4.1. Opracowanie marszruty rozwoju kariery zawodowej					
Metody badawcze: marszruty rozwoju, prognozowanie wsteczne, warsztaty	Rezultat: zestaw działań niezbędnych do podjęcia w określonej perspektywie czasowej w celu osiągnięcia wybranego wariantu rozwoju kariery zawodowej				

Figure 11. Diagram of the operationalisation of stage IV in the research methodology Source: own study.

Task 4.1 aims to identify the necessary operational activities that should be carried out by a participant in order to achieve the chosen career option. Actions should be planned in accordance to different time perspectives. An example of a career roadmap for individual work is presented in Figure 12.



igure 12. The basic concept of a career roadmap *Source:* own study.

The baseline career roadmap consists of four layers: knowledge, skills, qualifications, expected net salary (per month), position and activities to be undertaken (courses, training). The career roadmap refers to a time horizon and shows how a participant's career should develop over specific time intervals. The roadmap determines a kind of plan including the activities related to knowledge, skills, qualifications, which a user has to undertake in order to achieve the expected salary and occupy the expected job position. The roadmap allows to monitor the level of goals achievement over a certain time horizon.

A backcasting method will also be used. The user will start by defining a professional objective. Then, step by step, he or she will go backwards all the way to the present day, defining an action plan to achieve the objective.

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2. The process of generating foresight scenarios

The processes of generating foresight scenarios using the IT tool *Create the Future* are presented in detail below. The processes described concern the following areas:

- Labour market session conducted in a group,
- Any analysis area session conducted individually,
- My professional career session conducted individually.

2.1. Group work

Scenarios for the development of the future of the labor market (or other area of analysis) can be developed using the IT tool "Create the Future". The following section describes the process in detail, in which the facilitator will direct the work of a group of participants in such a way as to design alternative future development scenarios.

1. Introductory activities

The facilitator introduces the participants to the IT tool "Create the Future." It presents the genesis of its creation as part of the project "Foresight-oriented IT system supporting higher education and career development" (FORhesIT) and discusses its functionality and principles of operation.

The facilitator asks the participants to imagine for a moment that they have traveled into the future, for example to 2040, and answer the question:

- What is the unemployment rate?
- What job positions exist?
- What new professions have emerged in the market?
- What type of work is the most popular?
- Are people working in line with their education?
- Are salaries commensurate with education and tasks performed?
- Are there prospects for professional development?
- Are working-age individuals leaving the country for employment purposes?

The facilitator moderates a discussion on the variability of the surrounding world and job market, including the changing nature of professions and the impact of geopolitical situations on labor market development, such as the increase or decrease in demand for qualifications. Additionally, the facilitator acquaints participants with the significance of the foresight concept and highlights the differences between this concept and forecasting.

"foreseeing", "looking into Foresight means the future", "farsightedness". At the same time, foresight can be understood both as a category of competences possessed by individuals, i.e., skills that can be developed and improved in particular people, and as a category of specific techniques and methods that can be used in future-oriented processes. Foresight does not involve predicting the future, but rather a way of "using the future" to achieve goals in a changing environment. Given that the future cannot be predicted, foresight analyses help to better prepare for it. Forecasting is based on past facts and assumes that there is one future, attempting to discover and describe it. Foresight, on the other hand, assumes that there is not only one possible future and considers various probable and desirable versions of it.

2. The facilitator enters the website: <u>https://4futures.eu</u>

The landing page contains a welcome text and information that when working with the tool, follow the instructions displayed on the screen (Fig. 13).



Figure 13. Landing page of the "Create the Future" tool

3. The facilitator selects the group work module (button: Group work - Fig. 14)



Figure 14. Selection of the operating mode

4. The facilitator selects the area of analysis (Button: Labor market - Fig. 15).



Figure 15. Selection of the area of analysis: Labor market

5. A link appears on the screen where all analyses will be performed (Fig. 16). The facilitator forwards it available to participants.



Figure 16. An example link under which the analyses will be carried out

After reading the information, the facilitator selects the button: "Next".

6. After all participants enter the website address indicated by the facilitator, the group's work with the IT tool begins.

The screen that starts working with the "Create the Future" tool appears (Fig. 17). It shows the steps in which individual analyses will be performed.

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Labour market / Group work					
 Hello! So have just started to work with the "Create the Future" tool, with which you will carry out the following analyses in three steps: 1 STEEPVL analysis 2 Future scenarios 3 SWOT analysis 	You will be guided through the individual steps by the instructions displayed by clicking on the symbol				
Once you have gone through all the steps, you will know what the future of the selected area may look like. ← Back Next					

Figure 17. Welcome screen with information about individual analysis steps

After reading the information and discussing the nature of individual analyses, the facilitator selects the button: "Next".

7. A screen called "New project" appears (Fig. 18).



Figure 18. Fields for formulating questions and specifying the time horizon

The facilitator, after discussing with the group the session topic and specifying the time perspective to which foresight analyses will apply, enters the information into the tool template.

In the first white field, the facilitator enters a question about the future of the labor market area, e.g. *How will the labour market develop in a few years?*

In the second white field, the facilitator fills the time horizon of the analyses, e.g. 2040.

After entering the information, the facilitator selects the button: "Next".

Before starting the activity, the facilitator leads a discussion about **trends** (currently existing directions of development in a given field), which includes the following stages:

- observation of the environment knowledge about trends that directly shape the studied area, as well as those that may indirectly influence it should be checked and updated;
- searching for additional information observed trends should be critically verified using additional sources of information, i.e. trade magazines and newspapers, statistical data (national statistical services, Eurostat), market research, interviews with specialists in specific fields, and experts, page view statistics;
- identifying regularities at this stage of the analysis, it is necessary to verify how the identified trends are developing and what type of trend occurs (initial, growth, mature, declining trends).

Trend analysis becomes particularly important in the context of high uncertainty and variability of the environment that affect contemporary society and the economy. Understanding the mechanisms of trends may be an important element in the process of better preparation for future phenomena, as well as predicting the future.

Trend analysis also involves observing changes over time. Tracking these changes allows to identify which phenomena are becoming more important.

Trend analysis also allows for the identification of the so-called megatrends, i.e. long-term and wide-ranging changes that have a fundamental impact on society, the economy, or technology.

8. Step 1 – STEEPVL analysis

This step begins using the tool to perform STEEPVL analysis. The facilitator briefly explains the essence and purposefulness of the STEEPVL analysis, emphasizing the variety of factors that influence our lives, career path, and labor market needs (Fig. 19). Emphasizes that the lists of factors proposed in the "Create the Future" tool are not closed sets and that in each group of factors, there is an option to enter own - additional factor (mini-lecture).
STEEPVL analysis is an environment research tool used to better understand its complexity and develop a broader view of the future.

Basic dimensions (factors) in STEEPVL analysis:

- **S** Social
- T Technological
- E Economic
- E Ecological
- **P** Political
- **V** Values
- **L** Legal

The information with the names of factor groups appears on the screen. Additional information about selecting 1 to 3 factors from each of the seven indicated groups of STEEPVL factors is also displayed on the right side. Participants must mark those factors that, according to them, are the most important in the context of the labor market development. It is possible to browse the defined factors from the list or use the "search" function based on the entered keyword. If participants do not find suitable factors, they can formulate and add them themselves (Fig. 20).

Participants analyse (individually) each of the seven groups of factors and make individual recommendations. Before moving on to the next group of factors, each time there is a stage of agreeing (within the group) on the most important factors in the context of the development of the labor market.



Figure 19. STEEPVL analysis – information on the nature and process of factor selection

After familiarizing the participants with the information, the facilitator selects the button: "Next".

8.1. Selection of 1 to 3 most important social factors

Participants individually select from 1 to 3 most important social factors. If they do not find appropriate factors, they can formulate and add them (Fig. 20).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of social factors that you think have the greatest impact on the Labour market.	
	The level of virtualization of social life The level of digital competence of the society	
	Share of elderly people (65+) in the age structure of the society	
	The level of education of the society The level of flexibility of employees in terms of changing the type of work	
	Level of satisfaction with the education system	
	The level of cultural diversity in the labor market The level of action with the value of according free time	
	Search Q + Add your own ^{\$} Unfold	
	← Back Next	0/0

Figure 20. STEEPVL analysis – selection of social factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important social factors influencing the formation of the labor market area (Fig. 21).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of social factors that were considered to have the greatest impact on the Labour market as a result of the group discussion. Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of the labour market as a result of the group discussion Impact of labour as a result of the group discussion Impact of labour as a result of the group discussion Impact of elderly people (65+) in the age structure of the society Impact of elderly people (65+) in the age structure of the society	
	← Back Noxt	

Figure 21. STEEPVL analysis – sample group selection of social factors

8.2. Selection of 1 to 3 most important technological factors

Participants individually select from 1 to 3 most important technological factors. If they do not find appropriate factors, they can formulate and add them (Fig. 22).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of technological factors which, in your opinion, have the greatest impact on the Labour market.	
	The level of virtualization of the labor market	
	The level of development of robotization in services and industry The level of development of artificial intelligence applications	
	The level of cybersecurity in enterprises	
	Degree of use of e-services by residents	
	 The level of development of technologies that make life easier for the elderly (gerontechnology) 	
	Access to the data collection, processing and use system (open data)	
	Search Q + Add your own C Unfold	
	← Back Next	₽ 0/1

Figure 22. STEEPVL analysis – selection of technological factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important technological factors influencing the formation of the labor market area (Fig. 23).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of technological factors that were considered to have the greatest impact on the Labour market as a result of the group discussion. Impact of functions 1	
	← Back Next	

Figure 23. STEEPVL analysis – sample group selection of technological factors

8.3. Selection of 1 to 3 most important economic factors

Participants individually select from 1 to 3 most important economic factors. If they do not find appropriate factors, they can formulate and add them (Fig. 24).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of economic factors which, in your opinion, have the greatest impact on the Labour market.	
	The purchasing power of money	
	The level of costs of running a business	
	Cost of living/living in the country	
	The dynamics of establishing new enterprises	
	Availability of potential outlets for products and services	
	Availability of funds to support enterprises	
	Real estate price level	
	The lovel of accommin development of the ration	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	₽ 0/1

Figure 24. STEEPVL analysis – selection of economic factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important economic factors influencing the formation of the labor market area (Fig. 25).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of economic factors that were considered to have the greatest impact on the Labour market as a result of the group discussion.	
	← Back Next	

Figure 25. STEEPVL analysis – sample group selection of economic factors

8.4. Selection of 1 to 3 most important ecological factors

Participants individually select from 1 to 3 most important ecological factors. If they do not find appropriate factors, they can formulate and add them (Fig. 26).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of ecological factors which, in your opinion, have the greatest impact on the Labour market.	
	Level of use of renewable energy sources (RES)	
	The level of development of the circular economy	
	The level of ecological awareness of the society	
	Disease risk level (e.g. viruses, allergies)	
	The level of implementation of pro-ecological solutions in enterprises	
	The level of sense of ecological security	
	Availability of natural resources (e.g. fossil resources, water)	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	. 0/1

Figure 26. STEEPVL analysis – selection of ecological factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important ecological factors influencing the formation of the labor market area (Fig. 27).

1 STEEPVL	How will the labour market develop in a few years? 2040
	Select 1 to 3 factors from the group of ecological factors that were considered to have the greatest impact on the Labour market as a result of the group discussion. Number of Indications EL1 Level of use of renewable energy sources (RES) 1 EL2 The level of development of the circular economy 1 EL3 The level of ecological awareness of the society 1
	← Back Next

Figure 27. STEEPVL analysis – sample group selection of ecological factors

8.5. Selection of 1 to 3 most important political factors

Participants individually select from 1 to 3 most important political factors. If they do not find appropriate factors, they can formulate and add them (Fig. 28).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of political factors which, in your opinion, have the greatest impact on the Labour market.	
	The level of transparency of political life	
	The level of efficiency and effectiveness of the authorities	
	Level of support for the development of sectoral (vocational) education	
	Level of labor market support by state authorities	
	Level of support for talent development by the state	
	Stability of relations between the state and the EU	
	Geopolitisk situasjon i verden	
	Search Q + Add your own ‡ Unfold	
	← Back Next	₽ 0/1

Figure 28. STEEPVL analysis – selection of political factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important political factors influencing the formation of the labor market area (Fig. 29).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of political factors that were considered to have the Image: Constraint of the group discussion. Image: Constraint of the discussion of the discussion of the discussion of the discussion of the discussion. P1 The level of efficiency and effectiveness of the authorities 1 P2 Level of labor market support by state authorities 1 P3 Stability of relations between the state and the EU 1	
	← Back Next	

Figure 29. STEEPVL analysis – sample group selection of political factors

8.6. Selection of 1 to 3 most important values factors

Participants individually select from 1 to 3 most important values factors. If they do not find appropriate factors, they can formulate and add them (Fig. 30).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of values factors which, in your opinion, have the greatest impact on the Labour market.	
	 The level of willingness to self-development The level of intergenerational cooperation The level of care for physical and mental health The level of balance between private and professional life The level of trust in technology 	
	 The level of sense of security Entrepreneurial level of society Search Q + Add your own Unfold 	
	← Back Next	2 0/1

Figure 30. STEEPVL analysis – selection of values factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important values factors influencing the formation of the labor market area (Fig. 31).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of values factors that were considered to have the greatest impact on the Labour market as a result of the group discussion.	
	← Back Next	

Figure 31. STEEPVL analysis – sample group selection of values factors

8.7. Selection of 1 to 3 most important legal factors

Participants individually select from 1 to 3 most important legal factors. If they do not find appropriate factors, they can formulate and add them (Fig. 32).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of legal factors which, in your opinion, have the greatest impact on the Labour market.	
	The level of stability of legal regulations in Poland	
	Efficiency of administrative proceedings	
	The level of legal facilitations (regulations/requirements) for starting a business	
	The level of transparency of the tax system	
	Level of enforcement effectiveness	
	The level of transparency of legal regulations concerning the labor market	
	The level of complexity of the procedures for applying for financial support for business activity	
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Figure 32. STEEPVL analysis – selection of legal factors

After collecting the answers of all participants and conducting a group discussion, the facilitator uses the cursor to drag (to the empty field on the left) from 1 to 3 of the most important legal factors influencing the formation of the labor market area (Fig. 33).

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	Select 1 to 3 factors from the group of legal factors that were considered to have the greatest impact on the Labour market as a result of the group discussion. Image:	
	← Back Next	

Figure 33. STEEPVL analysis – sample group selection of legal factors

8.8. Assessment of the influence of factors

After identifying a maximum of 21 main factors of the STEEPVL analysis, participants assess the influence of the indicated factors on the development of the labor market in a previously determined time frame (Fig. 34). It should be noted that the influence is the level of impact of a given factor on the development of the analysed area (in this case the labor market).

Participants assess on a 7-point scale, i.e. from 1 to 7, where 1 - very low influence, 7 - very high influence. Users use the slider to click on the fields with individual factors.

1 STEEPVL	How will the labour market develop in a few years? 2040	
	Assess the influence of indicated factors in the context of the development of Labour market in the perspective of 2040 (evaluate using a scale of 1-7, where 1 – very low, 7 - very high)	
	Very low Very high influence	
	1 2 3 4 5 6 7	
	S1 The level of virtualization of social life	
	S2 The level of digital competence of the society	
	\$3 Share of elderly people (65+) in the age structure of the society	
	T1 The level of virtualization of the labor market	
	T2 The level of development of artificial intelligence applications	
	T3 The level of cybersecurity in enterprises	
	EN1 The purchasing power of money	
	EN2 Cost of living in the country	
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	← Back Next	2.

Figure 34. STEEPVL analysis – assessment of the influence of factors indicated by participants

An example of a group assessment of the influence of individual factors of the STEEPVL analysis on the labor market is shown in Figure 35.

1 STEEPVL	How will the labour market develop in a few years? 2040	EN
	The table below summarises the group assessment of each factor influence in the STEEPVL analysis.	
	EN2 Cost of living in the country 7	
	P3 Stability of relations between the state and the EU 7 S2 The level of digital competence of the society 6	
	S3 Share of elderly people (65+) in the age structure of the society 6	
	EN3 The dynamics of establishing new enterprises 6 P2 Level of labor market support by state authorities 6	
	V2 The level of willingness to self-development 6 L3 The level of transparency of the tax system 6	
	≎ Unfold	
	← Back Next	

Figure 35. STEEPVL analysis – summary of the group assessment of the influence of STEEPVL analysis factors

After assessing the influence of factors on the development of the labor market area, the facilitator selects the button: "Next".

8.9. Assessment of the predictability of factors

Next, the participants assess the predictability of the development of the indicated factors in the context of the development of the labor market in a previously determined time frame (Fig. 36).

Predictability is the level of possibility of predicting in advance how a given factor will develop in the future in relation to the analysed area (in this case the labor market).

Participants assess on a 7-point scale, i.e. from 1 to 7, where 1 - very low predictability, 7 - very high predictability. Users use the slider to click on the fields with individual factors.

Very low predictability							
	2	3	4	5	6	Very high predictability 7	
S1 The level of virt S2 The level of dig						\geq i	
S3 Share of elderly			re of the society				
T1 The level of virt T2 The level of dev			e applications			- 1	
T3 The level of cyb	ersecurity in en	iterprises					
EN1 The purchasing EN2 Cost of living/liv							
					0	Unfold	
(Ca	alculations perf	ormed by the sys	stem) must be con	e of further analys iverted to an uncer the predictability le	es rtainty level		

Users use the slider to click on the fields with individual factors.

Figure 36. STEEPVL analysis – assessment of the predictability of factors indicated by participants

The facilitator explains to the group that for the purposes of further analyses (calculations performed by the system), the level of predictability is converted to the level of uncertainty according to the relationship: 8 minus the assessment of the level of predictability.

An example of a group assessment of the uncertainty of individual factors in the context of labor market development is shown in Figure 37.

1 STEEPVL	How will the labour market develop in a few years? 2040	
	The table below summarises the group uncertainty assessment of the STEEPVL analysis factors.	
	Mean score	
	EN1 The purchasing power of money 6	
	T3 The level of cybersecurity in enterprises 5	
	EN2 Cost of living/living in the country 5	
	P3 Stability of relations between the state and the EU 5	
	S2 The level of digital competence of the society 4	
	EN3 The dynamics of establishing new enterprises 4	
	EL1 Level of use of renewable energy sources (RES) 4	
	EL2 The level of development of the circular economy 4	
	≎ Unfold	
	 In a moment you will see the results of the STEEPVL analysis in graphical form. They are the result of completing the work in the first step. We encourage you to continue working with the "Create the Future" tool!!! 	
	← Back Next	

Figure 37. STEEPVL analysis – summary of the group uncertainty assessment of the STEEPVL analysis factors

After assessing the level of uncertainty of individual factors of the STEEPVL analysis, the facilitator selects the button: "Next".

