CAREERS 4.0

A.4.2 Career Guidance 4.0 Training

Empowering VET, Career Guidance, VET and Social Inclusion Professionals for the next-generation Career Guidance provision

Theory & PracticeTraining Handbook

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PROGRESSUS RESEARCH & COUNSELLING

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Introduction

In the rapidly evolving landscape of work shaped by digital transformation, globalization, sustainability needs and socio-economic shifts, the role of career guidance has become more critical—and complex—than ever before. Traditional approaches to career support are no longer sufficient to address the dynamic realities of Fourth Industrial Revolution (Industry 4.0), where automation, artificial intelligence, and non-standard employment models are reshaping industries and individual career paths alike.

To remain relevant and effective, **VET trainers, career guidance practitioners, and social inclusion professionals** must be equipped with updated competencies to support individuals in new career navigation challenges. At the same time, the provision of career guidance is being redefined within a rapidly transforming landscape, contributing to the emergence of a novel Career Guidance 4.0 approach.

The Careers 4.0 project seeks to **enable career guidance and planning in the digitization era, preparing education and career professionals** as well as the end users to be able to cope with the management of change, the achievement of career adaptability and resilience and lifelong career development within the disruptive changes and transitions in the world of education and work, in the digital transformation era. The overall purpose of the project will be achieved through the development of tailor-made career guidance material, training and information resources, to serve as capacity building tools for first line professionals to help diverse clients with multiple job transitions to new jobs and new forms of work available (e.g. teleworking, platform economy, crowd work) and will feature new, emerging and flexible career pathways, enabled by automation, digitalisation, green transition etc. in different sectors and occupations, enhancing the inclusiveness of VET, work environments and diversity of the workforce.

Fostering professionals' competences and knowledge on dealing with new labour market trends and skills demands, it is a prerequisite so as to increase the responsiveness of education, VET and employment domains. Within the context of "Work package n°4 a Career Guidance 4.0 training program and new adapted career guidance 4.0 methodologies and practices for career practitioners is developed. The aim is to enable VET trainers, career and social inclusion practitioners to offer tailor-made services to youngsters and workers, according to the latest labour market trends and new adapted information and guidance methodologies and practices.

In this context, the Career Guidance Provision 4.0 Competence Profile defines the minimum qualification criteria, learning outcomes and certification processes for training, career and social inclusion professionals, feeding a relevant training curriculum. This provides the basis for a learning outcome based competence profile to be used for curriculum development and training provisions and function as an index tool for acquired knowledge, competences as well as training of VET and career guidance professionals in view of the Industry 4.0 challenges and labour market transformations. On the basis of these updated competence standards, a tailor-made Career Guidance 4.0 Training Curriculum has been created, highlighting the new necessary knowledge, competencies and skills, as well as tasks and responsibilities in relation to novel career guidance interventions and increasingly digitised services.

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It aims to provide comprehensive knowledge on new adapted career guidance 4.0 methodologies, LMI tools, career guidance and employability practices for youth, aiming to enhance relevant support professionals' upskilling and awareness raising. The relevant training content offers updated career information and guidance methodologies to tackle specific target group's needs, skills adaptation, digital career management skills and employment barriers in the Industry 4.0. The suggested training curriculum follows the principles of adult learning describing the learning goals, expected learning outcomes, and a specific procedure and criteria for assessment of the learning outcomes, including self assessment activities and exercises.

The overall Career Guidance 4.0 Training Curriculum and Handbook sets the updated training standards required for targeted quality training of relevant professionals. The training curriculum supports the adaptation of career information and guidance methodologies, linked to new LMI tools and practices, career prospects and opportunities aligned with new VET and labour market trends in the Industry 4.0, new working arrangements and types of labour. This will match career guidance practices to future needs and contribute to better organization of services across sectors, including education, VET, social inclusion and employment.

Moreover, given the extensive digital transformation of career guidance services, particular attention is paid to highlighting the use of new technologies in an ethically responsible manner, with a focus on the quality of services provided. This includes balancing automation with a human-centered approach in career guidance and ensuring accessibility to digital services for all, thereby preventing technological inequality (digital divide). It also contributes to the improvement of career guidance practices by promoting the continuous professional development of practitioners and the optimal support of beneficiaries. In this way, social responsibility is reinforced, and it is ensured that Career Guidance 4.0 serves the benefit of the educational and professional community and the end users as well as the individual and social welfare. It is also expected to increase professionalism and quality in the provision of training, careers and employment inclusion services for youth, by raising awareness of the practitioners involved to utilise adapted labour market inclusion and information practices, digital tools and novel guidance methodologies, so as to deliver appropriate services fitting the needs of career development in the Industry 4.0.

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Module 1: Lifelong Career Development and Future-oriented Career Management in a Digital Age

Learning scheme

Module 1 " Lifelong Career Development and Future-oriented Career Management in a Digital Age," is the foundational module, aiming to provide guidance practitioners, VET trainers, and social inclusion professionals with a comprehensive understanding of the core principles, concepts, emerging trends, and applications related to lifelong career development and future-oriented career management in the context of the digital age. It introduces the key challenges and opportunities brought about by rapid technological advancements, evolving labour market dynamics, and the non-linear nature of modern career paths. Serving as an essential introduction to the broader curriculum, this module sets the stage for deeper exploration of strategies, tools, and approaches that career professionals can use to effectively support individuals in navigating and thriving in an unpredictable and digitally-driven world of work.

Learning Objectives:

This module will support trainees to:

- Acquire knowledge of updated theoretical approaches to career empowerment, career readiness, and career development in transitional, digitized, and precarious work environments.
- Gain understanding of the latest trends and dynamics influencing the world of work.
- Identify appropriate upskilling and reskilling pathways to support career transitions and sustainable employability in response to technological change.
- Identify the role of STEAM skills (Science, Technology, Engineering, Arts, and Mathematics) in fostering career adaptability, personal growth, and resilience within the evolving digital economy.
- Acquire knowledge of digital career management skills among diverse end users and various client groups, ensuring equitable access to career opportunities in an increasingly digitised world of work.
- Describe business start-up processes and entrepreneurial opportunities in the digital economy, recognizing entrepreneurship as a viable and strategic career development path.

Expected Learning Outcomes:

By the end of this module, trainees will be able to:

- Apply updated theoretical approaches to career empowerment, career readiness, and career development in transitional, digitized, and precarious work environments.
- Analyze the latest trends, challenges, and dynamics shaping the evolving world of work, including globalization, technological advancements, and shifting labour markets.

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- Compare and recommend effective upskilling and reskilling pathways that support career transitions and sustainable employability in the context of technological change.
- Explain and enhance the development of STEAM skills (Science, Technology, Engineering, Arts, and Mathematics) to enable clients' career adaptability, personal growth, and resilience in the digital economy.
- Support the development and application of digital career management skills across diverse user groups, ensuring equitable access to career opportunities in the increasingly digitized world of work.
- Describe the key steps in business start-up processes and identify entrepreneurial opportunities within the digital economy, to enable clients recognizing entrepreneurship as a strategic pathway for career development.

Key words:
Career Development, Career Empowerment, Self-Directed Career Learning, Transitional Labour Markets, STEAM Skills, Upskilling and Reskilling, Digital Career Management, Career Resilience

Motivation Questions

- Do you believe that current career guidance approaches are adequate for helping individuals build sustainable and resilient careers in an era marked by rapid technological change, uncertainty, and emerging opportunities?
- In your opinion, are existing career development strategies evolving fast enough to empower individuals to successfully navigate nonlinear, global, and digital career paths?