8.10. The graph shows the final assessment results of the influence and uncertainty of STEEPVL factors determining the development of the selected area in the time perspective indicated by the participants.

Factors with the highest level of influence and uncertainty are marked in red. These factors will largely determine the development of the analysed area (Fig. 38).



Figure 38. Graph presentation of the results of assessing the influence and uncertainty of STEEPVL analysis factors

After familiarizing the participants with the information, the facilitator selects the button: "Next".

9. Step 2 – Future scenarios

In the next stage of using the tool, a scenario analysis will be performed (Fig. 39). The facilitator explains to the group the assumptions of the analysis.

The facilitator introduces the participants to the main idea of building scenarios, for example, the following should be pointed out:

There is no single scenario for the future. Many futures are possible, depending on action or inaction in the present.

Future events cannot be predicted with certainty, so various scenarios for the development of the current situation should be taken into account. However, it should be borne in mind that only one of them will exist.



Figure 39. Introduction to scenario analysis

After explaining the theoretical issues, the facilitator selects the button: "Next".

9.1. Selection of two crucial factors

As a result of the analyses, the system generates a list of crucial factors rated highest by the participants in terms of influence and uncertainty (i.e. the most influencing and most uncertain). If more than 2 factors appear on the list, the facilitator should conduct a group discussion leading to a decision on which two of them, according to the participants, are the crucial factors that will determine the development of the future of the studied area, in this case, the labor market. At the same time, these two factors will constitute the axes of the scenarios in further analyses (Fig. 40).

It should be noted that when selecting factors, it is desirable from a methodological point of view that they do not belong to the same group of factors (e.g. P - political), but to two different ones (e.g. P - political and S - social).

2 Future scenarios	How will the labour market develop in a few years? 2040	EN
	Identify exactly 2 factors that, as a result of the group discussion, were found to be crucial in the process of shaping the area Labour market.	
	Uncertainty Influence	
	7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	EN2 Cost of living in the country	
	EN3 The dynamics of establishing new enterprises	
	P2 Level of labor market support by state authorities	
	P3 Stability of relations between the state and the EU	
	L3 The level of transparency of the tax system	
	← Back Next	

Figure 40. Group selection of two crucial factors

After selecting the factors in a group, the facilitator selects the button: "Next".

9.2. Presentation of two selected factors constituting the axes of scenarios

An example of a summary of the selection of factors made by participants is presented in Figure 41.

2 Future scenarios	How will the labour market develop in a few years? 2040	E
	As a result of the analyses, the factors with the greatest influence and uncertainty in the development of the Labour market in the 2040 year were identified as:	
	Uncertainty Influence	
	7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	S2 The level of digital competence of the society	
	P3 Stability of relations between the state and the EU	
	← Back Next	

Figure 41. An example of the two factors rated highest by participants in terms of influence and uncertainty

After the information appears, the facilitator selects the button: "Next".

9.3. Creating scenarios

Axes appears on the screen in which four scenarios will be created, representing different directions in which the future of the examined area, in this case the labor market, may develop (Fig. 42).

The facilitator suggests that participants create four alternative scenarios for the development of the labor market, and also asks them to suggest creative names for the scenarios and instructs them that the names of the scenarios should be concise. They should reflect the picture of the future determined by the factors placed on the axes. They can be formulated in both formal and informal forms - they may refer, for example, to the titles of films, songs, and literary eras.

In this step, participants name the scenarios in a group discussion. The facilitator enters them in the clear fields that read: Scenario (no.) name. It is also possible to select the graphical characteristics of individual scenarios, using the "camera" symbol available in the scenario fields.

2 Future scenarios	How will the labour market develop in a few years? 2040	EN
Sta sha futi	ctors: The level of digital competence of the society and ability of relations between the state and the EU were considered the most important - key in aping the area Labour market in the perspective of 2040 year, therefore they are the basis of the ure scenarios presented below. Using the example provided, suggest names for the scenarios d choose graphics that reflect each scenario. Very high Stability of relations between the state and the EU	
	Scenario 1 name Scenario 2 name Very high The level of digital competence of the society	
Very	Scenario 3 name Very low Very low	
	Stability of relations between the state and the EU	

Figure 42. Places to enter the names of the scenarios

After entering the names of the scenarios, the facilitator selects the button: "Next".

Examples of scenario names are shown in Figure 43. The facilitator should emphasize the possibility of preparing detailed descriptions for each of the four scenarios (apart from the "Create the Future" tool, e.g. group work using a dry-erase board or a large-format board with prepared fields for descriptions of each scenario).

As part of the analyses, the facilitator may divide the group into four smaller teams that will be tasked with developing the characteristics of the assigned scenario. It is also possible for the entire group to focus on developing the characteristics of one selected scenario (e.g. the most desirable one). Initially, the facilitator can write down individual ideas in a separate text file or on the board. Finally, they should be transformed into sentences, creating a coherent description.



Figure 43. Example scenario names generated in the discussion process

Using the "light bulb" symbol (Fig. 43), participants can familiarize themselves with sample characteristics of individual scenarios (Fig. 44-47) and, inspired by them, develop their own.



Figure 44. Example characteristics of scenario 1

Scenario 2 - Digital nomads

← Back

1. High level of digital competences of society 2. 2. Low level of availability of funds supporting enterprises

The society is well educated and has very well-developed digital competences. It is perfectly prepared to work with modern technologies, including in organizations implementing solutions in the field of automation, robotization and artificial intelligence. However, the European Union's suspension of the disbursement of financial resources supporting enterprises in Poland resulted in a reduction in the dynamics of their development and implementation of innovative solutions. No new enterprises are being established, and existing ones are reducing employment. They also often suspend their activities. As a result, the unemployment rate in the country is starting to increase, and even educated citizens with high digital competences do not have jobs. People are forced to take up jobs below their qualifications or decide to go abroad to work.

Figure 45. Example characteristics of scenario 2



Figure 46. Example characteristics of scenario 3



Figure 47. Example characteristics of scenario 4

9.4. Selection of a scenario for further analysis

After developing the names of four alternative scenarios, participants choose the scenario of their most desired future or another one that they want to subject to a SWOT analysis (Fig. 48 - scenario marked in dark blue).



Figure 48. Example of selecting a scenario for further analysis

After the group has selected a scenario, the facilitator selects the button: "Next".

10. Step 3 – SWOT analysis

In the third stage of using the tool, a SWOT analysis will be carried out in the context of the development of the labor market in the future scenario selected by the participants (Fig. 49).

The facilitator should briefly explain the essence and purpose of the SWOT analysis, and explain the concepts of strengths and weaknesses, opportunities, and threats in the context of their impact on the formation of the selected labor market development scenario.

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths, weaknesses, opportunities, and threats of any entity or phenomenon:

- S strenghts (features that constitute an advantage),
- W weaknesses (features that constitute disadvantages),
- O opportunities (potential or existing opportunities in the environment),
- T threats (probable or existing threats in the environment).

3 SWOT	How will the labour market develop in	n a few years? 2040	EN
	SWODT analysis With regard to the selected future development scenario, select to factors, divided into: S strengths W weaknesses 0 opportunities	You can browse the defined factors from the list or additionally use the 'search' function based on the entered keyword.	
	T threats		
	affecting the shaping of the area Labour market in the scenario Global and digital.		
	← Back Next)	

Figure 49. SWOT analysis instructions

After familiarizing the participants with the concepts of SWOT analysis, the facilitator selects the button: "Next".

10.1. Selection from 2 to 10 strengths and weaknesses

Participants choose from 2 to 10 strengths and weaknesses influencing the development of the labor market (Fig. 50).

3 SWOT	How will the labour market	develop in a few years? 2040	EN
	Mark the most important strengths and wea of the area Labour market in the scenario "Gl in each field, from 2 to 10 factors in total).		
	Strengths	Weaknesses	
	Low unemployment rate	High level of labour costs	
	Job opportunities for highly qualified individuals	The mismatch between the education system and the needs of the economy	
	□ Job opportunities for individuals with vocational education	Structural mismatch between labour market demand and	
	High level of labour market virtualization	 Structural mismatch between labour market demand and supply in the labor market 	
	Entrepreneurial attitudes of society	Low level of labour market virtualization	
	Education system related to the needs of the economy	Passive entrepreneurial attitudes of the society	
	Significant flexibility of employees in changing their workplace	Lack of collaboration between universities and businesses and labour market institutions	
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	1 2004		

Figure 50. A list of strengths and weaknesses for participants to choose from

Example choices are shown in Figure 51.

3 SWOT	How will t	he labour market	develop in a few years? 2040	EN
	the most important str	engths and weakness he scenario "Global ar	p discussion, were considered ses affecting the formation of the nd digital" (at least 1 factor in	
	Strengths	Number of indications	Weaknesses Number of indications	
	□ Job opportunities for highly qualified individuals	1	Low level of labour market virtualization	
	Low unemployment rate	1	The mismatch between the education system and the needs of the economy	
		← Back	Next	

Figure 51. Summary of participants' selection of strengths and weaknesses

The facilitator moderates the group discussion. Participants must choose from 2 to 10 total strengths and weaknesses that influence the development of the labor market in the selected scenario. The facilitator marks the participants' choices (Fig. 52).

3 SWOT	How will the	ne labour marke	t develop in a few years? 2040	EN
	the most important stre	engths and weakne e scenario "Global	oup discussion, were considered esses affecting the formation of the and digital" (at least 1 factor in	
	Strengths	Number of indications	Weaknesses Number of indications	
	Job opportunities for highly qualified individuals	1	Low level of labour market virtualization 1	
	S1 Low unemployment rate	1	W1 The mismatch between the education system and the needs of the economy	
		← Back	Next	

Figure 52. An example of the result of a group discussion regarding the selection of strengths and weaknesses that influence the development of the labor market

After making the selection, the faciitator selects the button: "Next".

10.2. Selection of 2 to 10 opportunities and threats

Participants select from 2 to 10 opportunities and threats that influence the development of the labor market (Fig. 53).

3 SWOT	How will the labour market	develop in a few years? 2040	EN
	Select the most important opportunities an formation of the area Labour market in the select 1 factor in each field, from 2 to 10 factor	cenario "Global and digital" (at	
	Opportunities	Threats	
	Stable geopolitical situation in the country and in the world	Unstable domestic and global geopolitical situation	
	Increase in foreign investment creating new jobs and implementing modern technologies	Low level of purchasing power of money	
	Acquisition and utilisation of financial resources from EU	Worsening relations between Poland and the EU	
	funds	Increased poverty in population	
	Increase of domestic investment expenditures	Less access to markets for products and services	
	Dynamic economic growth in the country	Decreased public spending on education	
	Active institutions supporting entrepreneurship	Bureaucracy and complex regulations related to setting up a new business	
	Accessibility to potential markets for products and services		
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	← Back	Next	₽ 0/1

Figure 53. List of opportunities and threats for participants to choose from

Example choices are shown in Figure 54.

SWOT	Indicate which factors, as a rest the most important opportune	ult of the <u>c</u> ities and th ario "Globa	roup discussion, were considered reats affecting the formation of the al and digital" (at least 1 factor in	
		Number of ndications	Threats Number of indications	
	Stable geopolitical situation in the country and in the world	1	Low level of purchasing power of money 1	
	Increase in foreign investment creating new jobs and implementing modern technologies	1	Worsening relations between Poland and the EU Less access to markets for products and services 1	
	Dynamic economic growth in the country	1		
	Numerous EU programs supporting skills enhancement	1		
	National programs supporting talent development	1		
	High level of robotics development in industry and service	e 1		
		← Back	Next	

Figure 54. Summary of participants' selection of opportunities and threats

The facilitator moderates the group discussion. Participants must select from 2 to 10 opportunities and threats in total that influence the development of the labor market in the selected scenario. The facilitator marks the participants' choices (fig. 55).

3 SWOT	How will the lab	our marke	t develop in a few years? 2040	EN
		ities and thre ario "Global	oup discussion, were considered ats affecting the formation of the and digital" (at least 1 factor in	
		Number of ndications	Threats Number of indications	
	O3 Numerous EU programs supporting skills enhancement	1	T2 Less access to markets for products and services 1	
	O2 Increase in foreign investment creating new jobs and implementing modern technologies	1	T1 Worsening relations between Poland and the EU 1 Low level of purchasing power of money 1	
	O1 Stable geopolitical situation in the country and in the world	1	Low rever of purchasing power of money	
	High level of robotics development in industry and service	1		
	National programs supporting talent development	1		
	Dynamic economic growth in the country	1		
		← Back	Next	

Figure 55. An example of the result of a group discussion regarding the selection of opportunities and threats that influence the development of the labor market

A summary of the selection of strengths, weaknesses, opportunities, and threats appears on the screen (Fig. 56).

	The table below presents a set of selecter weaknesses, O - opportunities, T - threats, Labour market in the scenario "Global and noticed in the list, it is still possible to mal symbol in the previous steps	, influencing the future of the area	
S	Strengths	Weaknesses	w
	S1 Low unemployment rate	W1 The mismatch between the education system and the needs of the economy	
0	Opportunities	Threats	Т
	01 Stable geopolitical situation in the country and in the world	T1 Worsening relations between Poland and the EU	
	02 Increase in foreign investment creating new jobs and implementing modern technologies	T2 Less access to markets for products and services	
	03 Numerous EU programs supporting skills enhancement		

Figure 56. An example selection of strengths, weaknesses, opportunities and threats

After analysing the choices, the facilitator selects the button: "Next".

If a contradiction is detected between the selected factors, the facilitator can use the "Back" button to go back to the previous step and make changes.

10.3. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of the labor market (current year)

The facilitator asks the participants to evaluate the indicated strengths, weaknesses, opportunities and threats for the development of the labor market area. It refers to the present (Fig. 57).

3 SWOT	How will the labour market develop in a few years?	EN
	Evaluate the importance of the indicated strengths and weaknesses as well as opportunities and threats for the development of the Labour market in the current year (evaluate on a scale of 1-7, where 1 – very low, 7 - very high)	
	l 2 3 4 5 6 7	
	\$1 Low unemployment rate	
	W1 The mismatch between the education system and the needs of the economy	
	01 Stable geopolitical situation in the country and in the world	
	02 Increase in foreign investment creating new jobs and implementing modern technologies	
	03 Numerous EU programs supporting skills enhancement	
	T1 Worsening relations between Poland and the EU	
	T2 Less access to markets for products and services	
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1	← Back Next	2, 0/1

Figure 57. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of the labor market (current year)

Participants evaluate (on a 7-point scale) the importance of the indicated strengths, weaknesses, opportunities, and threats for the development of the labor market (in the current year). They use the slider to click on individual fields. An example summary of the results of a group assessment of the importance of SWOT factors at the moment is presented in Figure 58.

3 SWOT	How will the labour market develop in a few years? 2040	
	The table below presents a summary of the collective (group) assessment of the importance of SWOT factors in the current year	
	Socre S1 Low unemployment rate 7	
	01 Stable geopolitical situation in the country and in the world 7 03 Numerous EU programs supporting skills enhancement 7 W1 The mismatch between the education system and the needs of the economy 6	
	O2 Increase in foreign investment creating new jobs and implementing modern technologies 5 T1 Worsening relations between Poland and the EU 4	
	T2 Less access to markets for products and services 3	
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	← Back Next	

Figure 58. Summary of the group evaluation of the importance of strengths and weaknesses, opportunities, and threats for the development of the labor market (in the current year)

After presenting a summary of the results of the joint evaluation of the importance of SWOT factors, the facilitator selects the button: "Next".

10.4. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of a selected area in a selected time perspective

The facilitator asks the participants to evaluate the indicated strengths and weaknesses, as well as opportunities and threats for the development of the labor market. The evaluation refers to the future defined by the participants (Fig. 59).

3 SWOT	How will the labour market develop in a few years? 2040	EN	
	Evaluate the importance of the indicated strengths and weaknesses as well as opportunities and threats for the development of the Labour market in perspective of 2040 year (evaluate on a scale of 1-7, where 1 – very low, 7 - very high)		Figure 59. Evaluation of the importance of strengths and
	Definitely unimportant 1 2 3 4 5 6 7		weaknesses, opportunities and
	S1 Low unemployment rate W1 The mismatch between the education system and the needs of the economy		threats for the development of a
	 O1 Stable geopolitical situation in the country and in the world O2 Increase in foreign investment creating new jobs and implementing modern technologies 		selected area in a selected time
	03 Numerous EU programs supporting skills enhancement T1 Worsening relations between Poland and the EU		perspective
	T2 Less access to markets for products and services		
	C Unfold	- 1	
	← Back Next	2 0/1	

Participants evaluate (on a 7-point scale) the importance of the indicated strengths, weaknesses, opportunities, and threats for the development of the labor market in the analysed time perspective. They use the slider to click on individual fields. An example summary of the result of a group evaluation of the importance of SWOT factors in a selected time perspective is presented in Figure 60.

3 SWOT	How will the labour market develop in a few years? 2040	
	The table below presents a summary of the collective (group) assessment of the importance of SWOT factors in perspective of 2040 year.	
	02 Increase in foreign investment creating new jobs and implementing modern technologies 7	
	01 Stable geopolitical situation in the country and in the world 7	
	W1 The mismatch between the education system and the needs of the economy 7	
	S1 Low unemployment rate 7 O3 Numerous EU programs supporting skills enhancement 6	
	T2 Less access to markets for products and services 2	
	T1 Worsening relations between Poland and the EU 2	
	C Unfold	
	← Back Next	

Figure 60. Summary of the group evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of the labor market in 2040

After summarizing the results of a joint evaluation of the importance of SWOT factors in the selected perspective, the facilitator selects the button: "Next".

10.5. Results of evaluating the importance of strengths and weaknesses, opportunities and threats for the development of the selected area now and in the future

The final results of evaluating the importance of strengths, weaknesses, opportunities, and threats for the labor market area currently and in the time horizon indicated by the participants are displayed on the screen. The strengths and weaknesses, opportunities and threats that are most important now and in the future are marked in red. These factors will largely determine the development of the labor market (Fig. 61).



After familiarizing the participants with the results and summarizing their joint work, the facilitator selects the button: "Next".

11. Generating a report

After completing work with the "Create the Future" tool, participants can download a report on the analyses in the form of an editable .docx document or a non-editable .pdf document (Fig. 62).