Theoretical background

Conceptualising Career Guidance 4.0

Career Guidance 4.0 (Euroguidance, 2017; Vlachaki, 2018; Cedefop et al., 2021) refers to a modern approach to vocational and career guidance that responds to the challenges and opportunities of the Fourth Industrial Revolution (Industry 4.0). In a context of unstable, non-linear, and unpredictable career paths, the focus shifts from career management to managing change, adaptability, and individual resilience in the workplace.

Career Guidance 4.0 leverages advanced technologies—such as artificial intelligence, data analytics, digital platforms, and automation—to offer personalized, interactive, and dynamic guidance services. It incorporates:

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- Innovative digital technologies and ICT tools for delivering tailored career guidance services,
- Contemporary approaches and models that respond to the evolving, digitized, and precarious nature of work, with emphasis on individual and societal well-being, sustainability, and justice,
- Updated, real-time (where possible) labor market information based on trends and dynamics that rapidly reshape the nature and content of work, and
- Support for lifelong career development in an educational and professional environment that is being transformed by technological and socio-economic changes and structural shifts in the labor market.

Thus, Career Guidance 4.0 signifies a necessary shift in the role of career guidance towards dynamic, digital, and interactive practices that enhance the professional readiness and development of individuals and groups within a fluid, unpredictable, and interconnected career landscape.

Career Guidance 4.0 - Contemporary Career Development Theories and Models

The fourth industrial revolution (Industry 4.0)[1] is creating unprecedented workplace challenges and opportunities, further intensifying the rather unpredictable, unstable, and non-linear career paths for the individuals. These prospects shift the focus of career counselling and guidance from the management of career decisions to the management of change and achievement of career adaptability and resilience. This shift accompanied by boundaryless ICT innovation contributes to the emergence of a new career guidance approach given the name Career guidance 4.0 (Euroguidance, 2017; Vlachaki, 2018;). Career Guidance 4.0 reflects a shift in career development theory and practice in response to the complexities of the digital age and the transformations brought by the Fourth Industrial Revolution. Traditional, linear models are no longer sufficient to support individuals navigating today's uncertain, non-linear, and rapidly evolving career paths. Also, digital innovation practices in the changing context of career guidance provision to support lifelong career development with the disruptive changes and transitions in the world of education and work, in the digital transformation era. Therefore, updated theoretical approaches and models suitable to address career development in transitional, digitalised and precarious working conditions should be adapted to align with the dynamic nature of work and learning.

Protean Career Theory (Hall, 2004)

Protean Career theory views careers as driven by the individual rather than the organization, emphasizing personal values, self-direction, and psychological success. A core concept of the

[1] See (Davies, 2015). Defined as disruptive transformations in the design, manufacture, and operation of systems, products, processes, and services as a result of new and innovative technological developments. It is characterised by a fusion of technologies blurring the lines between the physical, digital, and biological spheres, leading to a range of changes in systems of production, management, and governance, based on technology and devices autonomously communicating with each other along the value chain (Davies, 2015; Schwab, 2016).

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theory suggests that Individuals are the primary agents of their careers, guided by personal values and internal definitions of success.The protean careerist actively adapts to changing environments and defines success on personal terms rather than hierarchical achievement.

Protean Career theory in the context of Career Guidance 4.0:

- Promotes **psychological success over external validation** in navigating dynamic career paths.
- Place emphasis on **lifelong learning**, **resilience**, and **value-driven career design**.
- Encourages **digital self-directed career management** through online/ICT environments.
- Utilize **digital self-management tools** that reflect values and priorities and digital or **AI-based platforms** that enable individuals to design and control their own career trajectories in dynamic job markets.

Boundaryless Career Theory (Arthur, 2014; Sullivan & Arthur, 2006; Arthur & Rousseau, 1996)

This theory suggests that careers extend beyond organizational boundaries and are characterized by mobility, flexible identity, and the use of networks. Individuals navigate across various work settings and roles, leveraging learning and relationships.

Boundaryless Career Theory in the context of Career Guidance 4.0:

- Cultivates digital identity management, career agility, and cross-sector competencies.
- Encourages development of boundary-spanning career capital and network literacy.
- Reflects the rise of digital career mobility and the growing emphasis on portfolio-based work models.
- Encourages network-based guidance approaches and digital networking platforms for career mobility and lifelong learning.
- **Facilitates network-based career planning** using professional social media, digital job matching, freelance platforms, and e-portfolios.

Career Construction Theory and Practice (CCTP) (Savickas, 2005, 2013)

Rooted in constructivism, this theory focuses on how individuals construct meaning in their careers through life stories and narratives. It emphasizes adaptability, identity, and life design. Careers are built through narratives that reflect identity, purpose, and life themes.

CCTP in the context of Career Guidance 4.0:

- Supports **identity work and adaptability** via digital storytelling.
- Fosters **career adaptability, identity coherence**, and **future self-construction**.
- Helps ındividuals navigate **complex transitions** with meaning and direction.

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- Integrates **digital storytelling and AI-driven narrative tools** to facilitate self-reflection and personalized career path creation.

Planned Happenstance Theory (Krumboltz & Levin, 2004)

This theory suggests that career paths can be positively shaped by unplanned events, if individuals are open, curious, and prepared. It encourages individuals to develop skills that allow them to capitalize on chance events in their lives. It promotes curiosity, flexibility, persistence, and optimism as career competencies.

Updated in the context of Career Guidance 4.0:

- Encourages **agile responses to unpredictable labour market changes.**
- Promotes **exploratory mindset, adaptability, and resilience** to disruption.
- Develops skills in **opportunity recognition**, **risk-taking**, and **exploratory behavior**.
- Encourages **strategic engagement** with serendipity in digital contexts.
- Utilises **scenario-based learning, career games, digital simulation tools and adaptive learning platforms** to help individuals build competencies to recognize and act on emerging opportunities in real time.

Social Cognitive Career Theory (SCCT) (Lent & Brown, 2013; Lent, Brown, & Hackett, 1994)

Socio Cognitive Career Theory (SCCT) (Lent & Brown, 2013; Lent et al., 1994) identifies the interactions between personal inputs and social and environmental factors that underpin career decision-making. This theory highlights that career choices are shaped by self-efficacy, outcome expectations, personal goals, and environmental support. It also accounts for contextual factors and individual differences. Self-efficacy refers to people's subjective assessment of their capacity to succeed in an activity or tackle a problem. As a result, self-efficacy refers to a person's own perception about their ability to succeed in certain conditions or complete a task, rather than whether they are objectively capable (Bandura, 1986). Outcome expectations represent individuals' beliefs about the consequences (social, physical, or self-evaluative) of engaging in certain actions (Lent & Brown, 2006). A goal signifies an individual's determination to carry out an action or attain a specified result. “Learning experiences” is also a crucial variable in the SCCT model, serving as one of the primary sources of self-efficacy. Learning experiences influenced by personal successes and failures, role-models, affirmation from others and emotional state (Lent et al., 2017), self-efficacy and outcome expectations greatly influence one's interests, which in turn influence career choices and achievement performance. Accordingly, Lent et al. (1994) present a comprehensive and systematic model to elucidate how the interaction between core cognitive, personal, and environmental variables contributes to an individual's career development.

The purpose of the SCCT intervention is to develop and modify self-efficacy related to career choices and interests, to overcome barriers related to choice and success and to define personal goals by expanding interests and promoting choices. The techniques and methods of

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SCCT-based career interventions, mainly include expanding choice options, coping with barriers, building support, goal setting and self-regulation, facilitating work performance, and promoting work satisfaction (Wang, 2022).

SCCT in the context of Career Guidance 4.0:

- Enhances user **self-awareness and decision-making** through data-driven feedback.
- Strengthens **self-efficacy, goal-setting, and strategic career planning**.
- Encourages active engagement with continuous feedback processes in fast-evolving environments.
- Integrates **AI-powered diagnostics** for interest, personality, and skill assessments and **data visualization tools** for career pathways, labour market trends, and personal competencies, to provide personalized feedback and visualizations of career paths, enhancing confidence and informed decision-making.
- Support inclusive career guidance providing strategies tailored to the needs of various groups in the context of labour market transformations.

Psychology of Working Theory (PWT) (Blustein, 2006; Duffy et al., 2016; Hirschi, 2017)

PWT focuses on how work fulfills psychological, social and self-determination needs, especially for marginalized groups. **It addresses equitable access, dignity at work, and social inclusion.**

PWT in the context of Career Guidance 4.0:

- Addresses issues of access, dignity, and social justice in employment.
- Recognizes and supports **non-traditional and precarious work** realities.
- Addresses inequality in digital access and employment dignity.
- Promotes inclusive digital **career guidance** platforms that reach underrepresented groups, with tailored resources to support equitable access to work.
- Promotes Implementation of **community-based and hybrid digital services** for disadvantaged populations.

Career Craft (Amundson & Poehnell)

Careers are creatively shaped through active, imaginative engagement and self-reflection.Career Crafting emphasizes the active, creative shaping of one's career through reflection, imagination, and action. It integrates career counseling with life design, purpose, and well-being.

The theory of Career Crafting in the context of Career Guidance 4.0:

- Supports intentional, holistic career design aligned with personal and societal well-being.
- Encourages continuous creative engagement in uncertain work ecosystems.

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- Uses digital creativity tools to design meaningful futures, encouraging creative scenario-building, life-purpose exploration, and well-being integration.
- Supports immersive career exploration tools (e.g. VR career labs, digital journaling) and gamified environments to foster creative engagement with career possibilities.

Locus of Control Theory (Rotter, 1966; Zimbardo, 1985)

Locus of Control is considered to be an important aspect of personality (Rotter, 1966). Locus of Control refers to an individual's perception about the underlying main causes of events in his/her life. A locus of control orientation is a belief about whether the outcomes of our actions are contingent on what we do (internal control orientation) or on events outside our personal control (external control orientation)." (Zimbardo, 1985, p. 275) External Locus of Control suggests that the individual believes that his/her behaviour is guided by fate, luck, or other external circumstances Internal Locus of Control suggests that the Individual believes that his/her behaviour is guided by his/her personal decisions and efforts.

This theory examines whether individuals attribute outcomes to internal (personal effort) or external (fate, luck) factors. It influences motivation and perceived agency in career development.

Locus of Control Theory in the context of Career Guidance 4.0:

- Builds career self-management, ownership of decisions, and motivation.
- Encourages internal locus of control to thrive in unstable environments.
- Encourages the development of self-efficacy through real-time feedback and interactive simulations, and personal goal-setting tools that reinforce belief in personal impact and agency and reduce fatalism in career progression.

Thriving with Social Purpose (Ford & Smith, 2007)

This framework highlights the importance of connecting individual goals and work to broader societal goals and social impact. It emphasizes social consciousness, ethical engagement, and thriving through meaningful contribution.

Thriving with Social Purpose in the context of Career Guidance 4.0:

- Integrates purpose, contribution, and global citizenship in career journeys.
- Encourages alignment between personal meaning and societal transformation goals.
- Supports value-driven paths and social engagement via digital tools.
- Utilises platforms that help individuals align career paths with values, purpose-driven careers/positions and societal challenges (e.g., sustainability, inclusion).
- Integrates values clarification tools, sustainability education, and ethical career planning.

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Narrative Career Counseling

Narrative Career Counseling could be understood as a largely verbal process in which a career counselor and counselee(s) are in a dynamic and collaborative relationship, focused on identifying and acting on the counselees' goals. The counselor uses a variety of techniques or processes to help the counselee gain a better understanding of themselves, the career concerns they face, the behavioral options available to them, and how to make informed decisions. The counselee is ultimately responsible for their own actions (Herr et al., 2004; McIlveen & Patton, 2007). In this framework, clients are supported in sharing personal life stories and experiences that holistically accounts for his or her life and career, and enables the person to make meaningfully informed career-decisions and actions (McIlveen & Patton, 2007). Personal narratives that clients share with the career counselor are essential since individuals create future prospects by combining their experiences from the past and present to envisage the future (McMahon & Watson, 2012). According to Savickas (1993), counselors, acting as co-authors and editors of these narratives, can help clients: (i) authorize their careers by narrating a coherent, continuous, and credible story, (ii) invest career with meaning by identifying themes and tensions in the story line, and (iii) learn the skills needed to perform the next episode in the story.

There is a significant range of narrative career counseling techniques and approaches that can be translated into effective interventions for various ages and populations. These approaches include among others: Life Themes (Savickas, 2005), Sociodynamic Counseling (Peavy, 2000), the Storied Approach (Brott, 2001), the Career Style Interview (Savickas, 2005), the Life/Work Design approach (Campbell & Ungar, 2004), and the Career Systems Interview (McIlveen et al., 2003).

Narrative Career Counseling in the context of Career Guidance 4.0:

- evolves to integrate digital storytelling tools, AI-assisted reflection, and immersive technologies (e.g., virtual or augmented reality) to help clients construct, visualize, and re-author their career narratives.
- supports lifelong career adaptability, allowing individuals to frame their identities dynamically in response to rapidly shifting labor markets.
- promote meaning-making in careers disrupted by automation or hybrid work, helping clients find purpose and coherence.
- utilise online platforms and e-portfolios enabling individuals to curate and share evolving digital career stories, fostering agency, resilience, and visibility in global, interconnected career ecosystems.

Psychology of Sustainability and Sustainable Development (Di Fabio, 2016a, 2017)

This approach highlights the contribution of the psychology of sustainability and sustainable development to well-being in organizations from a primary prevention perspective. It deals with sustainability not only in terms of the ecological, economic, and social environment but also in terms of improving the quality of life of every human being. The psychology of sustainability and

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sustainable development is seen as a primary prevention perspective that can foster well-being in organizations at all the different levels going from the worker, to the group, to the organization, and also to inter-organizational processes. This approach seeks to promote understanding how people can establish meaningful lives and meaningful work experiences in the midst of numerous challenges, transitions, and changes.The psychology of sustainability and sustainable development can be seen as an adaptive response to the need to develop well-being in organizations that have to cope with the challenging and unpredictable environments of the 21st century.