How will the labour market d	levelop in a few years? 2040
Future analysis	Thank you for using our tool
If you want to download the results of the analysis carried out, select the file format:	Remember that using the "Create the future" tool, you can also conduct group analyses.
± Document docx	We also encourage you to repeat the analysis in order to compare how, with the passage of time and changes in the environment, the development of the study area may be different.
Document pdf	
÷	Back

Figure 62. Information about the possibility of downloading the report

The report contains the results of all stages of the analysis in the form of tables and drawings. Participants also have access to the analysis by clicking on the link generated at the beginning (Fig. 16).

2.2. Individual work

Any analysis area

1. The user enters the website: <u>https://4futures.eu</u>

The landing page contains a welcome text and information that when working with the tool, the user should follow the instructions displayed on the screen (Fig. 63).



Figure 63. Landing page of the "Create the Future" tool

2. The user selects the individual work module (button: Individual work - Fig. 64)



Figure 64. Selecting the operating mode

3. The user selects the analysis area (Button: Any analysis area - Fig. 65)



Figure 65. Selection of the area of analysis: Any analysis area

4. A link appears on the screen where all analyses will be available (Fig. 66)



Figure 66. An example link under which the analyses will be carried out

After reading the information, the user selects the button: "Next".

5. The screen that starts working with the "Create the Future" tool appears (Fig. 67)

Any area of analysis / Individual work	EN
<section-header><section-header><text><text><list-item><list-item><list-item><list-item><text></text></list-item></list-item></list-item></list-item></text></text></section-header></section-header>	
← Back Next	

Figure 67. Welcome screen with information about individual analysis steps

The screen shows the steps in which individual analyses will be performed. After reading the information, the user selects the button: "Next".

Any area of analysis / Individual work	EN
New project	
Enter the analysis area Formulate a question about the future of the area Enter a question	
e.g. How will the labour market develop in our city in future ? How will the labour market develop in Poland in future? Determine the time horizon of the analyses Select a year	<u> </u>
← Back Next	

6. A screen entitled "New project" appears (Fig. 68)

Figure 68. Fields for entering the analysis area, question and specifying the time horizon

In the first white field, the user enters the area of analysis, e.g. IT industry. In the second white field, the user enters a question about the future of the area, e.g. "How will the IT industry develop in the future?". In the third white field, enter the time horizon of the analyses, e.g. 2040.

After entering the information, the user selects the button: "Next".

Before starting the activity, the user should conduct **trends analysis** (current development directions in a given field), which includes the following stages:

- observation of the environment knowledge about trends that directly shape the studied area, as well as those that may indirectly influence it should be checked and updated;
- searching for additional information observed trends should be critically verified using additional sources of information, i.e. trade magazines and newspapers, statistical data (national statistical services, Eurostat), market research, interviews with specialists in specific fields, and experts, page view statistics;

 identifying regularities - at this stage of the analysis, it is necessary to verify how the identified trends are developing and what type of trend occurs (initial, growth, mature, declining trends).

Trend analysis becomes particularly important in the context of high uncertainty and variability of the environment that affect contemporary society and the economy. Understanding the mechanisms of trends may be an important element in the process of better preparation for future phenomena, as well as predicting the future.

Trend analysis also involves observing changes over time. Tracking these changes allows to identify which phenomena are becoming more important.

Trend analysis also allows for the identification of the so-called megatrends, i.e. longterm and wide-ranging changes that have a fundamental impact on society, the economy, or technology.

7. Step 1 – STEEPVL analysis

This step begins using the tool to perform STEEPVL analysis.

STEEPVL analysis is an environment research tool used to better understand its complexity and develop a broader view of the future.

Basic dimensions (factors) in STEEPVL analysis:

- **S** Social
- T Technological
- E Economic
- E Ecological
- P Political
- \mathbf{V} Values
- L Legal

Information with the names of factor groups appears on the screen. It is also recommended to select 1 to 3 factors from each of the seven indicated groups of STEEPVL factors. Those that in the user's opinion, are most important in the context of the development of the selected area should be selected. It is possible to browse the defined factors from the list or additionally use the "search" function based on the entered keyword. If the user does not find factors that are suitable for the analysis, it is possible to formulate and add them (Fig. 69).

1 STEEPVL	How will the IT industry develop in t	he future? 2040	EN
	STEEPPVL analysis The future of the labour market will by influenced by the variety of factors. Among them, there may be factors classified as: S - social T - technological EL - ecological P - political V - values	On the following pages, select 1 to 3 factors from each of the seven identified groups of STEEPVL factors. Select the ones you think are most relevant to the future development of IT industry. You can browse through the defined factors in the list or additionally use the "search" function based on the keyword you entered. If you do not find any relevant factors, you can formulate and add them by yourself.	
	← Back Next		

Figure 69. STEEPVL analysis - information on the nature and process of factor selection

After reading the information, the user selects the button: "Next".

7.1. Selection of 1 to 3 most important social factors

The user selects from 1 to 3 most important social factors (Fig. 70). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of social factors that you think have the greatest impact on the IT industry.	
	The level of virtualization of social life	
	The level of digital competence of the society	
	Share of elderly people (65+) in the age structure of the society	
	The level of education of the society	
	The level of flexibility of employees in terms of changing the type of work	
	Level of satisfaction with the education system	
	The level of cultural diversity in the labor market	
	The level of satisfaction with the ways of spending free time	
	Search Q + Add your own	
	← Back Next	0/3

Figure 70. STEEPVL analysis – selection of social factors

7.2. Selection of 1 to 3 most important technological factors

The user selects from 1 to 3 most important technological factors (Fig. 71). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of technological factors which, in your opinion, have the greatest impact on the IT industry.	
	The level of virtualization of the labor market	
	The level of development of robotization in services and industry	
	The level of development of artificial intelligence applications	
	The level of cybersecurity in enterprises	
	Degree of use of e-services by residents	
	The level of development of technologies that make life easier for the elderly (gerontechnology)	
	Access to the data collection, processing and use system (open data)	
	*	
	Search Q + Add your own	
	← Back Next	0/3

Figure 71. STEEPVL analysis – selection of technological factors

After selecting or entering the factors, the user selects the button: "Next".

7.3. Selection of 1 to 3 most important economic factors

The user selects from 1 to 3 most important economic factors (Fig. 72). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of economic factors which, in your opinion, have the greatest impact on the IT industry.	
	The purchasing power of money	
	The level of costs of running a business	
	Cost of living in the country	
	The dynamics of establishing new enterprises	
	Availability of potential outlets for products and services	
	Availability of funds to support enterprises	
	Real estate price level	
	The level of economic development of the region	
	Search Q, + Add your own 🗘 Unfold	
	← Back Noxt	0/3

Figure 72. STEEPVL analysis – selection of economic factors

7.4. Selection of 1 to 3 most important ecological factors

The user selects from 1 to 3 most important ecological factors (Fig. 73). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of ecological factors which, in your opinion, have the greatest impact on the IT industry.	
	Level of use of renewable energy sources (RES)	
	The level of development of the circular economy	
	The level of ecological awareness of the society	
	Disease risk level (e.g. viruses, allergies)	
	The level of implementation of pro-ecological solutions in enterprises	
	The level of sense of ecological security	
	Availability of natural resources (e.g. fossil resources, water)	
	State of the natural environment (including air quality)	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	0/3

Figure 73. STEEPVL analysis – selection of ecological factors

After selecting or entering the factors, the user selects the button: "Next".

7.5. Selection of 1 to 3 most important political factors

The user selects from 1 to 3 most important political factors (Fig. 74). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of political factors which, in your opinion, have the greatest impact on the IT industry.	
	The level of transparency of political life	
	The level of efficiency and effectiveness of the authorities Level of support for the development of sectoral (vocational) education	
	Level of labor market support by state authorities	
	Level of support for talent development by the state Stability of relations between the state and the EU	
	Geopolitisk situasjon i verden	
	The level of effectiveness of social policy	
	Search Q + Add your own	
	← Back Next	0/3

Figure 74. STEEPVL analysis – selection of political factors

7.6. Selection of 1 to 3 most important values factors

The user selects from 1 to 3 most important values factors (Fig. 75). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of values factors which, in your opinion, have the greatest impact on the IT industry.	
	The level of willingness to self-development The level of intergenerational cooperation The level of care for physical and mental health The level of balance between private and professional life The level of trust in technology The level of security Entrepreneurial level of society The level of openness to representatives of other cultures	
	Search Q + Add your own 🗘 Unfold	0/3

Figure 75. STEEPVL analysis – selection of values factors

After selecting or entering the factors, the user selects the button: "Next" .

7.7. Selection of 1 to 3 most important legal factors

The user selects from 1 to 3 most important legal factors (Fig. 76). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	Select 1 to 3 factors from the group of legal factors which, in your opinion, have the greatest impact on the IT industry.	
	The level of stability of legal regulations in Poland	
	Efficiency of administrative proceedings	
	The level of legal facilitations (regulations/requirements) for starting a business	
	The level of transparency of the tax system	
	Level of enforcement effectiveness	
	The level of transparency of legal regulations concerning the labor market	
	The level of complexity of the procedures for applying for financial support for business activity	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	0/3

Figure 76. STEEPVL analysis – selection of legal factors

7.8. Assessment of the influence of factors

After identifying a maximum of 21 main factors of the STEEPVL analysis, the user assesses the influence of the indicated factors on the development of the selected area in a previously determined time frame (Fig. 77).

1 STEEPVL	How will the IT industry develop in the future? 2040	E
	Assess the influence of indicated factors in the context of the development of IT industry in the perspective of 2040 (evaluate using a scale of 1-7, where 1 - very low, 7 - very high)	
	Very low influence	
	1 2 3 4 5 6 7	
	S1 The level of virtualization of social life	
	S2 The level of digital competence of the society	
	T1 The level of virtualization of the labor market	
	T2 The level of development of artificial intelligence applications	
	T3 The level of cybersecurity in enterprises	
	EN1 The purchasing power of money	
	EN2 Cost of living in the country	
	EL1 Level of use of renewable energy sources (RFS)	
	Unfold	
	← Back Next	

Figure 77. STEEPVL analysis – assessment of the influence of factors indicated by the user

Notice: It should be noted that the influence is the level of impact of a given factor on the development of the analysed area (in this case the IT industry).

The user assesses on a 7-point scale, i.e. from 1 to 7, where 1 - very low influence, 7 - very high influence. The user uses the slider to click on the fields with individual factors.

After assessing the influence of factors on the development of the labor market area, the user selects the button: "Next".

7.9. Assessment of the predictability of factors

Next, the user assesses the predictability of the indicated factors on the development of the selected area in a previously determined time frame (Fig. 78).

1 STEEPVL	How will the IT industry develop in the future? 2040	
	Assess the predictability of indicated factors in the context of the IT industry in the perspective of 2040 (assess using a scale of 1-7, where 1 - very low predictability, 7 - very high predictability)	
	Very low predictability 1 2 3 4 5 6 7	
	S1 The level of virtualization of social life	
	S2 The level of digital competence of the society	
	T1 The level of virtualization of the labor market	
	T2 The level of development of artificial intelligence applications	
	T3 The level of cybersecurity in enterprises	
	EN1 The purchasing power of money EN2 Cost of living/living in the country	
	EL1 Level of renewable energy sources (RES)	
	C Unfold	
	Attention!!! The level of predictability for the purpose of further analyses (calculations performed by the system) must be converted to an uncertainty level according to the relation: 8 minus the evaluation of the predictability level	
	← Back Next	

Figure 78. STEEPVL analysis – assessment of the predictability of factors indicated by the user

Notice: Predictability is the level of possibility of predicting in advance how a given factor will develop in the future in relation to the analysed area (in this case the IT industry).

The user assesses on a 7-point scale, i.e. from 1 to 7, where 1 - very low predictability, 7 - very high predictability. The user uses the slider to click on the fields with individual factors.

After assessing the predictability of factors on the development of the labor market area, the user selects the button: "Next".

7.10. For the purposes of further analysis (calculations performed by the system), the level of predictability is converted to the level of uncertainty according to the relationship: 8 minus the assessment of the level of predictability

An example of a table presenting a summary of the assessment of the influence and uncertainty of factors is presented in Figure 79.

1 STEEPVL	How will the IT industry develop in the future? 2040	EN
	The table below summarizes the assessment of the strength of influence and uncertainty of individual factors of the STEEPVL analysis.	
	Uncertainty Influence	
	7 b 5 4 3 Z 1 1 Z 3 4 5 b 7	
	S2 The level of digital competence of the society	
	T1 The level of virtualization of the labor market	
	T2 The level of development of artificial intelligence applications	
	T3 The level of cybersecurity in enterprises	
	EN1 The purchasing power of money	
	EN2 Cost of living in the country	
	EL1 Level of use of renewable energy sources (RES)	
	 In a moment you will see the results of the STEEPVL analysis in graphical form. They are the result of completing the work in the first step. We encourage you to continue working with the "Create the Future" too!!!! 	
	← Back Next	

Figure 79. Summary of the assessment of the influence and uncertainty of the STEEPVL analysis factors

The final results of the assessment of the influence and uncertainty of the STEEPVL analysis factors determining the development of the selected area in the time frame indicated by the user are displayed on the screen.

After reading the information, the user selects the button: "Next".

7.11. The graph shows the final assessment results of the influence and uncertainty of STEEPVL factors determining the development of the selected area in the time frame indicated by the user

Factors with the highest level of influence and uncertainty are marked in red. These factors will largely determine the development of the analysed area (Fig. 80).



Figure 80. Graph presentation of the results of assessing the influence and uncertainty of STEEPVL analysis factors

After reading the information, the user selects the button: "Next".
8. Step 2 – Future scenarios

In the next stage of using the tool, a scenario analysis will be performed (Fig. 81).

Notice: A message will appear on the screen that there is no single scenario for the future. Many futures are possible, depending on action or inaction in the present.

Future events cannot be predicted with certainty, so various scenarios for the development of the current situation should be taken into account. However, it should be borne in mind that only one of them will exist.



Figure 81. Introduction to scenario analysis

After reading the information, the user selects the button: "Next".

8.1. Selection of two crucial factors

As a result of the analyses, the system generates a list of crucial factors rated highest by the user in terms of influence and uncertainty (i.e. the most important and most uncertain). If more than 2 factors appear on the list, the user is obliged to decide which two of them, in the user's opinion, are the crucial factors that will determine the development of the future of the examined area. At the same time, these two factors will constitute the axes of the scenarios in further analysis (Fig. 82).

It should be noted that when selecting factors, it is desirable from a methodological point of view that they do not belong to the same group of factors (e.g. V - value), but to two different ones (e.g. V - value and T – technological).

2 Future scenarios	How will the IT industry develop in the future? 2040	EN
	Specify exactly 2 factors that you consider to be crucial in the process of shaping the area IT industry. When choosing factors, you don't have to only consider ratings. Also be guided by your knowledge, experience and intuition.	
	Uncertainty Influence 7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	T3 The level of cybersecurity in enterprises P2 The level of efficiency and effectiveness of the authorities	
	 V1 The level of willingness to self-development V2 The level of trust in technology 	
	← Back Next	

Figure 82. Selection of two crucial factors

After selecting the factors, the user selects the button: "Next".

8.2. Presentation of two selected factors constituting the axes of scenarios

An example of a summary of the user's selection of factors is presented in Figure 83.

2 Future scenarios	How will the IT industry develop in the future? 2040	EN
	As a result of the analyses, the factors with the greatest influence and uncertainty in the development of the IT industry in the 2040 year were identified as:	
	Uncertainty Influence	
	7 6 5 4 3 2 1 1 2 3 4 5 6 7 T3 The level of cybersecurity in enterprises	
	V1 The level of willingness to self-development	
	C Back Next	

Figure 83. Example of two selected crucial factors

After displaying a summary of the selected crucial factors, the user selects the button: "Next".

8.3. Creating scenarios

Axes appear on the screen in which four scenarios will be created, representing different directions in which the future of the examined area, in this case, the IT industry, may develop (Fig. 84).

In this analysis step, the user names the scenarios, by entering them in the fields that read: Scenario (no.) name. It is also possible to select the graphical characteristics of individual scenarios, using the "camera" symbol available in the scenario fields.

Notice: The names of the scenarios should be concise. They should reflect the picture of the future determined by the factors placed on the axes. They can be formulated in both formal and informal forms - they may refer, for example, to the titles of films, songs, and literary eras.

2 Future scenarios	How will the IT industry develop in the future? 2040	EN			
	Factors: The level of cybersecurity in enterprises and Image: Comparison of the set of the se				
	Very high The level of willingness to self-development				
	Scenario 1 name Scenario 2 name				
	Very high The level of cybersecurity in enterprises				
	Very low ersecurity in enterprises				
	Scenario 3 name Scenario 4 name				
	Very low The level of willingness to self-development				
	← Back Next				

Figure 84. Places to enter the names of the scenarios

After entering the names of the scenarios, the user selects the button: "Next".

Examples of scenario names are shown in Figure 85. As part of the analyses, the user should develop the characteristics of individual scenarios or one selected one (e.g. the most desirable).

2 Future scenarios	How will the IT i	ndustry develop in the future?	2040 EN	
Factors: The level of cybersecurity in enterprises and The level of willingness to self-development were considered the most important - key in shaping the area IT industry in the perspective of 2040 year, therefore they are the basis of the future scenarios presented below. Using the example provided, suggest names for the scenarios and choose graphics that reflect each scenario.				
	The level of willi	Very high ingness to self-development		
		1		
The brain w	ar over security	A virtual paradise for geniuses		
			Very high The level of cybersecurity in enterprises	
Very low The level of cybersecurity in enterprise	es			
A paradise t	or fraudsters	virtual space for lazy people		
		$\mathbf{\Lambda}$		
Very low The level of willingness to self-development				
	← B	Back Next		

Figure 85. Example scenario names

Using the "light bulb" symbol (Fig. 85), the user can read the sample characteristics of individual scenarios (Fig. 86-89) and, inspired by them, develop their own.

Fa	← Back
	Scenario 1 - Paradise Island
	1. High level of digital competences of society 2. High level of availability of funds supporting enterprises
	There is prosperity in the country. Due to the high level of availability of domestic and foreign funds, more and more new enterprises are being established and existing ones are developing dynamically. Thanks to global technological progress, enterprises are implementing innovative solutions in the field of automation and robotization. The society is very well educated and has high digital competences, thanks to which many people easily find a very well-paid job. Unemployment is very
•	low. Employers respect their employees and provide them with flexible forms of work. They also care about their well-being, ensuring a balance between private and professional life.