The **Psychology of Sustainability and Sustainable Development** aligns closely with the demands of the **Industry 4.0** era and the goals of **Career Guidance 4.0**, as it emphasizes a **primary prevention perspective** that fosters **individual and organizational well-being** amid rapid technological, social, and economic transitions. This approach supports workers and organizations in navigating the **complex, digital, and ever-changing landscape** of modern work by focusing on **meaning-making**, **psychological resilience**, and **inclusive growth**. By promoting **sustainable career development**, it encourages career guidance to move beyond employability alone, toward **holistic life design**, personal empowerment, and **psychologically healthy work environments** that thrive even in uncertainty.

https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2017.01534/full

Psychology of Harmony and Harmonization (Di Fabio & Tsuda, 2018)

The psychology of harmonization emphasizes the importance to act early in a primary prevention perspective, considering the importance to build strengths: from the intrapersonal dimension to enhance interpersonal and community strengths to protect and sustain the environment and the relationships in/with the environment. It asks for intensifying the study of processes that facilitate the realization of harmonization, with attention to parts of the self, with others (internal and external relational contexts), with persons, groups, and community/ies, and with the natural world, taking into account both a synchronic and diachronic dimensions. The psychology of harmonization presents itself as a new pillar able to give valuable contributions to the psychology of sustainability and sustainable development. The guiding principle of balancing is a promising psychological point of reference to reach harmonization, offering a new promising perspective of psychological research and intervention from a prevention perspective. The construction of culture-inclusive approaches in psychology are also the basis for a new step forward for harmonization: The psychology of cross-cultural harmony balancing too much individualism and too much collectivism starting from primary prevention for a new cross-cultural balancing in terms of universal psychology.

The **Psychology of Harmony and Harmonization** (Di Fabio & Tsuda, 2018) offers a **human-centered, preventive framework** that aligns well with the **dynamic, digital, and transitional** nature of work in the **Industry 4.0 era** and supports the principles of **Career Guidance 4.0**. Emphasizing **inner balance, resilience, adaptability, and relational ethics**, it promotes psychological sustainability amid ongoing change.

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This approach encourages individuals to cultivate **self-awareness**, **emotional intelligence**, and **cultural sensitivity**, fostering meaningful life-career integration in increasingly digital and diverse work environments. It shifts the focus from static job matching to **holistic, values-based career construction**, preparing people for **fluid professional identities**, continuous reskilling, and **well-being-driven career paths** in a rapidly evolving world.

Holland's Theory of Career Choice in the Context of Industry 4.0

Holland's Theory of Career Choice—also known as the RIASEC model—classifies people and work environments into six personality and interest types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. The theory posits that individuals will experience greater satisfaction and performance in work environments that align with their personality type.

While Holland's framework has remained influential for decades, the advent of the Fourth Industrial Revolution (Industry 4.0)—characterized by digital transformation, artificial intelligence, robotics, and automation—is reshaping both the structure of occupations and the competencies required for success. This evolving context calls for a dynamic reinterpretation of Holland's theory to ensure its continued relevance in a digitized and interconnected labour market. In the context of Industry 4.0, Holland's Theory of Career Choice requires key updates:

- *Hybrid Job Roles and Blended RIASEC* Types: Industry 4.0 is blurring the lines between traditional occupational categories. For example, a cybersecurity specialist may align with both Investigative and Conventional types, while a UX designer may blend Artistic, Social, and Realistic traits. New roles increasingly demand multidisciplinary and cross-functional skills, requiring practitioners to interpret RIASEC results more flexibly.
- *Digital Transformation Across All Types:* Digital skills are now essential across all six RIASEC domains—not just in traditionally technical fields. For example, Realistic types in skilled trades must use digital diagnostic tools; Enterprising types use data analytics for strategic decisions; Social types in education or health may use virtual platforms for remote service delivery. Thus, ICT literacy has become a transversal competency across personality types.
- Emphasis on Career Adaptability and Lifelong Learning: Industry 4.0 jobs often require continuous upskilling and reskilling, as technological change accelerates the obsolescence of skills. Willingness to learn, adaptability, and career self-management skills are becoming just as important as occupational interests. Holland's theory can be enriched by integrating concepts from Career Construction Theory and Career Adaptability.
- Expansion of Entrepreneurial Pathways: The rise of the gig economy and digital entrepreneurship has expanded opportunities for Enterprising and Artistic types to create their own work environments. Freelancing, remote work, and platform-based careers challenge traditional employment models, offering more flexible and self-directed career paths that still align with Holland's typologies but require additional competencies in self-regulation and digital presence.

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- Labour Market Intelligence (LMI) Integration; Career practitioners must now complement Holland's interest-based guidance with real-time labour market data to match individuals not only to their preferences but also to evolving economic realities. This includes identifying growing sectors, emerging occupations, and future skill requirements, especially for young people and those navigating transitions.

Holland's Theory remains a valuable foundation in career guidance, offering a clear and intuitive way to explore vocational interests. However, in the era of Industry 4.0, the framework must be interpreted through a more fluid, competency-based, and technologically informed lens. Clients should be guided toward hybrid and interdisciplinary roles, with emphasis on evolving interests, adaptable career paths, and sector-wide skill ecosystems. Discussions should also address resilience, adaptability, and lifelong learning to prepare individuals for dynamic labour markets. Updating its application ensures that individuals are not only matched with suitable work environments but are also empowered to adapt, evolve, and thrive in an unpredictable and fast-changing world of work.

***Matching Holland's Personality / Interest Types with the* ESCO & *Industry 4.0 skills* and occupations**

Realistic			
Description of type: Commonly has athletic or mechanical ability and prefers to work with objects, machines, tools, plants or animals, or to be outdoors. Likes to work with things as opposed to ideas or people and has preference for concrete problems over abstract issues.	**Key skills:** Hard skills: Mechanical skills, ICT skills, Technical Skills Soft skills: Organisation, adaptability, willingness to learn, Creativity Professional skills: Using and operating tools, equipment and machinery, designing, building, repairing, maintaining, working manually, measuring, working in detail, driving, working with plants	**Relevant ESCO Occupational sectors/ occupations** Science and Engineering Associate Professionals/ Information & communications professionals/ Science and Engineering Professionals/ Production and Specialized Services Managers/ Protective Services Workers/ Market-oriented Skilled Agricultural Workers/ Market-oriented Skilled Forestry, Fishery and Hunting Workers/ Subsistence Farmers, Fishers, Hunters and Gatherers/ Building and Related Trades Workers (excluding electricians)/ Metal, Machinery and Related Trades Workers/ Handicraft and Printing Workers/ Electrical and Electronics Trades Workers/ Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers/ Stationary Plant and Machine Operators/ Assemblers/ Drivers and mobile plant operators, Cleaners and Helpers/ Agricultural, Forestry and Fishery Labourers/ Labourers in Mining, Construction, Manufacturing and Transport/ Food Preparation Assistants/ Street and Related Sales and Services Workers/ Refuse Workers and Other Elementary Workers *Indicative occupations: Electrical engineering technician, mechanical engineering technician, electronics engineering technician, pilot, farmer, fisher, horticulturalist, builder, armed services personnel, mechanic, upholsterer, electrician, computer technologist, park ranger, sportsperson, chemical processing plant controller, metal furnace operator, aquaculture production manager, food production operator, animal feed operator, food safety specialist, street food vendor, food preparation assistant, paper slitter operator, block machine operator, surface miner, firework assembler, furniture assembler, photographic equipment assembler, leaflet distributor, building cleaner, room attendant*	*New occupations in the context of Industry 4.0* *Automation Technician, CAD Technician (Computer-Aided Design), Quality Control Inspector, Cybersecurity Analyst, Data Analyst, UX/UI Designer (User Experience/User Interface), Science and Engineering Professionals, Artificial Intelligence Engineer, Renewable Energy Engineer, Supply Chain Manager, Operations Manager, Cybersecurity Incident Responder, Digital Forensics Analyst, Precision Agriculture Technician, Smart Fisheries Technician, Agri-Tech Consultant, Building Information Modeling (BIM) Technician, Smart Manufacturing Technician, Digital Print Operator, Smart Home Installer, Smart Factory Technician, Industrial IoT Operator: Robotics Assembler, Autonomous Vehicle Operator, Smart Cleaning Technician, Precision Farming Labourer, Automated Kitchen Assistant, E-commerce Fulfillment Associate, Smart Waste Management Technician, Renewable Energy Specialist, Healthcare Robotics Engineer, Digital Operations Supervisor*