Figure 86. Example characteristics of scenario 1

Scenario 2 - Digital nomads

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1. High level of digital competences of society 2. Low level of availability of funds supporting enterprises

The society is well educated and has very well-developed digital competences. It is perfectly prepared to work with modern technologies, including in organizations implementing solutions in the field of automation, robotization and artificial intelligence. However, the European Union's suspension of the disbursement of financial resources supporting enterprises in Poland resulted in a reduction in the dynamics of their development and implementation of innovative solutions. No new enterprises are being established, and existing ones are reducing employment. They also often suspend their activities. As a result, the unemployment rate in the country is starting to increase, and even educated citizens with high digital competences do not have jobs. People are forced to take up jobs below their qualifications or decide to go abroad to work.

Figure 87. Example characteristics of scenario 2



Figure 88. Example characteristics of scenario 3



Figure 89. Example characteristics of scenario 4

8.4. Selection of a scenario for further analysis

After developing four alternative scenarios, the user selects the scenario of the most desired future or another scenario that the user wants to subject to a SWOT analysis (Fig. 90 - scenario marked in dark blue).



Figure 90. Example of selecting a scenario for further analysis

After selecting the scenario, the user selects the button: "Next".

9. Step 3 – SWOT analysis

In the third stage of using the tool, a SWOT analysis will be carried out in the context of the development of the explored area in the future scenario selected by the user (Fig. 91).

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths, weaknesses, opportunities, and threats of any entity or phenomenon:

- S strenghts (features that constitute an advantage),
- W weaknesses (features that constitute disadvantages),
- O opportunities (potential or existing opportunities in the environment),
- T threats (probable or existing threats in the environment).

3 SWOT	How will the IT industry develop in	the future? 2040	EN
	SWOT analysis		
	With regard to the selected future development scenario, select the factors, divided into:		
	S strengths	• ••	
	W weaknesses	You can browse the defined factors from the list or additionally use the "search" function based on the entered keyword.	
	0 opportunities	If you do not find the appropriate factors, you can formulate them yourself and add them.	
	T threats		
	påvirker utformingen av området IT industry i scenario A virtual paradise for geniuses.		
	← Back Next		

Figure 91. SWOT analysis instructions

After reading the information, the user selects the "Next" button.

9.1. Selection from 2 to 10 strengths and weaknesses

The user selects from 2 to 10 strengths and weaknesses influencing the development of the analysed area (fig. 92) and then selects the button: "Next".

3 SWOT	How will the IT industry of	lop in the future? 2040	EN	
	Mark the most important strengths and we of the area IT industry in the scenario "A virt 1 factor in each field, from 2 to 10 factors in	aradise for geniuses" (at least	9	
	Strengths	Weaknesses		
	Low unemployment rate	High level of labour costs	j	
	Job opportunities for highly qualified individuals	The mismatch between the educat of the economy	ion system and the needs	
	□ Job opportunities for individuals with vocational education	Structural mismatch between labor	ur market demand and	
	High level of labour market virtualization	supply in the labor market	ar market demand and	
	Entrepreneurial attitudes of society	Low level of labour market virtualiz	ation	
	Education system related to the needs of the economy	Passive entrepreneurial attitudes o	f the society	
	Significant flexibility of employees in changing their workplace	Lack of collaboration between univ and labour market institutions	ersities and businesses	
	High level of competitiveness of Polish companies	Low flexibility of workers in terms of	of changing their	
	Search Q + Add your own \$ Unfold	Search Q + Add yo	ur own 🗘 Unfold	
	← Back	Next	0/10	

Figure 92. List of strengths and weaknesses for the user to choose from

9.2. Selection of 2 to 10 opportunities and threats

3 SWOT	How will the IT industry of	develop in the future? 2040	EN
	Select the most important opportunities ar formation of the area IT industry in the scen geniuses" (at least 1 factor in each field, from	ario "A virtual paradise for	
	Opportunities	Threats	
	Stable geopolitical situation in the country and in the world	Unstable domestic and global geopolitical situation	
	Increase in foreign investment creating new jobs and implementing modern technologies	Low level of purchasing power of money	
	Acquisition and utilisation of financial resources from EU	Worsening relations between Poland and the EU	
	funds	Increased poverty in population	
	Increase of domestic investment expenditures	Less access to markets for products and services	
	Dynamic economic growth in the country	Decreased public spending on education	
	Active institutions supporting entrepreneurship	Bureaucracy and complex regulations related to setting up a new business	
	Accessibility to potential markets for products and services	Low investments in R&D	
	Search Q + Add your own 🗘 Unfold	Search Q + Add your own 🗘 Unfold	
	← Back	Next	0/10

Figure 93. List of opportunities and threats for the user to choose from

The user selects from 2 to 10 opportunities and threats affecting the shape of the analysed area (fig. 93), and then selects the button: "Next".

Information about the selected strengths, weaknesses, opportunities and threats appears on the screen. An example selection is shown in Figure 94.

3 SWOT	How will the IT industr	y develop in the future? 2040	EN
	The table below presents a set of selecte weaknesses, O - opportunities, T - threats industry in the scenario 'A virtual paradis been noticed in the list, it is still possible symbol in the previous steps	, influencing the future of the area IT e for geniuses". If inaccuracies have	
S	Strengths	Weaknesses	W
	S1 Job opportunities for highly qualified individuals	W1 High level of labour costs	
	S2 High level of labour market virtualization	W2 Low level of competitiveness of Polish enterprises	
	S3 Large number of higher education institutions		
	S4 High level of cybersecurity in enterprises /institutions		
	S5 High level of digital maturity of society/workers		
0	Opportunities	Threats	Т
	O1 Increase in foreign investment creating new jobs and implementing modern technologies	T1 Unstable domestic and global geopolitical situation	
	02 Acquisition and utilisation of financial resources from EU funds	T2 Decreased public spending on education	
	03 Increase of domestic investment expenditures		
	04 National programs supporting talent development		
	← Back	a Next	
		_	

Figure 94. An example selection of strengths, weaknesses, opportunities and threats

After reading the information, the user selects the button: "Next".

9.3. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of the selected area (current year)



Figure 95. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of the selected area (current year)

The user evaluates the importance of the indicated strengths, weaknesses, opportunities and threats for the development of the selected area (in the current year) (Fig. 95) by using the slider to click on individual fields. After completing the evaluation, the user selects the button: "Next".

9.4. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of a selected area in a selected time perspective

3 SWOT	How will the IT industry develop in the future? 2040	E
	Evaluate the Importance of the indicated strengths and weaknesses as well as opportunities and threats for the development of the IT industry in perspective of 2040 year (evaluate on a scale of 1-7, where 1 – very low, 7 - very high)	
	S1 Job opportunities for highly qualified individuals	
	S2 High level of fabour market virtualization	
	S3 Large number of higher education institutions	
	S4 High level of cybersecurity in enterprises /institutions	
	S5 High level of digital maturity of society/workers	
	W1 High level of labour costs	
	W2. Low level of competitiveness of Polish enterprises Increase in foreign investment creating new jobs and implementing modern technologies	
	Acquisition and utilisation of financial resources from EU funds	
	Andorational and management of invances including a round and and and and a round and a round and a round and a	
	C Unfold	
	← Back Next	

Figure 96. Evaluation of the importance of strengths and weaknesses, opportunities and threats for the development of a selected area in a selected time perspective

The user evaluates the importance of the indicated strengths, weaknesses, opportunities, and threats for the development of the selected area in the analysed time frame (Fig. 96) by using the slider to click on individual fields.

After completing the assessment, the user selects the button: "Next".

9.5. Results of evaluating the importance of strengths and weaknesses, opportunities and threats for the development of the selected area now and in the future

An example of a summary of the evaluation of the importance of SWOT analysis factors for the development of a selected area in two time perspectives is presented in Figure 97.

з ѕмот	How will the IT industry develop in the future? 2040	EN
	The table below presents a summary of the assessment of the importance of SWOT factors currently (in the current year) and in the perspective of 2040 year.	
	Importance in the current year Importance in 2040 year 7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	7 6 5 4 3 2 1 1 2 3 4 5 6 7 S1 Job opportunities for highly qualified individuals	
	S2 High level of labour market virtualization	
	\$3 Large number of higher education institutions	
	S4 High level of cybersecurity in enterprises /institutions	
	S5 High level of digital maturity of society/workers	
	W1 High level of labour costs	
	W2 Low level of competitiveness of Polish enterprises	
	01 Increase in foreign investment creating new jobs and implementing modern technologies	
	02 Acquisition and utilisation of financial resources from EU funds	
1		
1		
1		
	← Back Next	

Figure 97. An example of a summary of the evaluation of the importance of SWOT analysis factors for the development of a selected area currently and in the selected time perspective

Then, the final results of assessing the importance of strengths, weaknesses, opportunities, and threats for the selected area currently and in the time horizon indicated by the user are displayed on the screen. The strengths and weaknesses, opportunities and threats that are most important now and in the future are marked in red. These factors will largely determine the development of the indicated area (Fig. 98).



Figure 98. An example of presenting the results of evaluation of the importance of SWOT factors for the development of the analysed area currently and in the selected time perspective

After reviewing the results, the user selects the button: "Next".

10. Generating a report

After completing work with the "Create the Future" tool, the user can download a report on the analyses performed in the form of an editable .docx document or non-editable .pdf document (Fig. 99).

How will the IT industry dev	relop in the future? 2040	EN
Future analysis	Thank you for using our tool	
If you want to download the results of the analysis carried out, select the file format:	Remember that using the "Create the future" tool, you can also conduct group analyses.	
* Document docx	We also encourage you to repeat the analysis in order to compare how, with the passage of time and changes in the environment, the development of the study area may be	
± Document pdf	different.	
+	Back	

Figure 99. Information about the possibility of downloading the report

The report contains the results of all stages of the analysis in the form of tables and drawings. The user also has access to this analysis by clicking on the link generated at the beginning (Fig. 66).

My professional career

1. The user enters the website: <u>https://4futures.eu</u>

The landing page contains a welcome text and information that when working with the tool, the user should follow the instructions displayed on the screen (Fig. 100).



Figure 100. Landing page of the "Create the Future" tool

2. The user selects the individual work module (button: Individual work - Fig. 101)



Figure 101. Selecting the operating mode

3. The user selects the analysis area (Button: My professional career - Fig. 102)



Figure 102. Selection of the area of analysis: My professional career

4. A link appears on the screen where all analyses will be available (Fig. 103)



Figure 103. An example link under which the analyses will be carried out

After reading the information, the user selects the button: "Next".

5. The screen that starts working with the "Create the Future" tool appears (Fig. 104)

The screen shows the steps in which individual analyses will be performed.

Мурт	ofessional career / Indiv	idual work	E
Hello! You have just started to work with the '	Create the Future' tool		
with which you will carry out the follow steps: 1 STEEPVL analysis		•	
2 Future scenarios 3 SWOT analysis 4 Professional career devel	opment roadmap	You will be guided through the individual steps by the instructions displayed by clicking on the symbol	
Once you have gone through all the ste the future of your career may look like.	ps, you will know what		
	← Back Next		

Figure 104. Welcome screen with information about individual analysis steps

After reading the information, the user selects the button: "Next".

6. A screen entitled "New project" appears (Fig. 105)

In the first white field, the user enters a question about career development, e.g. "How will my professional career develop in the future?". In the second white field, the time horizon of the analyses, e.g. 2040. After entering the information, the user selects the "Next" button.



Figure 105. Fields for entering questions and specifying the time horizon

Before starting the activity, the user should conduct **trends analysis** (current development directions in a given field), which includes the following stages:

- observation of the environment knowledge about trends that directly shape the studied area, as well as those that may indirectly influence it should be checked and updated;
- searching for additional information observed trends should be critically verified using additional sources of information, i.e. trade magazines and newspapers, statistical data (national statistical services, Eurostat), market research, interviews with specialists in specific fields, and experts, page view statistics;
- identifying regularities at this stage of the analysis, it is necessary to verify how the identified trends are developing and what type of trend occurs (initial, growth, mature, declining trends).

Trend analysis becomes particularly important in the context of high uncertainty and variability of the environment that affect contemporary society and the economy. Understanding the mechanisms of trends may be an important element in the process of better preparation for future phenomena, as well as predicting the future.

Trend analysis also involves observing changes over time. Tracking these changes allows to identify which phenomena are becoming more important.

Trend analysis also allows for the identification of the so-called megatrends, i.e. long-term and wide-ranging changes that have a fundamental impact on society, the economy, or technology.

7. Step 1 – STEEPVL analysis

This step begins using the tool to perform STEEPVL analysis.

STEEPVL analysis is an environment research tool used to better understand its complexity and develop a broader view of the future.

Basic dimensions (factors) in STEEPVL analysis:

S – Social

- **T** Technological
- E Economic
- E Ecological
- P Political
- V Values
- **L** Legal

Information with the names of factor groups appears on the screen. It is also recommended to select 1 to 3 factors from each of the seven indicated groups of STEEPVL factors. Those that in the user's opinion, are most important in the context of the development of the professional career should be selected. It is possible to browse the defined factors from the list or additionally use the "search" function based on the entered keyword. If the user does not find factors that are suitable for the analysis, it is possible to formulate and add them (Fig. 106).



Figure 106. STEEPVL analysis – information on the nature and process of factor selection

After reading the information, the user selects the button: "Next".

7.1. Selection of 1 to 3 most important social factors

The user selects from 1 to 3 most important social factors (Fig. 107). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of social factors that you think have the greatest impact on your career in the future.	
	The level of virtualization of social life The level of digital competence of the society	
	Share of elderly people (65+) in the age structure of the society Chevel of education of the society	
	The level of flexibility of employees in terms of changing the type of work Level of satisfaction with the education system	
	The level of cultural diversity in the labor market The level of satisfaction with the wavs of spending free time	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	0/3

Figure 107. STEEPVL analysis – selection of social factors

7.2. Selection of 1 to 3 most important technological factors

The user selects from 1 to 3 most important technological factors (Fig. 108). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of technological factors which, in your opinion, have the greatest impact on your career in future.	
	 The level of virtualization of the labor market The level of development of robotization in services and industry The level of development of artificial intelligence applications The level of cybersecurity in enterprises Degree of use of e-services by residents The level of development of technologies that make life easier for the elderly 	
	Control control control operation of control operation of the control operation	
	← Back Next	0/3

Figure 108. STEEPVL analysis – selection of technological factors

After selecting or entering the factors, the user selects the button: "Next".

7.3. Selection of 1 to 3 most important economic factors

The user selects from 1 to 3 most important economic factors (Fig. 109). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of economic factors which, in your opinion, have the greatest impact on your career in future.	
	The purchasing power of money	
	The level of costs of running a business	
	Cost of living in the country	
	The dynamics of establishing new enterprises	
	Availability of potential outlets for products and services	
	Availability of funds to support enterprises	
	Real estate price level	
	The level of economic development of the region	
	Search Q + Add your own 🗘 Unfold	
I		
	← Back Next	0/3

Figure 109. STEEPVL analysis – selection of economic factors

7.4. Selection of 1 to 3 most important ecological factors

The user selects from 1 to 3 most important ecological factors (Fig. 110). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of ecological factors which, in your opinion, have the greatest impact on your career in future.	
	Level of use of renewable energy sources (RES)	
	The level of development of the circular economy	
	The level of ecological awareness of the society	
	Disease risk level (e.g. viruses, allergies)	
	The level of implementation of pro-ecological solutions in enterprises	
	The level of sense of ecological security	
	Availability of natural resources (e.g. fossil resources, water)	
	State of the natural environment (including air guality)	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	0/3

Figure 110. STEEPVL analysis – selection of ecological factors

After selecting or entering the factors, the user selects the button: "Next".

7.5. Selection of 1 to 3 most important political factors

The user selects from 1 to 3 most important political factors (Fig. 111). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of political factors which, in your opinion, have the greatest impact on your career in future.	
	 The level of transparency of political life The level of efficiency and effectiveness of the authorities Level of support for the development of sectoral (vocational) education Level of labor market support by state authorities Level of support for talent development by the state Stability of relations between the state and the EU Geopolitisk situasjon i verden 	
	The level of effectiveness of social bolicv Search Q + Add your own	
	← Back Next	0/3

Figure 111. STEEPVL analysis – selection of political factors

7.6. Selection of 1 to 3 most important values factors

The user selects from 1 to 3 most important values factors (Fig. 112). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of values factors which, in your opinion, have the greatest impact on your career in future.	
	 The level of willingness to self-development The level of intergenerational cooperation The level of care for physical and mental health The level of balance between private and professional life The level of trust in technology The level of sense of security Entrepreneurial level of society The level of ocenness to reoresentatives of other cultures Search Q + Add your own C Unfold 	
	← Back Next	0/3

Figure 112. STEEPVL analysis – selection of values factors

After selecting or entering the factors, the user selects the button: "Next".

7.7. Selection of 1 to 3 most important legal factors

The user selects from 1 to 3 most important legal factors (Fig. 113). If the user does not find appropriate factors, it is possible to formulate and add them.

1 STEEPVL	How will my career develop in the future? 2040	EN
	Select 1 to 3 factors from the group of legal factors which, in your opinion, have the greatest impact on your career in future.	
	The level of stability of legal regulations in Poland	
	Efficiency of administrative proceedings	
	The level of legal facilitations (regulations/requirements) for starting a business	
	The level of transparency of the tax system	
	Level of enforcement effectiveness	
	The level of transparency of legal regulations concerning the labor market	
	The level of complexity of the procedures for applying for financial support for business activity	
	Search Q + Add your own 🗘 Unfold	
	← Back Next	0/3

Figure 113. STEEPVL analysis – selection of legal factors

7.8. Assessment of the influence of factors

After identifying a maximum of 21 main factors of the STEEPVL analysis, the user assesses the influence of the indicated factors on the development of the professional career in a previously determined time frame (Fig. 114).

1 STEEPVL		How will	my caree	er develop in	the future	? 2040				EN	
	Assess the influence of indicated factors in the context of the development of your career in the perspective of 2040 (evaluate using a scale of 1-7, where 1 – very low, 7 - very high)										
	Very low influence						Very high influence				
	1	2	3	4	5	6	7				
	S1 The level of virtu	ualization of social	life								
	S2 The level of digi	tal competence of	the society								
	S3 Share of elderly	people (65+) in th	e age structu	re of the society							
	T1 The level of dev	elopment of artific	ial intelligend	e applications							
	T2 The level of cyb	ersecurity in enter	orises								
	T3 Degree of use o	f e-services by res	idents								
	EN1 The purchasing	power of money									
	EN2 The level of cos	ts of running a bus	iness					v			
							🗘 Unfold				
			← Ba	ick Next							

Figure 114. STEEPVL analysis – assessment of the influence of factors indicated by the user

Notice: It should be noted that the influence is the level of impact of a given factor on the development of the analysed area (in this case the professional career).