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New approaches based on the use of ICT in Career Counseling and Guidance

In the context of evolving digitalisation of career counseling services, it is essential that guidance models and methodologies are constantly enhanced. Technology plays a key role in this evolution by expanding the reach of services to diverse end users. With the ongoing transformation in how people seek and access information about education, training, and employment, there is a pressing need to adapt career counseling practices to keep pace with these technological developments (Kettunen & Sampson, 2019; Cedefop, 2011). Transitioning to online guidance enables the introduction of new delivery methods. Kettunen (2017) identifies two primary ICT-driven approaches to career counseling: collaborative career exploration and co-careering.

Co-careering approach

Kettunen et al. (2013) found that where career professionals adopted a positive orientation towards social media technologies, this was more usually associated with a non-hierarchical approach to pedagogy and information exchange that was described as “co-careering”. Co-careering is a process in which social media community members share their skills and collaborate meaningfully on career concerns, while career professionals put themselves in a facilitative rather than didactic role.

A phenomenographic study by Jaana Kettunen at the University of Jyväskylä, Finland, examined conceptions of competency for social media among career practitioners. The study identified four types of perceptions on social media in the practitioner role:

■ using social media to deliver expert information (information approach);

■ using social media in a reflexive one-to-one dialogue (communication approach);

■ using social media to facilitate interaction among groups of individuals (collaborative approach);

■ using social media in actively engaging communities of individuals around career issues (co-careering). (European Training Foundation, 2020).

Social media are extensively utilized for :”co-careering”, where shared expertise and meaningful co-construction of career issues take place among online community members (Kettunen, 2017). The use of social media for co-careering is the most complex category. It is systemically focused and gives an impetus for paradigm change and reform in career services. This approach shows a change in the role of career practitioners and an evolution of the locus and nature of control in career-guidance processes. Professionals are required to have an online presence and professional proficiency, including the ethical dimension and innovation capacity. It is linked to creating and maintaining a reliable, properly managed and monitored online presence and participation within the relevant professional communities” (European Training Foundation, 2020).

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The practitioner becomes an active participant by acquiring the requisite skills and establishing a visible, approachable and trusted presence (Kettunen et al., 2015; Sampson et al., 2018). Building a reliable and authentic image of oneself within the relevant communities requires mindful online presence, monitoring and actively updating one's online profiles; it also requires a practical understanding of the means by which this presence is conveyed to others online (Kettunen, 2017).

This approach demonstrated that the competency for social media in career services is not only about a particular set of new skills, but it is a dynamic combination of cognitive, social, emotional and ethical factors. The findings of this research can be used to develop the pre-service and in-service training of career practitioners and support for the expanding of their competency for social media (Kettunen, 2017, European Training Foundation, 2020).

Careers professionals who aim to co-career with the counselees, see themselves as a resource available to the community, but one that coexists with other resources that may exist online or otherwise. This method has the advantage of allowing diverse individuals to obtain the help that best suits their requirements rather than having to choose between services supplied through various approaches (Bakke et al., 2018).

In the context of **Career Guidance 4.0**, social media platforms can be powerful tools for **"co-careering"**—a dynamic, participatory process where individuals collaboratively explore, construct, and reflect on career-related experiences and knowledge within digital communities. Career counselors can integrate co-careering into their practice by facilitating online discussion groups, curating reliable digital resources, encouraging reflective digital storytelling, and supporting clients in building constructive digital relationships. Potential activities could involve the following:

- **Peer Learning and Shared Expertise**: Online communities enable individuals to exchange career insights, job-seeking tips, and personal experiences, fostering a culture of mutual support and learning.
- **Career Identity Construction**: Social media allows individuals to present and shape their professional identities in real-time through content sharing, networking, and community participation. Career practitioners can guide clients in developing authentic, strategic digital presences aligned with their evolving goals.
- **Access to Real-Time Labour Market Insights**: Online platforms reflect emerging trends, skill demands, and industry shifts, offering valuable real-time career intelligence. Practitioners can help clients interpret and use this data to make informed, agile career decisions.
- **Engagement and Empowerment**: Co-careering empowers individuals to take an active role in their career development, shifting from passive recipients of guidance to active co-creators. It aligns with Career Guidance 4.0's emphasis on autonomy, adaptability, and lifelong learning.

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- **Facilitating Inclusive Support Networks**: Social media can provide inclusive, accessible spaces for underrepresented groups to find mentors, allies, and inspiration—extending the reach and equity of guidance services.

Collaborative career exploration

In collaborative career exploration, counselors or educators and individuals share information in an online environment, as they work toward common learning objectives, such as comprehending a subject or addressing a problem. Collaborative career exploration also improves participation and interaction and fosters collaborative processes in career learning among peer group members (Kettunen, 2017; Kettunen et al., 2020). Thus, learners are not passive absorbers of knowledge; instead, they actively pursue it by participating in discussions, searching for information, and exchanging perspectives with their peers. Online environments and web-based video conferencing systems for synchronous communication enable diverse beneficiaries to participate in collaborative counseling / learning processes.

More specifically, during these processes: (i) participants are acclimated to the online environment, (ii) they are engaged with online activities while exchanging resources with one another, (iii) they collaborate with one another to share ideas, ask questions, and push one another to think critically and (iv) participants are encouraged to reflect on and accept accountability for their own learning (Salmon, 2005).

In the context of **Career Guidance 4.0**, this approach supports alignment with **human-centered technology**, integrating advanced tools such as **AI-driven chatbots, virtual reality (VR) simulations**, and **augmented reality (AR)** into the guidance process. These technologies enable clients to engage in **collaborative, immersive, and personalized career exploration activities** within hybrid or digitally enhanced environments. For example, clients can virtually experience different job roles, participate in realistic work simulations, or interact with intelligent systems that provide tailored feedback on skills and preferences. Such interactive experiences can **boost self-awareness**, help clients **envision possible career paths**, and **clarify how their evolving capabilities match specific job tasks or professional domains**. Moreover, by enabling clients to **visualize success scenarios**, these tools empower career counselors to work collaboratively with clients in **co-constructing positive career narratives**, identifying meaningful goals, and strengthening **future-oriented thinking**. This approach also fosters **greater autonomy and engagement** in the career development process, particularly among younger digital-native generations. Additionally, it allows practitioners to adopt **data-informed yet empathetic guidance strategies**, blending analytics with emotional intelligence, and ensuring that technology enhances—rather than replaces—the human connection central to effective career counseling.