The user assesses on a 7-point scale, i.e. from 1 to 7, where 1 - very low influence, 7 - very high influence. The user uses the slider to click on the fields with individual factors.

After assessing the influence of factors on the development of the selected area, the user selects the button: "Next".

7.9. Assessment of the predictability of factors

Next, the user assesses the predictability of the indicated factors on the development of the professional career in a previously determined time frame (Fig. 115).

1 STEEPVL		How will	my caree	r develop ir	the future?	2040		
	developmen	predictability of t of your career in e of 1-7, where 1 y)	n future in t	he perspectiv	e of 2040 (as	ssess	?	
	Very low predictability 1	2	3	4	5	6	Very high predictability 7	
s	1 The level of v	virtualization of socia	II life					Î.
s	2 The level of a	digital competence of	f the society					
s	3 Share of elde	erly people (65+) in th	ne age structu	e of the society				
1	1 The level of o	development of artific	cial intelligenc	e applications				
т	2 The level of a	cybersecurity in enter	prises					
т	3 Degree of us	e of e-services by res	sidents					
E	N1 The purchas	ing power of money						
E	N2 The level of a	costs of running a bu	siness					
E	N3 Cost of living	1 in the country						÷
							🗘 Unfold	
	0	Attention!!! The level (calculations perform according to the rela	ned by the sys	tem) must be co	nverted to an unc	ertainty level		
			← ва	ck Next			r	

Figure 115. STEEPVL analysis – assessment of the predictability of factors indicated by the user

Notice: Predictability is the level of possibility of predicting in advance how a given factor will develop in the future in relation to the analysed area (in this case the professional career).

The user assesses on a 7-point scale, i.e. from 1 to 7, where 1 - very low predictability, 7 - very high predictability. The user uses the slider to click on the fields with individual factors.

After assessing the predictability of factors on the development of the selected area, the user selects the button: "Next".

7.10. For the purposes of further analysis (calculations performed by the system), the level of predictability is converted to the level of uncertainty according to the relationship: 8 minus the assessment of the level of predictability

An example of a table presenting a summary of the assessment of the influence and uncertainty of factors is presented in Figure 116 .

Iceland Liechtenstein Norway grants

1 STEEPVL	How will my career develop in the future? 2040	EN
	The table below summarizes the assessment of the strength of influence and uncertainty of individual factors of the STEEPVL analysis.	
	Uncertainty Influence 7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	S1 The level of virtualization of social life	
	 S2 The level of digital competence of the society S3 Share of elderly people (65+) in the age structure of the society 	
	T1 The level of development of artificial intelligence applications T2 The level of cybersecurity in enterprises	
	T3 Degree of use of e-services by residents EN1 The purchasing power of money	
	EN2 The level of costs of running a business	
	 In a moment you will see the results of the STEEPVL analysis in graphical form. They are the result of completing the work in the first step. We encourage you to continue working with the "Create the Future" too!!!! 	
	← Back Next	

Figure 116. Summary of the assessment of the influence and uncertainty of the STEEPVL analysis factors

The final results of the assessment of the influence and uncertainty of the STEEPVL analysis factors determining the development of the user's professional career in the time frame indicated by the user are displayed on the screen.

After reading the information, the user selects the button: "Next".

7.11. The graph shows the final assessment results of the influence and uncertainty of STEEPVL factors determining the development of the professional career in the time frame indicated by the user

Factors with the highest level of influence and uncertainty are marked in red. These factors will largely determine the development of the analysed area (Fig. 117).



Figure 117. Graph presentation of the results of assessing the influence and uncertainty of STEEPVL analysis factors

After reading the information, the user selects the button: "Next".

8. Step 2 – Future scenatios

In the next stage of using the tool, a scenario analysis will be performed (Fig. 118).

Notice: A message will appear on the screen that there is no single scenario for the future. Many futures are possible, depending on action or inaction in the present.

Future events cannot be predicted with certainty, so various scenarios for the development of the current situation should be taken into account. However, it should be borne in mind that only one of them will exist.



Figure 118. Introduction to scenario analysis

After reading the information, the user selects the button: "Next".

8.1. Selection of two crucial factors

As a result of the analyses, the system generates a list of crucial factors rated highest by the user in terms of influence and uncertainty (i.e. the most important and most uncertain). If more than 2 factors appear on the list, the user is obliged to decide which two of them, in the user's opinion, are the crucial factors that will determine the development of the future of the professional career. At the same time, these two factors will constitute the axes of the scenarios in further analysis (Fig. 119).

It should be noted that when selecting factors, it is desirable from a methodological point of view that they do not belong to the same group of factors (e.g. EN - economic), but to two different ones (e.g. EN - economic and S – social).

2 Future scenarios	How will my career develop in the future? 2040	EN
	Specify exactly 2 factors that you consider to be crucial in the process of shaping the area My professional career . When choosing factors, you don't have to only consider ratings. Also be guided by your knowledge, experience and intuition.	
	Uncertainty Influence 7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	S1 The level of virtualization of social life T1 The level of development of artificial intelligence applications	
	EN2 The level of costs of running a business EN3 Cost of living in the country	
	← Back Next	

Figure 119. Selection of two crucial factors

After selecting the factors, the user selects the button: "Next".

8.2. Presentation of two selected factors constituting the axes of scenarios

An example of a summary of the user's selection of factors is presented in Figure 120.

2 Future scenarios	How will my career develop in the future? 2040	EN
	As a result of the analyses, the factors with the greatest influence and uncertainty in the development of the My professional career in the 2040 year were identified as:	
	Uncertainty Influence	
	7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	S1 The level of virtualization of social life	
	EN3 Cost of living in the country	
	← Back Next	

Figure 120. Example of two selected crucial factors

After displaying a summary of the selected crucial factors, the user selects the button: "Next".

8.3. Creating scenarios

Axes appear on the screen in which four scenarios will be created, representing different directions in which the future of the examined area, in this case, the professional career, may develop (Fig. 121).

In this analysis step, the user names the scenarios, by entering them in the fields that read: Scenario (no.) name. It is also possible to select the graphical characteristics of individual scenarios, using the "camera" symbol available in the scenario fields.

Notice: The names of the scenarios should be concise. They should reflect the picture of the future determined by the factors placed on the axes. They can be formulated in both formal and informal forms - they may refer, for example, to the titles of films, songs, and literary eras.

2 Future scenarios	н	How will my career develop in the future? 2040	EN
th	e most important - key in shaping	n of social life and Cost of living in the country were considered ag your professional career in the perspective of 2040 year, future scenarios presented below. Using the example provided, and choose graphics that reflect each scenario.	
		Very high Cost of living in the country	
	Scenario 1 name	Scenario 2 name	
		Very high The level of virtualization of social life	
Very lo The level of virtualiza	ow tion of social life	0 0	
	Scenario 3 name	Scenario 4 name	
		Very low Cost of living in the country	
		← Back Next	

Figure 121. Places to enter the names of the scenarios

After entering the names of the scenarios, the user selects the button: "Next".

Examples of scenario names are shown in Figure 122. As part of the analyses, the user should develop the characteristics of individual scenarios or one selected one (e.g. the most desirable).

2 Future scenarios	How will my care	eer develop in the future? 2040	EN						
Among the presented scenarios, select (by "clicking") the scenario of your most desired future or another one that you want to undergo further analysis.									
Analogue hell Virtual survival school									
Very The level of virtuali	low ration of social life								
	Analogue but cool	Virtual paradise							
Cost of living in the country									
	← Back	Next							

Figure 122. Example scenario names

Using the "light bulb" symbol (Fig. 121), the user can read the sample characteristics of individual scenarios (Fig. 123-126) and, inspired by them, develop their own.

Fa	← Back
	Scenario 1 - Paradise Island
	1. High level of digital competences of society 2. High level of availability of funds supporting enterprises
	There is prosperity in the country. Due to the high level of availability of domestic and foreign funds, more and more new enterprises are being established and existing ones are developing dynamically. Thanks to global technological progress, enterprises are implementing innovative solutions in the field of automation and robotization. The society is very well educated and has high digital
•	competences, thanks to which many people easily find a very well-paid job. Unemployment is very low. Employers respect their employees and provide them with flexible forms of work. They also care about their well-being, ensuring a balance between private and professional life.

Figure 123. Example characteristics of scenario 1

Scenario 2 - Digital nomads

+ Back

1. High level of digital competences of society 2. 2. Low level of availability of funds supporting enterprises

The society is well educated and has very well-developed digital competences. It is perfectly prepared to work with modern technologies, including in organizations implementing solutions in the field of automation, robotization and artificial intelligence. However, the European Union's suspension of the disbursement of financial resources supporting enterprises in Poland resulted in a reduction in the dynamics of their development and implementation of innovative solutions. No new enterprises are being established, and existing ones are reducing employment. The also often suspend their activities. As a result, the unemployment rate in the country is starting to increase, and even educated citizens with high digital competences do not have jobs. People are forced to take up jobs below their qualifications or decide to go abroad to work.

Figure 124. Example characteristics of scenario 2



Figure 125. Example characteristics of scenario 3



Figure 126. Example characteristics of scenario 4

8.4. Selection of a scenario for further analysis

After developing four alternative scenarios, the user selects the scenario of his most desired future or another scenario that the user wants to undergo further analysis - SWOT analysis and developing a professional career development roadmap (Fig. 127 - scenario marked in dark blue).



Figure 127. Example of selecting a scenario for further analysis

After selecting the scenario, the user selects the button: "Next".

9. Step 3 – SWOT analysis

In the third stage of using the tool, a SWOT analysis will be carried out (limited to strengths and weaknesses) in the context of the user's professional career development in the selected future scenario (Fig. 128).

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths, weaknesses, opportunities, and threats of any entity or phenomenon:

- S strenghts (features that constitute an advantage),
- W weaknesses (features that constitute disadvantages),
- O opportunities (potential or existing opportunities in the environment),
- T threats (probable or existing threats in the environment).

SWOT analysis		
With regard to the selected future development scenario, select the factors, divided into:	You can browse the defined factors from the	
S strengths	list or additionally use the "search" function based on the entered keyword.	
W weaknesses	If you do not find the appropriate factors, you can formulate them yourself and add them.	
Virtual paradise.		

Figure 128. SWOT analysis instructions

After reading the information, the user selects the "Next" button.

It should be emphasized that SWOT analysis in the case of career development analyses was limited to the analysis of the user's strengths and weaknesses.

9.1. Selection from 2 to 10 strengths and weaknesses

Mark the most impo	ow will my career develop in the future? 2040 Prtant strengths and weaknesses affecting affecting your in the scenario "Virtual paradise" (at least 1 factor in each ctors in total).
Strengths	Weaknesses
High professional competence	Low professional competence
Networking skills	Lack of networking skills
Openness to change	Fear of change
Proficiency in using modern technologies	Poor ability to use modern technologies
Desire for self-improvement	Resistance to self-improvement
Collaboration skills	Inability to collaborate
Time management skills	Lack of time management skills
Active entrenreneurial mindset	Passive entrepreneurial mindset
Search Q + Add your own	Unfold Search Q + Add your own \$ Unfold
	← Back Next

Figure 129. List of strengths and weaknesses for the user to choose from

The user selects from 2 to 10 strengths and weaknesses that influence the development of the user's professional career (fig. 129), and then selects the button: "Next".

Information about the selected strengths and weaknesses appears on the screen. An example selection is shown in Figure 130.

3 SWOT	How will my career develop in the future? 2040								
	The table below presents a set of your s weaknesses) that influence the develop paradise' scenario.	strengths : ment of y	and weaknesses (S - strengths, W - 'our professional career in the "Virtual						
s	Strengths		Weaknesses	W					
	S1 High professional competence		W1 Lack of time management skills						
	S2 Openness to change		W2 Lack of time for hobbies and interests						
	S3 Desire for self-improvement								
	S4 Remote work capability								
	S5 High level of trust in technology								
	← Ba	ick	Next						

Figure 130. An example selection of strengths and weaknesses

After reading the information, the user selects the button: "Next".

9.2. Evaluation of the importance of strengths and weaknesses for the user's current career development (current year)

3 SWOT	How wi	ll my caree	r develop in 1	he future?	2040)		
developme	Evaluate the importance of the indicated strengths and weaknesses in the development of your professional career currently (in the current year) (evaluate on a scale of 1-7, where 1 – very low, 7 - very high)							
Definitely unimportant 1	2	3	4	5	б	Definitely important 7		
S1 High profes	sional competence							
S2 Openness to	change							
S3 Desire for s	elf-improvement							
S4 Remote wo	k capability							
S5 High level o	f trust in technolog	y						
W1 Lack of time	e management skill	s						
W2 Lack of time	for hobbies and in	terests						
						🗘 Unfold		
		← в	ack Next					

Figure 131. Evaluation of the importance of strengths and weaknesses for the development of the user's professional career currently (in the current year)

The user evaluates the importance of the indicated strengths and weaknesses for the development of the user's professional career currently (in the current year) (Fig. 131) by using the slider by clicking on the fields with strengths and weaknesses.

After completing the evaluation, the user selects the button: "Next".

9.3. Evaluation of the importance of strengths and weaknesses for the development of the user's professional career in the selected time frame

3 SWOT		How wi	ll my caree	r develop in t	he future?	2040		
	Evaluate the in development o on a scale of 1 Definitely	of your profe	ssional caree	er in the perspe	d weaknesse ctive of 204	es in the 10 year (eval	Definitely	
	unimportant 1	2	3	4	5	6	important 7	
	S1 High profession	ial competence						
	S2 Openness to ch	ange						
	\$3 Desire for self-i	mprovement						
	S4 Remote work c	apability						
	S5 High level of tru	ist in technolog	у					
	W1 Lack of time m	anagement skil	ls					
	W2 Lack of time fo	hobbies and ir	nterests					
							🗘 Unfold	
			← ва	ack Next				

Figure 132. Evaluation of the importance of strengths and weaknesses for the development of the user's professional career in the selected time frame

The user evaluates the importance of the indicated strengths and weaknesses for the development of a professional career in the analysed time frame (Fig. 132) by using the slider to click on the fields with strengths and weaknesses. After completing the assessment, the user selects the button: "Next".

9.4. Results of evaluating the importance of strengths and weaknesses for the development of the user's professional career in the current year and in the future

An example of a summary of the evaluation of the importance of strengths and weaknesses for career development in two time perspectives is presented in Figure 133.

3 SWOT	How will my career develop in the future?	EN
	The table below presents a summary of the assessment of the importance of SWOT factors currently (in the current year) and in the perspective of 2040 year.	
	Importance in the current year Importance in 2040 year 7 6 5 4 3 2 1 1 2 3 4 5 6 7	
	S1 High professional competence	
	S2 Openness to change	
	S3 Desire for self-improvement	
	S4 Remote work capability	
	S5 High level of trust in technology	
	W1 Lack of time management skills	
	W2 Lack of time for hobbies and interests	
	← Back Next	

Figure 133. An example of a summary of the evaluation of the importance of strengths and weaknesses for the development of the user's professional career currently and in the selected time perspective

Then, the final results of evaluating the importance of strengths and weaknesses for the development of the user's professional career currently and in the time horizon indicated by the user are displayed on the screen. The strengths and weaknesses that are most important now and in the future are marked in red. These factors will largely determine the development of the user's professional career (Fig. 134).



Figure 134. An example of presenting the results of evaluating the importance of strengths and weaknesses for the development of the user's professional career currently and in the selected time perspective

After reviewing the results, the user selects the button: "Next".

10. Step 4 – Professional career development roadmap

In the last stage of using the tool, the user prepares a roadmap for the development of the future of the personal professional career.

Notice:

The **technology roadmapping** (TRM) method is a comprehensive approach to strategic planning, the idea of which is expressed in the integration of science and technology with business practice, as well as in identifying opportunities for the development of new technologies.

The construction of development roadmaps is linked to fundamental questions that arise in every strategic context: Where to go? Where are we now? How can we get there? Why do we need to act? What should we do? How do we do it? Until when?

The roadmap can also be used in the context of long-term career planning (Fig. 135).

A roadmap is a kind of career development plan taking into account the following layers: time horizon, professional goal, future job positions, desired salary (net), knowledge and skills necessary to hold a given position, and activities that serve to achieve the set professional goal.



Figure 135. Instructions for preparing a professional career development roadmap

After reading the information, the user selects the button: "Next".

10.1. Defining the goal

In the first step of building the route, the user determines the professional goal the user would like to achieve in a specific time frame, then enters it in the white field (Fig. 136).

4 Professional career development roadmap	How will my career develop in the future? 2040	EN
	Knowing your strengths and weaknesses and being inspired by the given example, create your career development roadmap. Indicate the necessary knowledge, skills, qualifications and activities related to their acquisition that you must take to achieve the expected salary and hold the expected job position.	
Му	goal is: Define your professional career goal	
	e.g. Promoted to the position of head of the logistics department in the LogiBud company in the perspective of 2030. Become a member of the management board in a construction company in the perspective of 2035 Take up a job as a bridge constructor in Spain in the perspective until 2032	
-	+ Add the first step towards your goal	1
	← Back Next	

Figure 136. Defining the professional career goal

After entering the professional career goal, the user selects the button: "Next".

It should be emphasized that the development roadmap is a normative tool, i.e. the desired future state is pre-defined. It is therefore important to use the backcasting method, which focuses on the reversed thought process.

Notice:

Backcasting is a planning method that begins by defining a desired future and then works backward to identify policies and programs that will connect that specific future to the present.

It helps to think strategically about the future and take specific steps to achieve the desired results.

10.2. Career development stages

In the next stage, the user determines the key stages of the professional career, taking into account the planned time horizon. The user can add any number of stages of the future career. By pressing the "Add first stage on the way to the goal" button, the user enters the time horizon and the occupation that is desired during this period. Then the user determines the desired salary (net amount), knowledge, and skills that should be possessed. The user should also indicate specific actions that must be taken to obtain the planned job position (Fig. 137).

4 Professional career development roadmap		How will my career develop in the future? 2040	EN
	Knowing you example, cre knowledge, i you must tab position. My goal is:	Career stage Time horizon Enter the period needed to reach the goal e.g. 2023-2025 Occupation Who do I want to be? e.g. Database administrator Salary How much do I want to earn? e.g. 5 000 EUR Cancel Save	
		← Back Next	

Figure 137. Adding stages on the way to achieving a goal

After entering the necessary information, the user selects the button: "Save".

An example goal and effect of introducing information regarding the first career stage is shown in the Figure 138.
Iceland Liechtenstein Norway grants



Figure 138. An example of the first stage of a career development roadmap

10.3. Professional career development roadmap

By using the "Add a new career stage" button, in the same way, the user adds subsequent stages of professional career development along with individual layers (occupation, salary, knowledge and skills, actions), up to the time horizon planned as part of the analyses, e.g. 2040 (Fig. 139).