Strengths-Based Approach

A strength-based approach is a way of counseling that focuses on an individual's strengths and abilities in the career development process. The approach aims to build confidence and self-efficacy in individuals by recognizing their capabilities, assets or strengths that can be built

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upon in order to achieve their career-related goals (Littman-Ovadia et al., 2014). The Strengths-Based Approach, drawing on life-planning and positive psychology concepts and Appreciative Inquiry processes, is based on the simple assumption that every individual has something that works well and that these strengths can be the starting point for creating positive change. It suggests that the questions the counselor asks, drive the direction and focus of the client's actions and behavior.

Strength-based guidance in the context of Career Guidance 4.0 supports:

- **Empowerment for self-directed learning and career management,** helping individuals to build career self-efficacy and agency, aligning their strengths with emerging roles and promoting employability in non-linear, portfolio-based careers.
- **Inclusive career development** by focusing on what individuals can do rather than what they cannot in new labour market domains, which is especially relevant for vulnerable groups (such as the PWDs, NEETs etc.) to designing flexible, personalized career paths.
- **Resilience and Mental Wellbeing**. By anchoring guidance in what individuals do well, it boosts psychological well being, motivation, and adaptability to career disruptions (e.g., automation or job displacement).
- **Strengths Mapping across digital career ecosystems** that map job opportunities, skills frameworks, and learning platforms (e.g., ESCO, Europass, LinkedIn Learning), helping individuals navigate pathways by matching strengths with in-demand skills and labor market trends.
- **Personalization Through Digital Tools**. Provide personalized feedback, enabling clients to identify latents or soft skills (personality traits) and map individual strengths more accurately and dynamically, using modern digital platforms and AI-driven career assessments.

Co-constructing approach

The co-constructing approach was developed during a qualitative study involving professionals from the international career-guidance community (Bimrose et al., 2019). The participants attended a learning programme on the changing world of work and then took part in online career conversations, co-constructing meaning around their careers and identities.

The online learning programme offered a space for career conversations and for the co-construction of narratives through interaction with peers and tutors. **The online course supported participants in co-constructing meaning relating to their careers and identities.** The participants/ career counsellors are facing the challenge of helping their clients by co-constructing conversations about their own context, skills and identities.

The **co-construction process is based upon skill development in four domains (relational, emotional, practical and cognitive development)** to achieve a degree of career adaptability as roles evolve and contexts change. Career counselling focuses on **life themes** where the outcome is often career change for better alignment to lifestyle and life events. The career counsellor offers emotional support, expertise in relation to cognitive, practical and relational

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development, and support for client reflexivity in a framework designed to support career co-construction (Bimrose et al., 2019). The research revealed how processes of dialogue centred around careers and identities (in an online career programme) can build the development and revision of professional identities (European Training Foundation, 2020).

In the context of **Career Guidance 4.0**, the **co-constructing approach** is especially relevant as it aligns with human-centered, personalized digital, adaptive tailored and meaningful guidance experiences. The co-constructing approach helps individuals develop key career adaptability skills (concern, control, curiosity, and confidence) which are crucial in a world of constant change and non-linear career paths. Digital tools can be used to create spaces for reflective conversations, facilitating reflexive dialogue and digital story-telling, life design interviews, or narrative career assessments in digital environments (e.g. online platforms, AI chatbots, VR simulations) where clients explore their evolving identities, aspirations, and values, enabling a deeper understanding of personal narratives in dynamic labour markets. Career guidance platforms can integrate peer forums or group coaching sessions where individuals exchange experiences, offer feedback, and build collective knowledge.

The "Green" Guidance Approach

The “green” guidance approach in career counseling refers to sustainable development, environmental awareness, and ecological responsibility. Main aim is to empower individuals to become aware of “green” and sustainable education and employment options, which minimize harm to the environment. It also encourages individuals to consider the environmental impact of their career choices and to balance work with other aspects of life, thus maintaining a lifestyle that promotes health, financial security, and social justice. Moreover, this approach highlights the need for a greener perspective on economic development, as well as the importance of integrating sustainability into all levels of education. It supports educators and career guidance professionals in developing their own skills so that they can guide individuals toward more sustainable career and life choices (Plant, 2014; European Training Foundation, 2020).

The “green” guidance approach In the context of Career Guidance 4.0:

- helps individuals clarify their values and explore careers that align with their environmental and sustainability concerns, personal values and their desire for positive impact.
- supports awareness of the environmental effects of career choices and professional development,
- assist individuals in exploring career paths related to environmental sustainability (e.g., renewable energy, sustainable agriculture) and in seeking information about emerging opportunities in green industries.
- promote the development of skills and knowledge required for environmentally focused professions, highlighting education and training opportunities that promote sustainability.
- evaluate the outcomes of guidance not only through economic criteria but also through “green” criteria, by linking sustainability goals to guidance activities.

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Career Readiness approach

The prolonged economic crisis—and even more so, the recent COVID-19 pandemic—has led to a sharp global rise in unemployment, particularly among young people (OECD, 2020). Youth face heightened professional uncertainty and are especially vulnerable in their efforts to find, secure, and maintain employment (Mann, Denis & Percy, 2020). Moreover, the rapid transformations driven by the digital and "green" transitions are creating additional challenges for career decision-making and planning.

Recent findings from the OECD's *Career Readiness Project* reveal that young people's career expectations worldwide are often narrow and unclear. Half of all youth over the age of 15 express interest in just ten occupations, while 38–41% aspire to jobs at high risk of automation. Furthermore, one in five young people holds educational and career expectations that are mismatched (OECD, 2020; PISA 2018). These issues are closely linked to limited access to career guidance and information services, which in turn fosters stereotypical choices disconnected from actual labor market trends and conditions. Many young people also demonstrate limited awareness of the full range of available educational and career opportunities (Mann et al., 2020).

The OECD is conducting in-depth research on youth career readiness and national-level data, developing indicators that link participation in career guidance activities and services with improved employment outcomes. The aim is to support policymakers and practitioners in delivering higher-quality guidance services that better meet the needs of young people (Covacevich et al., 2021a; Covacevich et al., 2021b).

National longitudinal studies show that what students think about themselves and their potential futures in work matters. Teenagers who are uncertain, confused, less ambitious, and who do not see the value of school to their future can be expected to do worse as young adults in the labour market than comparable peers (Mann, Denis and Percy, 2020[2; Covacevich et al., 2021). Teenagers' plans many times do not reflect labour-market demand (Mann et al.,2020). In addition, their aspirations can be narrowed and influenced by social background and it is students from the lowest socio-economic backgrounds and achievement levels who exhibit thinking that generates greatest concern (Mann, Denis and Percy, 2020[2]). As a result, they often enter the workforce with a weak understanding of their potential, increased uncertainty, an unclear career outlook, and insufficient employability and career management skills. Conversely, early access to quality career guidance services plays a critical role in helping young people form more realistic and informed aspirations, prepare effectively for the labor market, and navigate the transition from education to employment more successfully.

Key concepts - indicators of teenage career readiness include:

Career readiness refers to the "capacity of young people to approach labour market entry and imagine career progression from an informed and confident perspective based on critical engagement with the world of work" and be successfully prepared for transitions into, and

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navigation through, future working lives, deploying the knowledge, skills and qualifications developed in education and training systems" (Mann, Denis and Percy, 2020).

Career certainty refers to articulation, as a teenager, of an occupational ambition or career expectation for adult life. It does not require occupational expectations to be fixed, but for a student to have a view on the type of job they envision in adulthood (Mann, Denis and Percy, 2020).