Figure 139. An example of a completed professional career development roadmap

11. Generating a report

After completing work with the "Create the Future" tool, the user can download a report on the analyses performed in the form of an editable .docx document or non-editable .pdf document (Fig. 140).



Figure 140. Information about the possibility of downloading the report

The report contains the results of all stages of the analysis in the form of tables and drawings. The user also has access to this analysis by clicking on the link generated at the beginning (Fig. 103).

II. PRACTICAL PART

The FORhesIT project team prepared three scenarios for sessions carried out with the support of the IT tool "Create the Future", both in the form of group and individual workshops:

- Scenario no. 1 individual session on the development of a professional career path (development of the scenario and conducting the session: Białystok University of Technology)
- Scenario no. 2 group session on the development of the labor market (development of the scenario and conducting the session: Łukasiewicz-ITeE)
- Scenario no. 3 group session on any other topic (development of the scenario and conducting the session: Norwegian Board of Technology)

The adopted structure of scenarios outlined below can be beneficial for all users of the IT tool, including teachers and career advisors, in planning its utilization during group classes or individual sessions with students:

Table 2. Structure of a session scenario using the IT tool "Create the Future"

GENERAL INFORMATION

- **1.** The topic of the session (if known in advance).
- **2.** General goals (no more than 2).
- **3.** Specific objectives (no more than 5).
- **4.** Time horizon of foresight analyses.
- **5.** Form (individual/group).
- **6.** Venue of the session.
- **7.** Characteristics of the group of participants.
- 8. Workshop time (approx.).

COURSE OF THE WORKSHOP

- **9.** Organizational and mobilizing activities stimulating interest (e.g. ice-breaker exercises before starting work with an IT tool).
- **10.** Justification of the advisability of participating in the session introductory discussion on the variability of the surrounding world and the labor market/variability of the nature of professions/the future, which may be different, etc.
- **11.** Working with the "Create the Future" tool:
 - **11.1.** Step 1 STEEPVL analysis:
 - Formulating the topic and choosing the time horizon.
 - Mini lecture (e.g. using a presentation) explanation of STEEPVL analysis variety of factors affecting our lives, career path, labor market needs.
 - A brief description of the STEEPVL analysis, which was carried out during a group/individual session, along with a list of factors selected from 7 groups as the most important in the context of the development of the studied area.

- Explanation of the concepts of predictability and uncertainty.
- Presentation of the chart developed and a brief discussion of the results of the STEEPVL analysis.
- **11.2.** Step 2 future scenarios:
 - Selection of 2 factors that were considered crucial in the process of shaping the area in the selected time perspective (brief description of the course of the discussion).
 - Discussion differentiating 4 scenarios (short description of the discussion).
 - Formulation of titles for 4 scenarios.
 - Development of a description of 4 scenarios (optional).
- **11.3.** Step 3 SWOT analysis:
 - Selection of one of the 4 scenarios for further analysis (description of the adopted selection criteria, short description of the discussion).
 - Explaining the concepts of strengths and weaknesses, opportunities and threats (e.g. using a presentation).
 - A brief description of the course of the SWOT analysis, which was carried out during a group/individual session, along with an indication of the factors selected as the most important in the context of the development of the studied area in two time perspectives: currently and in the time horizon indicated at the beginning of the session (chart).
- **11.4.** Generating a report.
- **11.5.** Session evaluation.

General notes, tips, comments:

- Work method used: workshop using a unique, innovative IT tool supporting the process of creating future scenarios; discussion.
- Required resources devices enabling the use of the tool: computers/smartphones with access to the Internet; projector displaying the facilitator's screen (group sessions).
- Recommended/suggested resources and materials (group sessions): a board for the group to prepare their own scenarios together; interesting graphics/sentences/sayings, introducing participants to the atmosphere of uncertainty and variability of the future in various spheres of human life; aids for ice-breaker exercises; other. If the selected area of analysis or the specificity of the session topic requires additional materials or resources, they are indicated in individual scenarios.
- In group sessions, there are alternating stages of individual participants' choices and group arrangements. Each time in such a situation, the facilitator has the deciding vote (e.g. about moving to the next stage).

3. Scenario no. 1: individual session on the development of a professional career path

The topic of the session: How will my career develop in the future?

General goal: analysis of the development of the participant's future professional career, along with an indication of its stages, using the "Create the Future" tool using selected foresight methods.

Specific objectives:

- identification of STEEPVL analysis factors (social, technological, economic, ecological, values, and legal) influencing the development of the participant's professional career in the time frame chosen by the participant;
- developing four scenarios representing different points of view, defining the directions in which the participant's professional career may develop;
- analysis of the participant's strengths and weaknesses that may influence the development of the participant's professional career in the selected scenario;
- preparing a roadmap for the participant's professional career development in the analysed time frame.

Time horizon: 2040

Form: individual

Venue: Białystok University of Technology, Faculty of Engineering Management

Participants: students of first-cycle logistics and second-cycle management full-time studies (12 participants in total)

Workshop time: 60 min.

Course of the workshop

Explanation of the purpose of the session – introductory discussion

Familiarizing the participant with the IT tool "Create the Future". Presentation of the genesis of its creation as part of the project "Foresight-oriented IT system supporting higher education and career development" (FORhesIT). Discussion of functionality and operating principles.

An example of the facilitator discussing the functionality and the use of the "Create the Future" tool is shown in Photo 1.



Photo 1. The facilitator of the individual session explains to the participant the functionalities and rules of using the "Create the Future" tool.

1. Organizational and mobilizing activities

The facilitator asks the participant to go into the future for a moment, to 2040, and answer the questions:

What is your occupation/job? Do you work according to your education? Are you happy and professionally fulfilled? Does your job give you satisfaction? Is your salary adequate for your education and tasks performed? Do you have prospects for further development? Do you dream of another job?

Additionally, the facilitator can utilize printed inspiration cards to distribute to participant.

2. Justification of the advisability of participating in the session

Introductory discussion about the variability of the surrounding world and the labor market, the variability of the nature of professions and the future, which may be different, etc.

It is worth familiarizing the participant with the meaning of foresight and pointing out the differences between this concept and forecasting.

Foresight means "foreseeing", "looking into the future", "farsightedness". At the same time, foresight can be understood both as a category of competences possessed by individuals, i.e., skills that can be developed and improved in particular people, and as a category of specific techniques and methods that can be used in future-oriented processes. Foresight does not involve predicting the future, but rather a way of "using the future" to achieve goals in a changing environment. Given that the future cannot be predicted, foresight analyses help to better prepare for it. Forecasting is based on past facts and assumes that there is one future, attempting to discover and describe it. Foresight, on the other hand, assumes that there is not only one possible future and considers various probable and desirable versions of it.

3. Working with the "Create the Future" tool

The participant accesses the website of the "Create the Future" tool, located at <u>https://4futures.eu</u>, and then the facilitator acquaints them with the greeting displayed on the screen. The greeting instructs the participant to follow the on-screen instructions while utilizing the tool. Additionally, the

facilitator highlights that instructions will be available during the execution of individual steps by hovering the cursor over the icon with a question mark. The participant selects the individual work module ((button: Individual work – Fig. 141).



Figure 141. Selecting the operating mode

Then the participant selects the area of analysis (Button: My professional career - Fig. 142).



Figure 142. Selection of the area of analysis: My professional career

Then, a link will be displayed where all analyses will be performed. Then, a screen appears, starting work with the "Create the Future" tool and presenting the analyses that will be performed at each stage of work. On the next screen, the student is asked to formulate a question about the future of the My professional career area and to define the time horizon of the analyses.

Example: How will my career develop in the future?

Time horizon: 2040

An example is presented in Figure 143.

New project	
Formulate a question about the future of the area My profe career	ssional
How will my career develop in the future?	
e.g. How might my career develop in future?	
Determine the time horizon of the analyses	
2040	

Figure 143. Example of a research question and a specific time horizon

Step 1 – STEEPVL analysis

In the next step, the participant starts using the tool by performing a STEEPVL analysis. The facilitator shows what STEEPVL analysis is.

STEEPVL analysis is an environment research tool used to better understand its complexity and develop a broader view of the future.

Basic dimensions (factors) in STEEPVL analysis:

- **S** Social
- T Technological
- E Economic
- E Ecological
- **P** Political
- V Values
- **L** Legal

The facilitator instructs the participant that on the subsequent screens of the tool, one should select from 1 to 3 factors from each of the seven indicated groups of STEEPVL factors. Those that the participant believes are most important in the context of shaping the future professional career should be marked. It is possible to browse the defined factors from the list or additionally use the "search" function based on the entered keyword. If the user does not find factors that are suitable for the analysis, it is possible to formulate and add them.

An example of selecting the "The level of virtualization of social life" factor from the group of social factors is presented in Figure 144.



Figure 144. An example of selecting the "The level of virtualization of social life" factor from the group of social factors (S)

In the same way, the participant should indicate from 1 to 3 factors from each of the six remaining groups of STEEPVL factors, i.e.: technological (T), economic (EN), ecological (EL), political (P), values (V) and legal (L). The participant should mark the factors that they believe are most important in the context of shaping their future professional career.

After identifying a maximum of 21 main factors of the STEEPVL analysis, the facilitator asks the participant to assess the impact of the indicated factors on the development of their professional career in a previously determined time horizon.

Notice: The facilitator should explain that the influence is the level of impact of a given factor on the development of the analysed area (in this case, professional career).

The participant assesses on a 7-point scale, i.e. from 1 to 7, where 1 - very low influence, 7 - very high influence. An example of such an assessment of the influence of factors is presented in Fig. 145.



Figure 145. An example of a participant's assessment of the influence of social and technological factors

Next, the instructor asks the participant to assess the predictability of the indicated factors on the development of their professional career in a previously determined time horizon.

Notice: The facilitator explains the concept of predictability - it is the level of possibility of predicting in advance how a given factor will develop in the future in relation to the analysed area (in this case, professional career).

The participant assesses on a 7-point scale, i.e. from 1 to 7, where 1 - very low predictability, 7 - very high predictability. An example of such an assessment of the predictability of factors is shown in Figure 146 and Photo 2.



Figure 146. Example of a participant's assessment of the predictability of social and technological factors



Photo 2. Example of a participant's assessment of the predictability of social and technological factors

Then, the facilitator should pay attention to the fact that for the purposes of further analysis (calculations performed by the system), the level of predictability will be converted into the level of uncertainty in accordance with the relationship: 8 minus the assessment of the level of predictability. An example of a table presenting a summary assessment of the influence and uncertainty of social and technological factors of STEEPVL analysis is presented in Figure 147 and Photo 3.



Figure 147. Example of a summary of the assessment of the strength of influence and uncertainty of STEEPVL analysis factors

Statement of the local division in which the local division in which the local division is not the local division of the local division in the local divis		
forheat x ■ forheat x + + c ■ 4NumerLear/NMA/16		× - 3 ×
2 Scenariusze przyszłości	Kariera zawodowa Ewy 2030	a
	Arr for the former in the former water are a filtering of more the structure of the structu	
COP COLOR		

Photo 3. Example of a summary of the assessment of the strength of influence and uncertainty of STEEPVL analysis factors

Then, the final assessment results of the strength of influence and uncertainty of STEEPVL factors determining the development of the participant's professional career in the time frame indicated by them are displayed on the screen. The facilitator points out that the factors with the highest level of influence and uncertainty are marked in red. These factors will largely determine the development of the participant's professional career. An example is presented in Figure 148 and Photo 4.



Figure 148. Example of the final results of assessing the strength of influence and uncertainty of STEEPVL factors



Photo 4. Example of the final results of assessing the strength of influence and uncertainty of STEEPVL factors

Step 2 – Future scenarios

In the next stage of using the tool, a scenario analysis is performed. The facilitator familiarizes the participant with the main idea of creating scenarios, for example by pointing out that:

There is no single scenario for the future. Many futures are possible, depending on action or inaction in the present.

Future events cannot be predicted with certainty, so various scenarios for the development of the current situation should be taken into account. However, it should be borne in mind that only one of them will exist.

The two factors rated highest by the participant in terms of influence and uncertainty will constitute the scenario axes (Fig. 149).



Figure 149. An example of the two highest rated factors in terms of influence and uncertainty

In the next step, axes are created, the upper right field receives a positive tone, and the lower left field receives a negative tone. The other two fields take positive and negative values for the first or second factor, respectively. In this way, four scenarios are created, representing different points of view on what direction the future of the participant's professional career may develop.

The facilitator suggests the participant create four alternative scenarios for the development of their professional career. At the same time, the participant will be asked to suggest creative names for the scenarios and informed about the possibility of selecting graphical characteristics of individual scenarios. The facilitator also instructs the participant that:

The names of the scenarios should be concise. They should reflect the picture of the future determined by the factors placed on the axes. They can be formulated in both formal and informal forms - they may refer, for example, to the titles of films, songs, and literary eras.

An example of a participant naming four scenarios is shown in Photo 5.

Photo 5. An example of a participant naming four scenarios

Example names of scenarios based on factors: The level of willingness to self-development and Demand on the labor market are shown in Figure 150.



2 Future scenarios	How will my career develop in the future?	2040
considered the year, therefore	and on the labor market and The level of willingness to self-development e most important - key in shaping your professional career in the perspect they are the basis of the future scenarios presented below. Using the ev- est names for the scenarios and choose graphics that reflect each scen	ctive of 2040 xample
	Very high The level of willingness to self-development	
		O
Missed opp	Chance for success	
		Very high Demand on the labor market
Very low Demand on the labor market	٥	0
Unemploye	d	
	Very low The level of willingness to self-development	
	← Back Next	

Figure 150. Example scenario names

After developing the names of four alternative scenarios, the participant chooses the scenario of the most desired future or another scenario that the participant wants to subject to further analysis - SWOT analysis and professional career development roadmap (Fig. 151).



Figure 151. Example of selecting a scenario for further analysis

Step 3 – SWOT analysis

In the third stage, a SWOT analysis will be used in the context of the participant's professional career development in the selected future scenario.

The facilitator should familiarize the participant with the main idea of the SWOT analysis and the concepts, in particular the strengths and weaknesses. It should be emphasized that the SWOT analysis in the individual path is limited to the analysis of the participant's strengths and weaknesses.

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths, weaknesses, opportunities, and threats of any entity or phenomenon:

S – strenghts (features that constitute an advantage),

W - weaknesses (features that constitute disadvantages),

- O opportunities (potential or existing opportunities in the environment),
- T threats (probable or existing threats in the environment).

The facilitator instructs the participant that it is possible to choose strengths and weaknesses from the list of factors or add their own (Fig. 152).

How will my career develop in the	e future? 2040
SWOT analysis	
With regard to the selected future development scenario, select the factors, divided into: S strengths	You can browse the defined factors from the list or additionally use the "search" function based on the entered keyword.
W weaknesses affecting the shaping of your professional career in the scenario Chance for success.	If you do not find the appropriate factors, you can formulate them yourself and add them.
← Back Next)

Figure 152. SWOT analysis instructions

3 SWOT	How will my career der Mark the most important strengths and we professional career in the scenario "Chance each field, from 2 to 10 factors in total).	eaknesses affecting affecting your
	Strengths	Weaknesses
	High professional competence	W2 Low professional competence
	Networking skills	Lack of networking skills
	Openness to change	Fear of change
	Proficiency in using modern technologies	W1 Poor ability to use modern technologies
	S1 Desire for self-improvement	Resistance to self-improvement
	Collaboration skills	Inability to collaborate
	S2 Time management skills	Lack of time management skills
	Active entrepreneurial mindset	✓ W3 Passive entrepreneurial mindset
	Search Q + Add your own ‡ Unfold	Search Q + Add your own C Unfold
	← Back	Next

The participant chooses from 2 to 10 strengths and weaknesses (Fig. 153).

Figure 153. An example of a participant's selection of strengths and weaknesses

The participant evaluates the importance of the indicated strengths and weaknesses for the development of the professional career currently (in the current year), as presented in Figure 154.



Figure 154. An example of evaluating the importance of strengths and weaknesses for the development of a participant's professional career currently (in the current year)

Then, the participant evaluates the importance of the indicated strengths and weaknesses for the development of a professional career in the analysed time perspective, as presented in Figure 155.

Evaluate the i development on a scale of	of your profe	ssional caree	er in the persp		es in the Oyear (evalua	ate
Definitely unimportant						Definitely important
1	2	3	4	5	6	7
S1 Desire for self	improvement					
S2 Time manage	ment skills					
S3 Curiosity abou	t the world					
W1 Poor ability to	use modern tech	nologies				
W2 Low professio	nal competence					
W3 Passive entrep	oreneurial minds	et				
						. Unfold

Figure 155. An example of evaluating the importance of strengths and weaknesses for the development of a participant's professional career in a selected time frame (2040)

The screen displays the final results of the evaluation of the importance of strengths and weaknesses for the development of the participant's professional career currently and in the time horizon indicated by the participant (in the example - 2040). The facilitator points out that the strengths and weaknesses are marked in red, which are the most important now and in the future. These factors will largely determine the development of the participant's professional career. An example is presented in Figure 156.



Figure 156. An example of evaluating the importance of strengths and weaknesses for the development of a participant's professional career currently and in the selected time perspective

Step 4 – Professional career development roadmap

In the last stage of using the tool, the participant will prepare a roadmap for the development of the future professional career. The facilitator familiarizes the participant with the assumptions of the technology roadmapping method in the context of its use for planning professional career development.

The **technology roadmapping** (TRM) method is a comprehensive approach to strategic planning, the idea of which is expressed in the integration of science and technology with business practice, as well as in identifying opportunities for the development of new technologies.

The construction of development roadmaps is linked to fundamental questions that arise in every strategic context: Where to go? Where are we now? How can we get there? Why do we need to act? What should we do? How do we do it? Until when?

The facilitator explains to the participant that the roadmap can also be used in the context of longterm career planning. The facilitator shows an example of a roadmap available in the "Create the Future" tool or other examples of roadmaps. The facilitator explains how to create a roadmap in the "Create the Future" tool. A roadmap is a kind of career development plan taking into account the following layers: time horizon, professional goal, future job positions, desired salary (net), knowledge and skills necessary to hold a given position, and activities that serve to achieve the set professional goal.

In the first step of building the roadmap, the participant, as a result of the discussion, determines the professional goal the participant would like to achieve in a specific time frame. An example of a career goal is shown in Figure 157.



Figure 157. An example of a professional goal in a career development roadmap

In the next stage, as a result of a discussion with the facilitator, the participant determines how many key stages of the professional career the participant should go through, taking into account the planned time horizon. During the discussion, the backcasting method is used, i.e. a reversed thought process.