Teenage **career uncertainty** – the inability as a teenager to name an expected adult occupation – has been associated with adult economic penalties (Mann, Denis and Percy, 2020[2]).

Career ambition, defined as the expectation of working in a job classified as managerial or professional, has been associated with positive adult employment outcomes such as higher earnings, reduced unemployment, and greater career satisfaction, even after controlling for background variables (Green et al., 2017[76]; Schoon and Polek, 2011[77]).

Career alignment refers to young people having educational plans that are aligned with their occupational ambitions (Mann, Denis and Percy, 2020[2]), while career misalignment refers to teenagers whose educational plans are not aligned with their occupational ambitions. Misalignment can be conceived as confusion about the labour market and specifically the levels of education and qualifications that are typically required to access desired employment (Covacevich et al., 2021[3]).

Student motivation plays a crucial role in shaping future labor market success. It can be classified into two main types:

- **Internal motivation**, which arises from personal interest, enjoyment, and the inherent rewards of learning.
- **External or instrumental motivation**, which is driven by anticipated external outcomes, such as future job opportunities or financial rewards.

While both types are important, **instrumental motivation** has been found to strongly influence course and career choices, academic achievement, and long-term outcomes. It is linked to better career prospects, lower chances of becoming NEET (Not in Education, Employment, or Training), and higher adult earnings.

Career originality is a new concept - indicator (Covacevich et al.,2021, referring to whether the career expectations of students can be considered more or less original, compared with those of their peers.

The *Career Readiness Project* brings to the forefront current concerns, challenges, and opportunities in bridging the gap between education and employment. It emphasizes the urgent need for early development of career readiness and lifelong career management skills to cultivate a workforce that is truly prepared for the future of work.

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Workforce generational changes

Gen Y & Z in the Changing World of Work

The new generations, and in particular the Millennial generation (Generation Y) and Generation Z, already face an entirely different reality in the labour market due to the rapid technological advancements and workplace transformations brought about by the Fourth Industrial Revolution. Young people belonging to these generations differ significantly from previous generations (Generation X and Baby Boomers) as well as from each other in terms of values, attitudes, expectations, and work styles, which reflect their worldview and how they interact with it. They are often described by the term “Generation Slashers[2],” as they simultaneously or consecutively engage in multiple professional activities, maintaining several sources of income.

Generation Y (Millennials) born roughly between 1980 - 1994, includes individuals who grew up during the rise of the internet, with access to computers and digital tools. They are socially conscious, confident, and value teamwork, preferring collaborative, trust-based work environments. They seek meaningful work, creative roles, and appreciate immediate feedback. instant feedback. Often employed in knowledge-based positions, they tend to take personal responsibility for maximizing the value and effectiveness of their contributions.As they are unwilling to stay in the same job for long, their career paths are increasingly dynamic, fluid, and less predictable. They possess intercultural awareness and consider themselves global citizens. They prefer flexibility, flexible work schedules, and collaboration over competition. They bring an entrepreneurial mindset to the workplace and are not afraid to take risks and follow their dreams.(Strauss & Howe, 2000, Twenge, 2006, Huyler, Debaro et al., Bondar, 2017).

Generation Z, also known as the iGeneration iGeneration, Μετά-Millennials, Gen Tech, Gen Wii, Homeland Generation, were born roughly between 1995 and 2015. Generation Z is the first cohort to have had direct access to the internet from a very young age. As true *digital natives*, they have developed a seamless relationship with technology and grown up immersed in a world of constant mobile and online connectivity (e.g., YouTube, social media) (Prensky, 2001; Turner, 2015; Twenge, 2017). Their worldview is shaped by the unique conditions of their time—marked by economic uncertainty and rapid technological change—making them more pragmatic about job opportunities and more cautious about risk. They tend to prioritize stability and financial security, yet also value flexibility, remote collaboration, and the ability to work fluidly across digital platforms. Gen Z expects their contributions to be recognized and respected, and they are less tolerant of rigid hierarchies or authoritarian corporate cultures.

[2] The term was introduced in 2007 by American journalist Marci Alboher in her book "One Person/Multiple Careers: A New Model for Work/Life Success" where she describes a group of people who are experienced in "multiple jobs" or "poly-activity". This term comes from the sign (/) that separates the different jobs that a person holds or has held at the same time. We also encounter the term "moonlighting", which describes taking on a second job or more jobs in addition to full-time employment. The number of slashers has increased today due to the infinite opportunities offered by new technologies, forming an emerging alternative career path, known as the flasher career.

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Making a meaningful impact is important to them, and they seek work environments that align with their values and allow them to contribute purposefully.

Both generations are increasingly participating in the gig economy, preferring project-based work over traditional full-time roles. Many enjoy the freedom and adaptability it offers, while some observers suggest that the economic recession pushed young people in this direction. Whether by choice or necessity, the increasing prevalence of flexible and temporary forms of work (gig works) raises multiple questions about both the new skills that workers are required to demonstrate and the skills that they may be "abandoning", especially those required and reinforced in a more conventional work environment (e.g. communication, leadership and teamwork skills).

On the other hand, the term **"Generation Flux"** was coined by Robert Safian, the Editor of Fast Company magazine from his many interviews with successful business leaders[3]. Generation Flux describes a group of people who are not defined by their chronological age but by their willingness and ability to adapt, their positive attitude toward instability and uncertainty, and by the fact that they not only tolerate but actually enjoy the re-tuning of their career paths and the redefinition of their goals and activities. They possess an open mindset toward new ideas, value meritocracy, and approach their careers through the variety of projects they undertake (project-to-project careers). These are creative individuals who have discovered the antidote to boredom, burnout, job insecurity, and many other challenges in the modern labor market. While Baby Boomers often complain about the pace and direction of change, younger generations like Gen Y and Gen Z, along with those who exhibit the characteristics of Generation Flux, are seizing every opportunity—leveraging the endless possibilities brought by new technologies and innovation—to the benefit of all types of businesses.

Additionally, **intrapreneurship**—where employees act entrepreneurially within organizations—is on the rise. Intrapreneurs take initiative, innovate, and transform ideas into profitable ventures. It is known as the practice of a corporate management style that incorporates the risk-taking and innovation approaches, as well as the reward and motivation techniques, which are traditionally considered to constitute entrepreneurship. Pinchot (1984) characterized "intranspreneurs" as "dreamers" who act and take responsibility for creating any form of innovation within a company. Studies suggest that personality traits (like extroversion), work values (like creativity), and sociocultural factors (like individualism) influence the degree to which employees exhibit intrapreneurial behavior, making this a valuable asset for organizational success (Pinchot, 1984; Sinha & Srivastava, 2013).

[3] https://www.fastcompany.com/1802732/generation-flux-meet-pioneers-new-and-chaotic-frontier-business

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Upskilling and reskilling strategies for sustainable and resilient careers

Rethinking Lifelong Learning/Career pathways within Industry 4.0

Rethinking lifelong learning and career pathways within Industry 4.0 involves shifting from linear, qualification-based models to flexible, modular, and personalized learning journeys. As digital transformation reshapes jobs and skill demands, individuals must continuously upskill and reskill through micro-credentials, online platforms, and hybrid learning formats. This new paradigm emphasizes adaptability, self-directed learning, and the integration of both technical and soft skills, enabling individuals to navigate dynamic career pathways to maintain employability in an ever-evolving labour market. Career guidance must support this shift by promoting flexible learning mindsets and mapping diverse, inclusive pathways for sustainable career development towards personal and professional welfare. Individuals need to be supported in mapping modular learning options that correspond with labour market trends, identifying opportunities for credential accumulation, and navigating non-traditional routes to employment. This approach emphasizes adaptability, employability, and a proactive learning mindset as key to success in Industry 4.0.