Backcasting is a planning method that begins by defining a desired future and then works backward to identify policies and programs that will connect that specific future to the present.

It helps to think strategically about the future and take specific steps to achieve the desired results.

The participant can add any number of stages of the future professional career. By pressing the "Add the first stage on the way to the goal" button, the participant enters the time horizon and the desired occupation in a given period. Then, it determines the desired salary (net), the knowledge and skills, and specific actions to take up the planned job position. An example of preparing the first stage of professional career development as part of the roadmap is shown in Figure 158 and Photo 6.



Figure 158. An example of the first stage of a career development roadmap



Photo 6. An example of preparing the first stage of professional career development as part of a roadmap

Using the "Add a new career stage" button, in the same way, the participant adds subsequent stages of career development along with individual layers (occupation, salary (net), knowledge and skills, actions) until the planned time horizon is achieved. An example of a completed career development route is shown in Figure 159 and Photo 7.

My	y goal is: Be	come an international	project manager by 2040	
Time horizon	Occupation	Salary How much do	Knowledge, skills	Actions
When?	Who do I want to be?	I want to earn?	What do I need to know?	What I have to do?
			apply for EU funds	course on obtaining EU funds
2030	Project specialist	6000	be able to use the Office package	an Office course
2000			be able to speak English	intensive English course
			+ Add skill	+ Add action
			knowledge of project management	Prince2 methodology course
			speak English very well	conversations with native speakers
2035	project manager	8000	be able to manage a team	human resources management course
			+ Add skill	+ Add action
			ability to manage an international team	course on working in a multicultural
	international project		ability to manage an international team	environment
2040	manager	12000	+ Add skill	training on negotiation

Figure 159. An example of a completed career development roadmap



Photo 7. An example of a career development roadmap completed by a participant

Generating a report

After completing work with the "Create the Future" tool, the facilitator informs the participant that it is possible to download the report on the analyses carried out in the form of an editable Word document or a non-editable PDF document (Fig. 160). The report contains the results of all stages of the analysis in the form of tables and drawings. The participant also has access to the analysis by clicking on the link generated at the beginning of the analysis. The facilitator thanks the participant for participating in the individual session, and at the same time encourages the participant to repeat the analysis after some time and check how differently the professional career may develop in the changing environment. The facilitator also indicates other functionalities of the "Create the Future" tool, such as group work on the labor market or any other area of analysis. The facilitator asks for feedback from the participant on the usefulness of the analysis and functionality of the "Create the Future" methods and tool.



Figure 160. Completing work in the "Create the Future" tool - generating a report

4. Scenario no. 2: group session in the area of the labor market

The topic of the session: *How will the labour market develop in the transport sector (regional dimension: Poland-Ukraine)?*

General goal: analysis of possible scenarios for the development of the labor market for the transport industry (important for the city and the Radom region, among others, due to the graduates of the Faculty of Transport of the University of Radom)

Time horizon: 2030

Form: group

Venue: Łukasiewicz Research Network – Institute for Sustainable Technologies, Centre for Vocational Education Research and Innovation Management

Participants: academic teachers of various faculties of the University of Radom, employees and professional advisors of the Masovian Local Government Center for Teacher Development (8 participants in total)

Workshop time: 120 min.

Course of the workshop

Explanation of the purpose of the session – introductory discussion

Topics for discussion (approximately 10 minutes):

- variability of the surrounding world and the labor market, variability of the nature of professions performed,
- the impact of the geopolitical situation on the directions of development of the labor market, on the increase/decrease in demand for qualifications,
- war as a threat and an obstacle, or an opportunity and a catalyst for the development of the transport industry,
- main trends of changes in the transport industry (including electromobility, autonomous vehicles, safety).

Working with the "Create the Future" tool

1. Preparatory activities

In the group session, the facilitator performs several initial activities aimed at organising joint work, namely:

- enters the website with the IT tool (<u>https://4futures.eu/</u>),
- selects the group work option (Fig. 161),
- selects the area of analysis: Labour market (Fig. 162),
- generates a unique address that identifies a given session (also available in the future, after the session ends) and makes it available to participants (Fig. 163).



Figure 161. Selecting the operating mode



Figure 162. Selection of the area of analysis: Labour market



Figure 163. View of the screen with the generated website address identifying a given session

After all participants enter the website address indicated by the facilitator, the group's actual work with the IT tool begins.

The system informs that it will be implemented in three steps:

- 1. STEEPVL analysis
- 2. Future scenarios
- 3. SWOT analysis

Step 1 – STEEPVL analysis

The facilitator, after agreeing with the group on the wording of the session topic and specifying the time perspective to which foresight analysis will apply, enters them into the tool template (Fig. 164).

Labour market / Group work	EN
New project	Time limit
	Unlimited 🗸
Formulate a question about the future of the Labour market How will the labour market develop in the transport sector (regional dimension: Pole	
e.g. How will the labour market develop in our city in future ?	
How will the labour market develop in Mazovia region in future? How will the labour market develop in Poland in future?	
Determine the time horizon of the analyses	
← Back Next	

Figure 164. Example of a research question and a specific time horizon

The facilitator briefly explains the essence and purpose of the STEEPVL analysis, emphasizing the variety of factors that influence our lives, career paths, and labor market needs. Emphasizes that the lists of factors proposed in the "Create the Future" tool are not closed sets and that in each group of factors, there is an option to enter one developed by the group - additional factor (mini-lecture).

Participants analyse (individually) each of the seven groups of factors and make individual recommendations. Before moving on to the next group of factors, each time there is a stage of agreeing (in the group) on the most important factors in the context of the labor market, and in particular in the perspective of the development of the transport industry (in the face of the ongoing war in Ukraine).

STEEPVL analysis is an environment research tool used to better understand its complexity and develop a broader view of the future.

Basic dimensions (factors) in STEEPVL analysis:

- \mathbf{S} Social
- T Technological
- E Economic
- **E** *Ecological*
- **P** Political

V – Values L – Legal

During the discussion, the participants strongly emphasized the following issues:

- safety of movement within the territory of Ukraine,
- unpredictability of fuel prices,
- the presence of Ukrainian drivers on the Polish labor market,
- demography (large share of people 65+ among professionally active Polish drivers).

As a result of group work, a list of the following 12 factors considered to be the most important was agreed:

Social factors:

- S1 Percentage of foreigners in the labor market
- S2 Unemployment rate in the industry
- S3 Demand on the labour market

Technological factors:

- T1 Level of availability of transport infrastructure
- T2 Introduction of autonomous vehicles into use

Economic factors:

- EN The level of costs of running a business
- EN Fuel prices

Ecological factors:

EL Level of use of electric vehicles

Political factors:

- P1 Geopolitical situation in the world
- P2 The geopolitical situation of the country

Values factors:

V1 Level of sense of community/interpersonal and social bonds

Legal factors:

L1 The level of transparency of legal regulations in Poland

The facilitator draws the participants' attention to the definitions of the concepts contained in the tool: "influence", "predictability" and "uncertainty".

Participants assess each of the 12 selected factors in terms of its "influence" on the development of the labor market in the transport industry and the "predictability" of its development in the perspective of 2030.

After collecting all individual answers (in the form of two numerical values for each of the 12 factors), the tool generates a chart (Fig. 165) visualizing the results for the entire group (wherein the "predictability" values are converted into the "uncertainty" value in accordance with the adopted methodology).



Figure 165. Example of the final results of assessing the strength of influence and uncertainty of STEEPVL factors

The group agreed that out of several factors included in the first quarter of the above chart, two were selected for further work, which were considered crucial in the process of shaping the labor market area in the selected time frame (until 2030):

Factor 1: The level of costs of running a business Factor 2: Geopolitical situation in the world

2 Future scenarios How will the labour market develop	o in the transport sector (regional dimension: Poland-Ukraine)? 2030 EN
discussion, were found	ors that, as a result of the group d to be crucial in the process of
shaping the area Lab	bur market .
Uncert	ainty Influence
7 6 5 4 3	2 1 1 2 3 4 5 6 7
S2 Unemployment rat	e in the industry
S3 Demand on the lat	or market
EN1 The level of costs	of running a business
P1 Geopolitical situati	
P2 The geopolitical si	
	arency of legal regulations in Poland
	E Back Next

Figure 166. An example of assessing selected STEEPVL factors in terms of importance and uncertainty

During the discussion, participants pointed out the key importance of elements such as::

• End of hostilities (including security, access to markets, uninterrupted border traffic, reactivation of tourism),

• The impact of fuel prices on the costs of running a business in the transport sector; maintaining/abolition of customs duties, quantitative and qualitative restrictions on transported goods.

Step 2 – Future scenarios

The two factors rated highest by the participants in terms of importance and uncertainty constitute the scenario axes, with extremely high or low factor values at the ends of the vertical and horizontal axes. Axes created defining four possible scenarios (Fig. 167).

The facilitator initiates and moderates a discussion differentiating the four scenarios and formulating titles for them, then enters the scenario titles agreed with the group into the tool.



Figure 167. Axes of four future scenarios with assigned names

The facilitator emphasizes the possibility of preparing detailed descriptions for each of the four scenarios (apart from the "Create the Future" tool, e.g. group work using a dry-erase board or a large-format board with prepared fields for descriptions of each scenario).

The leader agrees with the group of participants to select one of the four scenarios for further analysis. It was assumed that the main criterion would be to indicate the most desirable future scenario. The group indicated a scenario titled "Transport Paradise", which assumed low costs of running a business and favorable geopolitical conditions, which should allow even small transport companies to develop.

Step 3 – SWOT analysis

The facilitator briefly explains the essence and purpose of the SWOT analysis, explains the concepts of strengths and weaknesses, opportunities and threats in the context of their impact on the formation of the selected labor market development scenario - "Transport Paradise" (mini discussion on the understanding of the concepts).

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths, weaknesses, opportunities, and threats of any entity or phenomenon:

- S strengths (features that constitute an advantage),
- W weaknesses (features that constitute disadvantages),
- O opportunities (potential or existing opportunities in the environment),
- T threats (probable or existing threats in the environment).

The facilitator emphasizes that the lists of S - strengths, W - weaknesses, O - opportunities, and T - threats proposed in the "Create the Future" tool are not closed sets and that there is an option to enter additional factors (mini-lecture).

Participants individually analyze the lists of SWOT factors proposed by the system and make individual recommendations. Before moving on to the next group of factors, each time there is a stage of agreeing (in the group) on the most important factors in the context of the labor market, and in particular in the perspective of the development of the transport industry (in the face of the ongoing war in Ukraine).

As a result of group work, the most important SWOT factors were identified:

S – strengths	W – weaknesses
 S1 Low unemployment rate S2 Jobs for people with industry education 	 W1 Low flexibility of employees in changing the form of work
O – opportunities	T – threats
 O1 Dynamic economic growth of the country 	 T1 Pressure to strive for climate neutrality

Participants individually assess the SWOT factors mentioned in terms of their importance for the development of the labor market in the transport industry:

a) in current year,

b) in 2030.

The system calculates the average grades for the entire group and generates a chart visualizing the results (Fig. 168).



Figure 168. An example of assessing the importance of strengths and weaknesses for the development of the labor market area in the transport industry currently and in the selected time horizon (2030)

The labor market in the "Transport Paradise" scenario, both currently and in the perspective of 2030, is considered to be decisive for the development of the area (marked in red in the chart above):

- O1 Dynamic economic growth of the country
- W1 Low flexibility of employees in changing the form of work

Generating a report

Both the facilitator and participants generate and save a report on the session on their devices.



Figure 169. Completing work in the "Create the Future" tool - group session

The "Create the Future" tool allows to save the report in .docx or .pdf formats.

Iceland Liechtenstein Norway grants

Photographic documentation of the session



Photo 8. The course of the session at Łukasiewicz-ITeE



Photo 9. The course of the session at Łukasiewicz-ITeE



Photo 10. The course of the session at Łukasiewicz-ITeE



Photo 11. The course of the session at Łukasiewicz-ITeE



Photo 12. The course of the session at Łukasiewicz-ITeE



Photo 13. The course of the session at Łukasiewicz-ITeE



Photo 14. The course of the session at Łukasiewicz-ITeE



Photo 15. The course of the session at Łukasiewicz-ITeE

5. Scenario no. 3: group session on any other analysis area

The topic of the session: Can radical climate technologies help address the climate crisis?

General goal: Analyzing the future of radical climate technologies to mitigate or reduce the impact of global warming in Norway. (Radical technologies could be, for example, CO2 removal, growing algae to absorb CO2, and sun protection to prevent glaciers from melting.) The workshop aims to assess the feasibility of NBT starting a project on this topic, as well as how the tool "Create the future" applies to other types of futures research.

Time horizon: 2035

Form: group

Venue: Norwegian Board of Technology

Participants: Project managers/research staff at NBT (5 participants in total)

Workshop time: 120 min.

Course of the workshop

Explanation of the purpose of the session – introductory discussion

- Topics for discussion (approximately 10 minutes)
- Introduction to foresight methodology and STEEPVL analysis
- Technological trends in radical climate technologies
- The state of these technologies in Norway
- Presentation of a recent citizens' panel where citizens discussed some of these technologies.
 An overview of prevailing opinions about these technologies

Working with the "Create the Future" tool

1. Preparatory activities

In the group work session, the facilitator performs several initial activities aimed at organizing joint work, namely:

- enters the website with the IT tool (<u>https://4futures.eu/</u>),
- selects the group work option (Fig. 170),
- selects the area of analysis: Any analysis area (Fig. 171),
- generates a unique address that identifies a given session (also available in the future, after the session ends) and makes it available to participants (Fig. 172).



Figure 170. Selecting the operating mode



Figure 171. Selection of the area of analysis: Labour market



Figure 172. View of the screen with the generated website address identifying a given session

After all participants enter the website address indicated by the facilitator, the group's actual work with the IT tool begins.

The system informs that it will be implemented in three steps:

- 1. STEEPVL analysis
- 2. Future scenarios
- 3. SWOT analysis

Step 1 – STEEPVL analysis

The facilitator, after agreeing with the group on the wording of the session topic and specifying the time perspective to which foresight analysis will apply, enters them into the tool template (Fig. 173).

New project	Time limit
	Unlimited 👻
Define the area of analysis	
Tackling climate change	
Formulate a question about the future of the are change	a Tackling climate
Can radical climate technologies help address the climate	e crisis?
e.g. How will the labour market develop in our city in future 7 How will the labour market develop in Mazóvia region in future?	
How will the labour market develop in Poland in future?	
Determine the time horizon of the analyses	
2035	

Figure 173. Example of a research question and a specific time horizon

The facilitator briefly explains the purpose of the STEEPVL analysis, relating it to the topic of global warming and climate technologies. Then, the facilitator explains that many of the factors given will be more important when choosing a career. Encourages participants to draw inspiration from the factors already provided in the tool and use them as a starting point to develop factors that are more relevant to exploring the future of climate technologies. Participants consider relevant factors and add their own. It should be noted that finding own factors takes some discussion and thought. This is an important part of the script workshop process!

The use of the STEEPVL methodology will help generate new ideas for the future of a given topic. For example, how Norway's relationship with the EU or sense of ecological security could influence the future of climate technologies in Norway.

STEEPVL analysis is an environment research tool used to better understand its complexity and develop a broader view of the future.

Basic dimensions (factors) in STEEPVL analysis:

- $\mathbf{S}-Social$
- T Technological
- **E** *Economic*
- E Ecological
- **P** Political
- V Values
- **L** Legal

During the discussion, the participants strongly emphasized the following issues:

- Maturity of climate technologies in 2035
- Climate policy in Norway in the future
- Climate goals in the future relations of the EU and Norway with the EU
- Alternative measures to reduce greenhouse gas emissions, such as reducing consumption, reducing air travel and the like

As a result of group work, a list of the following 21 factors considered to be the most important was agreed:

Social factors:

- S1 The level of population's support to actions to reduce climate emissions
- S2 People's trust in innovative technological solutions
- S3 Level of cooperation in society

Technological factors:

- T1 Technological maturity of zero-emission technologies
- T2 Incentives for the development of new technologies
- T3 Technological competences in Norway

Economic factors:

- EN1 Costs and purchasing power
- EN2 Cost of business/industry
- EN3 Amount of government support

Ecological factors:

- EL1 The level of enterprise involvement in pro-ecological initiatives
- EL2 Environmental condition (including air quality)
- EL3 Sense of ecological security in society

Political factors:

- P1 Level of openness in political life
- P2 Stability in Norway-EU relations
- P3 Geopolitical situation in the world

Values factors:

- V1 Trust in new technologies
- V2 Level of intergenerational cooperation
- V3 Level of openness to innovation and change

Legal factors:

- L1 Effectiveness of court trials
- L2 The complexity of applying for economic grants for enterprises
- L3 Environmental requirements for running a business

The facilitator draws the participants' attention to the definitions of the concepts contained in the tool: "influence", "predictability" and "uncertainty".



Participants evaluate each of the 21 selected factors in terms of "influence" on the development of radical climate technologies and "predictability" of its development in the perspective of 2035.

Figure 174. Presentation of the results of assessing the influence and uncertainty of STEEPVL analysis factors

After collecting all individual answers (in the form of two numerical values for each of the 12 factors), the tool generates a chart (Fig. 174) visualizing the results for the entire group (with conversion of the "predictability" value into "uncertainty" value in accordance with the adopted methodology).

The group discussed the factors in the quadrant and selected two that were most likely to create interesting and useful climate technology scenarios over the time horizon to 2035. The two selected factors were:

Factor 1: Technological maturity of zero-emission technologiesFactor 2: The level of ecological security of society

During the discussion, participants drew attention to the key importance of elements such as:

- Risk tolerance when it comes to trying new technologies to reduce or reverse climate emissions.
- The conflict between mitigating climate change and protecting nature (for example, some measures may reduce climate emissions but are likely to affect nature in undesirable ways, e.g. by disturbing ecosystems in the ocean).
Step 2 – Future scenarios

The two factors most highly rated by participants in terms of influence and uncertainty (i.e., most important and most uncertain) are the scenario axes, with extremely high or low factor values at the ends of the vertical and horizontal axes. Axes created defining four possible scenarios (Fig. 175).



Figure 175. Axes of four future scenarios with assigned names

Notice: suggestion of a method supporting the process of creating scenarios

During tests in Norway, an AI (artificial intelligence) tool was used as inspiration when working on scenarios:

To help create scenarios, the facilitator creates a prompt for ChatGPT, asking for four short stories based on selected factors and two scenario axes.

It's important to take this as an inspiration, not a replacement. In this case, several scenarios were generated and the group decided on the titles that were ultimately included in the tool as the most useful.

The group discusses four scenarios: advantages and disadvantages and how likely or improbable they are. The most desirable scenario was selected for further analysis. The group pointed to the so-called "Lungs of the ocean" scenario, which indicates a high degree of technological maturity combined with a high need to prevent climate change. This scenario explores how Norway could use existing competences in marine industries (such as fishing, salmon farming, and offshore drilling) to grow algae that could help capture CO2.

(The remaining scenarios were called "Decline in CO2 capture", "Glacier of innovation" and "Norway as a battery".)

Step 3 – SWOT analysis

The facilitator briefly explains the essence and purpose of the SWOT analysis, and explains the concepts of strengths and weaknesses, opportunities and threats in the context of their impact on the development of the selected scenario for the future of climate technologies in Norway.

SWOT analysis is a technique of organizing and verifying information, the purpose of which is to identify the strengths, weaknesses, opportunities, and threats of any entity or phenomenon:

- S strengths (features that constitute an advantage),
- W weaknesses (features that constitute disadvantages),
- O opportunities (potential or existing opportunities in the environment),
- T threats (probable or existing threats in the environment).

The facilitator emphasizes that the lists of S - strengths, W - weaknesses, O - opportunities, and T - threats proposed in the "Create the Future" tool are not closed sets and that there is an option to enter additional factors.

Participants discuss and present SWOT factors. This creates the opportunity to look at the selected scenario from new perspectives. For example, the awareness that Norway's existing maritime industry could pose both a benefit and a threat to future climate technologies.

As a result of group work, the most important SWOT factors were identified:

S – strengths	W – weaknesses
 S1 Synergies with fisheries and aquaculture S2 Existing competences in marine technologies 	 W1 Low acceptance of geoengineering in the ocean W2 The sea is becoming warmer and more acidic
O – opportunities	T – threats
 O1 Increased international cooperation 	 T1 Subsidies may be too spread out

Participants individually assess the SWOT factors mentioned in terms of their importance for counteracting climate change:

a) in current year,

b) in 2035.

The system calculates the average grades for the entire group and generates a chart visualizing the results (Fig. 176).



Figure 176. An example of assessing the importance of strengths and weaknesses for counteracting climate change currently and in the selected time horizon (2035)

The following factors have the greatest impact on climate technologies (in particular algae farming), both now and in the future:

- W2 The oceans are becoming warmer and more acidic
- W1 Social acceptance of geoengineering in the ocean

SWOT analysis in this area shows that most of the selected factors are more important in the long term and less important in the short term. This is a very important result of the analysis because it shows that radical climate technologies such as geoengineering are more dependent on what happens in the long term rather than the short term.

Generating a report

Both the facilitator and participants generate and save a report on the session on their devices. The "Create the Future" tool allows to save the report in .docx or .pdf formats.

Photographic documentation of the session conducted by NBT



Photo 16. The course of the session at NBT



Photo 17. The course of the session at NBT



Photo 18. The course of the session at NBT



Photo 19. The course of the session at NBT

III. INSTRUCTIONS FOR USING THE "Create the Future" IT TOOL

Technology

The "Create the Future" application is built using React JS technology (React JS is a library of the most popular programming language, JavaScript, enabling the creation of advanced user interfaces). The frontend (the application layer visible in the browser window, responsible for the user interface code) communicates with the server using services based on a MySQL database and the scripting programming language PHP. Communication occurs when the user interacts with the "NEXT" button or is performed asynchronously, no less frequently than every five seconds. With each connection, the application sends the user's status to the server and retrieves the state of the entire application from it. This model allows for the participation of a larger group of users in a single session.

The session status is stored on the server as a record of data saved in JSON format, and it is updated only when the status changes for any of the session users. This approach conserves server computational power.

Server Requirements

The application requires standard hosting with a server (such as Apache2), PHP interpreter version 8.0 or higher, and a MySQL database server. It must operate on a domain with a valid SSL certificate, ensuring encrypted communication between users and the server. Additionally, it's essential for the proper functioning of the frontend layer based on React JS.

The required server performance depends on the number of simultaneous sessions and users accessing it. Assuming that at any given moment, the number of users does not exceed 200, the server should have the following parameters:

- Linux operating system, a recent distribution, terminal-only without GUI.,
- 8 GB of VRAM (Video Random Access Memory),
- 4 virtual cores clocked at a minimum of 1 GHz each,
- Disk capacity of 1 GB,
- Internet connection speed of 100 Mb/s.

Hardware Requirements

The application is designed for use on desktop computers, laptops, and tablets.

The recommended screen resolution is 1920x1080 or higher. It is possible to use the application at lower resolutions (not lower than 1360x768), but the full user interface may not fit on the screen, requiring scrolling.

Using the application on smartphones is possible, but some elements may not fit on the screen, and the application may require horizontal scrolling. However, tests for the proper functioning of the application have been conducted and successfully completed on smartphones with a minimum screen resolution of 1080 x 1920 pixels.

The application can be run on any computer that meets the minimum requirements.:

- Processor: 1 GHz, 2 cores, 2 threads (recommended: 2 GHz, 2 cores, 4 threads),
- RAM: 4 GB (recommended: 8 GB),
- Screen resolution: 1360 x 768 pixels, 65 million colors (recommended: 1920x1080 pixels),
- Physical or on-screen keyboard,
- Mouse or touchscreen,
- Internet access (required).

Software Requirements

Operating System:

- Microsoft Windows 8 or higher,
- Apple MacOS 13 or higher,
- ChromeOS 110 or higher,
- Linux with KDE 5 or higher desktop environment,
- Linux with GNOME 42 or higher desktop environment,
- Other systems capable of running current versions of the recommended web browsers below,
- Android 13 on tablets,
- iPadOS 16 or higher.

The user-side application is launched within a web browser window by entering the address into the address bar: <u>https://4futures.eu/</u>.

The application functions correctly on web browsers:

- Google Chrome version 95 and higher,
- Microsoft Edge version 95 and higher,
- Apple Safari version 5 and higher,
- Mozilla Firefox version 100 and higher,
- Opera version 80 and higher,
- Other browsers based on the Chrome engine version 100 or higher.

Additional Notes:

- It is not recommended to use additional plugins in the browser.
- Automatic translation of texts in the application by the browser is not recommended as it may distort content. Instead, users should select the appropriate language version of the application: Polish, English, or Norwegian.
- During testing, it was observed that the application running on older versions of Apple Safari, on Apple devices, does not function properly because the browser incorrectly translates content. This issue arises due to the incomplete compatibility of Safari browser versions lower than 5 with React.js - the browser incorrectly interprets the language version of the application communicated by React.js.

Roles of tool users

The application allows for both individual and group scenarios. In individual scenarios, there is only one role available - the user creates the scenario themselves and proceeds through all its steps alone. In a group session, two roles are required per scenario.:

- The role of facilitator, typically assumed by an instructor or lecturer.,
- The roles of participant, typically student.

Additionally, the system includes the role of an administrator for STEEPVL, SWOT, and translation dictionaries. The administrator role is reserved for the creators of the application.

The role of facilitator

The facilitator role is only present in group sessions. The facilitator initiates the application on their computer, generates a session link for participants, and guides them through the successive steps of the scenario. Further details about the facilitator role are described in the "Group work" chapter.

The role of participant

The participant role is present in both individual and group sessions. The participant role is described in more detail in the relevant chapters regarding sessions.

The role of administrator

The tool also includes the role of an administrator, responsible for the STEEPVL and SWOT factor dictionaries, as well as translations. The administrator can expand the lists of factors and make changes to translations at the following address: <u>https://4futures.eu/api/adm</u>.

Scenarios

The application allows for working with five types of scenarios, including two group scenarios and three individual scenarios.

At the beginning of working with each scenario, the facilitator, in agreement with the group, or the individual user:

- enters the analysis area (if it differs from the Labour Market)),
- enters a question about the future of the selected analysis area,
- specifies the time horizon for the introduced issue.

In group scenarios, the facilitator can additionally set a time limit for each step. The operation of the timer is described in the "Group Scenarios" section.

Each of the scenarios consists of the following stages:

- Determination of the analysis problem in the form of a "question" and the time horizon of the analysis.
- STEEPVL analysis.
- Development of future scenarios.
- SWOT analysis.
- Professional career development roadmap (only in the case of individual sessions and for the area of "My professional career").

At the end of each stage, it is possible to download reports in .docx and .pdf formats containing detailed results of the completed scenario.

Individual scenarios

The user starts working in the application and generates a link, which allows them to return to the scenario at any time (Fig. 177).



Figure 177. An example link under which the analyses will be carried out

Next, the participant independently:

- enters the analysis area (if it differs from the Labour Market),
- enters a question about the future of the selected analysis area,
- specifies the time horizon for the issue (Fig. 178).

Any area of analysis / Individual work	EN
New project Define the area of analysis	
IT Formulate a question about the future of the area IT Will the programming profession be in demand on the labour market in the future? eg	
How will the labour market develop in our city in finure ? How will the labour market develop in Poland in finure? Determine the time horizon of the analyses 2050	
← Back Next	

Figure 178. Example of a research question and a specified time horizon

The participant's task is to conduct a STEEPVL analysis, which consists of the following stages:

1. Selection of factors that may influence the given issue in seven areas: **social, technological, economic, environmental, political, values, legal**.

1 STEEPVL	Will the programming profession be in demand on the labour market in the future? 2050	EN
	Select 1 to 3 factors from the group of social factors that you think have the greatest impact on the IT.	
	 The level of virtualization of social life \$1 The level of digital competence of the society Share of elderly people (65+) in the age structure of the society The level of education of the society The level of flexibility of employees in terms of changing the type of work Level of satisfaction with the education system 	
	The level of cultural diversity in the labor market The level of satisfaction with the ways of spending free time Search Q + Add your own Unfold	
	← Back Next	⊘ 1/3

Figure 179. STEEPVL analysis – selection of social factors

The participant can use the factor search engine (Fig. 179).

The participant can expand the list of factors using the "**Unfold**" button. The choice of whether the list of factors is expanded or not is remembered and is reflected in subsequent screens.

The user can independently propose factors in each of these areas using the "**Add your own**" button visible below the list of factors.

In the lower right corner, the application user sees information about how many factor selections he has already made and how much is left (e.g. 1/3).

The "Next" button takes the user to the next screen. This button becomes active after meeting the conditions described in the command - in Figure 179 above - after selecting from one to three factors. Moving to the next screen saves the user's choices, it is not possible to change them after moving to the next steps.

Notice: The "**Back**" button allows to return to previous screens, but without the ability to make changes.

2. Assessment of the influence of the indicated factors on the selected issue

The participant evaluates the influence and predictability of previously selected factors on a scale from 1 to 7 by clicking on the appropriate position of the factor bar (Fig. 180). The assessment of predictability is transformed into an assessment of uncertainty.

1 STEEPVL	Will the programming profession be in demand on the labour market in the future? 2050
	Assess the influence of indicated factors in the context of the development of IT in the perspective of 2050 (evaluate using a scale of 1-7, where 1 – very low , 7 - very high)
	Very low influence
	1 2 3 4 5 6 7
	\$3 Share of elderly people (65+) in the age structure of the society
	T1 The level of development of artificial intelligence applications
	T2 Degree of use of e-services by residents
	EN1 The purchasing power of money
	EN2 Cost of living in the country
	EL1 Pressure to strive for climate neutrality
	P1 Level of support for employing foreigners
	P? The reprodition of the country 🗧
	← Back Next

Figure 180. STEEPVL analysis – assessment of the influence of factors indicated by the user

3. The result of the factor assessment is a table and a chart containing points reflecting the selected factors on the coordinate axis. The system highlights in red the factors with the highest influence and the highest uncertainty, located in the first quadrant of the coordinate system, as those that should be subjected to further analysis. After clicking on the selected point, the user receives an explanation and a detailed assessment of the factor (Fig. 181).



Figure 181. STEEPVL analysis – chart with the results of factor assessment

Based on the previously selected two factors with the highest uncertainty and the greatest influence on the selected issue, the user creates possible future scenarios.



Figure 182. Example scenario names

The next stage in the individual scenario is SWOT analysis. This stage is performed in a similar way to STEEPVL analysis.

If the "My professional career" scenario is selected, at the "Professional career development roadmap" stage, the participant has the opportunity to simulate a professional career path. Work at this stage begins with the definition of a professional career goal. Then the user defines subsequent stages of a professional career embedded in a time frame, using the "Add a new stage of career" button.

4 Professional career development roadmap		How will my career develop in the future? 2040	EM
		Career stage	
	Knowing you	Time horizon ?	
	example, cre knowledge, s	Enter the period needed to reach the goal at	
	you must tak position.	e.g. 2023-2025	
		Occupation	
		Who do I want to be?	
	My goal is:	e.g. Database administrator	
		Salary	
		How much do I want to earn?	
		e.g. \$ 000 EUR	
		Cancel	

Figure 183. Example of adding career stages

At each career step, the participant adds new skills and activities needed to successfully complete a given stage.

Career stages defined in this way will be included in the scenario report, which can be generated in the last step.



Figure 184. Information about the possibility of downloading the report

Group scenarios

Group scenarios require the role of a facilitator. The facilitator starts working on the application and generates a link that is shared on the screen with the rest of the participants. Participants can join the project using the link generated by the presenter at the beginning of the session.

Notice: The role of the facilitator is assigned to the user using the computer on which the link to the scenario was generated.

The facilitator's task is to explain to the participants what to do at each step of the scenario, ensure that the participants complete the next steps, and maintain the appropriate pace through the scenario.

The facilitator does not select the factors and does not evaluate them so as not to suggest them to the participants. The facilitator, in consultation with the group, selects the most important factors of the STEEPVL analysis and SWOT analysis previously assessed by the group for further analysis.

Moreover, the task of the facilitator on the "Future scenarios" screen, in consultation with the group, is to give titles to the four future scenarios and to select pictures illustrating the considered scenarios.

The facilitator controls the course of the scenario and can decide when the group takes the next step. This is helped by the information in the lower right corner of the screen, on screens requiring users to make choices: how many application users are participating in the current scenario, and how many of them have already completed the current step.

When working in a group session, participants cannot make changes to already completed steps as this could affect the overall session. In special cases, the facilitator may go back to specific project steps and make changes to the choices that has been agreed with the group.

Interrupting and continuing the session

If any of the participants in the group session interrupts their work, they can return to the scenario at any time. Unfortunately, the participant will not be able to make selections or evaluations of factors in the steps skipped, because the choices and evaluations could significantly affect the status of the whole session. A returning participant can start from the step the group is currently at.

Using the link generated at the start of the scenario, it is also possible to join the session at any time. A late participant will not be able to make choices about factors or assess their importance and predictability from the beginning of the scenario, but from the step in which the group is currently at.

If a participant in an individual session stops working on the scenario, it is possible to return to work at any time using the link generated at the beginning of the scenario.

If any of the participants or people who did not participate in the session use the link to a completed scenario, they will be able to review the individual steps of working on the scenario and download the resulting reports.

Undoing steps in a scenario in a group session

In special cases, the facilitator in a group session may go back to the previous step and make other choices in consultation with the group. Steps in which undoing is possible are marked with an additional "Back" button.

Clock in group sessions

In group sessions, on one of the start screens, when setting the topic for a new scenario, the facilitator can set a time limit for each step. Available options: unlimited, 2 minutes, 3 minutes, 5 minutes (Fig. 185).

The purpose of the clock is to introduce a time regime to the scenario exercise and discipline the group so that its members do not fall behind. This allows you to set a time frame for completing the entire exercise within a specific time frame.

If the facilitator sets a limit, a countdown clock that starts automatically after moving to the next step informs the participants how much time is left to complete a given stage of the scenario. When the timer reaches zero, the facilitator can decide to move to the next screen without waiting for lingering participants. Their unsaved selections will not be included in the session, but this does not prevent them from completing the entire session.

Any area of analysis / Group work	E
New project Define the area of analysis Enter the analysis area Formulate a question about the future of the area	Time limit Unlimited V Unlimited 2 min. 3 min. 5 min.
e.g. How will the labour market develop in our city in future ? How will the labour market develop in Mazovia region in future? How will the labour market develop in Poland in future? Determine the time horizon of the analyses Select a year	
← Back Next	

Figure 185. Setting a time limit

The clock is displayed for both the facilitator and the participants in the lower left corner of the screen.

Moreover, in the lower right corner the participant has information about the number of choices possible to be made in the current step of the scenario.

1 STEEPVL	How can the development of the city of Radom be shaped? 2040	EN
	Select 1 to 3 factors from the group of social factors that you think have the greatest impact on the IT.	
	The level of virtualization of social life	
	The level of digital competence of the society	
	Share of elderly people (65+) in the age structure of the society The level of education of the society	
	The level of flexibility of employees in terms of changing the type of work	
	Level of satisfaction with the education system	
	The level of cultural diversity in the labor market The level of satisfaction with the ways of spending free time	
	Search Q + Add your own 🗘 Unfold	
01:57	← Back Next	0/0

Figure 186. Location of the remaining time clock (according to the set limit)

Placing graphics in scenario descriptions

In one of the last stages of STEEPVL analysis, the facilitator or individual participant has the opportunity to title each of the four resulting scenarios and post photos visualizing the scenario. Photos can be downloaded from the hard drive of the computer where the exercise is performed.

The photo should be in JPG format, not exceeding 1920 x 1080 pixels, and 2 MB. Larger images may not be processed correctly by the server.

Backup system

The tool has an automatic system for creating backups of data entered by users when creating scenarios. The tool performs a full database backup once a week and saves it in the /WWW/4futures.eu/backups/ folder on the server disk. The name of the backup file consists of the date and time the copy was created, for example, the file name: 20240113_003000_bak.sql is a backup of the SQL database from January 13, 2023, at 0:30 and 0 seconds.

The administrator can manually backup the database by entering the address in the search engine: <u>https://4futures.eu/bkp.php</u>.

Backups are text files in SQL format, they contain database commands. If it is needed to recover data after a server failure, the latest available backup should be used.

GDPR

The system does not store any personal data of participants. The system only stores the session number to recognize the returning user. Data about the user's choices are stored in the local memory of the participant's computer and are sent to the server to create the application status. The data is not personalized in any way. Scenario session data is saved in a database on the server for later access.

The application does not use any other means of identifying users, nor does it transfer such capabilities to any other entities. The app does not use Google Analytics or Facebook Pixel, which could track app users.

The application can store quantitative data regarding:

- number of sessions conducted,
- number of session participants,
- types of these sessions (individual, group, scenario type),
- temporal presentation of the above data (when the sessions took place).

This data may be stored in a database on the server and does not contain any information that may be used to personalize users.

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