Microlearning

Microlearning is a novel educational strategy that focuses on learning new information in small units. This approach to learning breaks down topics into short-form, standalone units of study that the learner can view as many times as necessary, whenever and wherever they need. Microlearning fits well within the context of digitized education. Its flexibility and adaptability make it a good match for the kinds of short, attention-limited spans that today's learners tend to have. Several studies have shown that microlearning improves knowledge retention, lowers cognitive load, and allows learners to consume content at their own pace. These studies have established microlearning as a highly effective and flexible modern pedagogical practice. The dissemination of microlearning is now largely in the hands of digital tools—mobile apps, e-learning platforms, and social media—making it more accessible and convenient than ever before (Mostrady et. al., 2024).

Microlearning offers targeted, just-in-time learning opportunities that align well with the dynamic and fast-paced demands of the Industry 4.0 labour market. It supports the development of digital and soft skills through short, focused modules that are easy to access via mobile or digital platforms. For career guidance, it enhances learner engagement and autonomy, allowing individuals to upskill or reskill quickly based on their personal career goals and evolving industry needs. Microlearning also supports lifelong learning by making continuous education more manageable and relevant.

Despite its advantages, microlearning has **limitations**, particularly when it comes to developing deep, critical thinking or complex problem-solving skills, which often require more extensive engagement. Fragmented content can also hinder the integration of knowledge if not

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well-structured within a broader learning path. Additionally, there may be issues with digital access and literacy, especially among vulnerable or underserved populations. In career guidance 4.0, practitioners must carefully curate and contextualize microlearning resources to ensure they contribute meaningfully to personal growth and career development.

Micro-credentials for lifelong learning and employability

On 16 June 2022, the Council of the European Union (EU) adopted a Recommendation on a European approach to micro-credentials for lifelong learning and employability (2022/C 243/02). The Recommendation seeks to support the development, implementation and recognition of micro-credentials across institutions, businesses, sectors and borders.**'**

Micro-credential' means the record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes will have been assessed against transparent and clearly defined criteria. Learning experiences leading to micro-credentials are designed to provide the learner with specific knowledge, skills and competences that respond to societal, personal, cultural or labour market needs. Micro-credentials are owned by the learner, can be shared and are portable. They may be stand-alone or combined into larger credentials. They are underpinned by quality assurance following agreed standards in the relevant sector or area of activity. **Providers of micro-credentials'** may be education and training institutions and organisations, social partners (i.e. organisations representing workers and employers), employers and industry, civil society organisations, public employment services (PES) and regional and national authorities, and other types of actors designing, delivering and issuing micro-credentials for formal, non-formal and informal learning.

Micro-credentials certify the learning outcomes of short-term learning experiences, for example a short course or training. They offer a flexible, targeted way to help people develop the knowledge, skills and competences they need for their personal and professional development. Micro-credentials can also support the professional development and mobility of workers, including people in non-standard forms of work, such as those in the platform economy, who may have difficulties accessing training depending on their employment status.

Shorter forms of learning opportunities than traditional qualifications, such as micro-credentials, are being developed rapidly across Europe and around the world. These opportunities are made available by a wide variety of public and private providers in response to the demand for more flexible, learner-centred forms of education and training. They also have the potential to offer education and training opportunities to a wider range of learners, including disadvantaged and vulnerable groups.

The Recommendation provides building blocks including a definition, standard elements for describing micro-credentials, and principles for designing and issuing micro-credentials. As a result, micro-credentials can be developed, used and compared in a coherent way among Member States, stakeholders and different providers (from education and training institutions to

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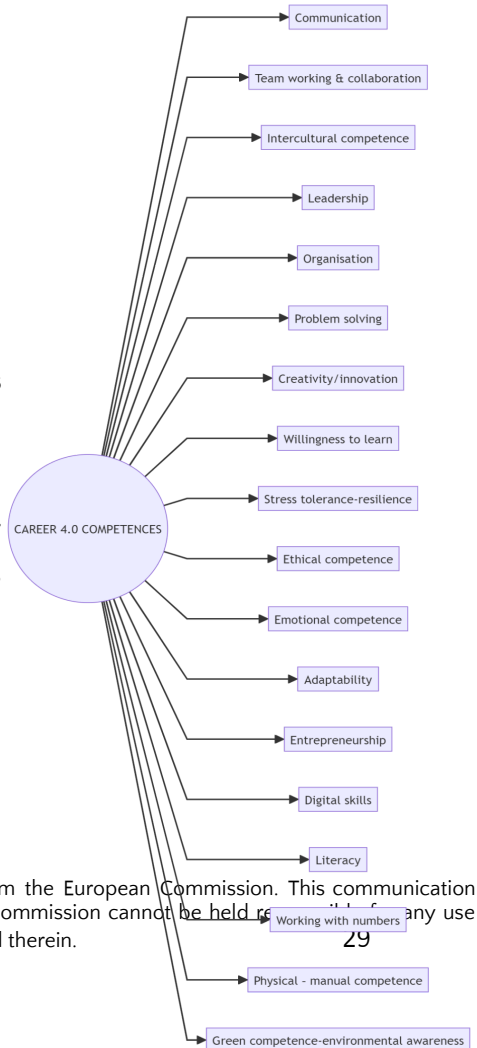
private companies) across different sectors, fields and borders. It will support the building of trust in micro-credentials across Europe.

Career Competencies to thrive in Industry 4.0 labour market - The Career Competencies 4.0 Framework

Industry 4.0 creates disruptive transformations in the operation of systems and processes, related to production, management, governance and services provision as a result of new and innovative technological developments (Davies, 2015; Schwab, 2016). As entire industries adapt and new ones are born, many professions may become extinct or will undergo a fundamental transformation (World Economic Forum, 2016, McKinsey Global Institute, 2017; ILO 2018; WEF, 2016; Frey, Osborne, 2013; Kergroach, 2017). On the other hand, espite high unemployment, many employers struggle to find candidates with the right competencies, highlighting widespread skills mismatches. Research by OECD, CEDEFOP, and others confirms that talent gaps are affecting business performance across Europe. In this context, today's youngsters and students, being at the starting point of their careers, will face unpredictable changes in the labour market, including new types of jobs and tasks, or professions that do not exist today.

The 4th Industrial Revolution is reshaping the world of work, with automation, AI, and globalization demanding a new blend of technical, cognitive, and social-emotional skills. Research by the WEF, OECD, ILO, and McKinsey highlights rising demand for complex problem-solving, adaptability, critical thinking, digital literacy, and collaboration. Soft skills like communication, resilience, and leadership are increasingly essential alongside technological skills. Job tasks are shifting toward creativity, innovation, and people-oriented roles, while routine physical and cognitive tasks are declining. Cedefop and Eurofound stress that future employment growth is tied to jobs requiring high-level cognitive and interpersonal skills. Career Management Skills (CMS) and career readiness frameworks emphasize lifelong learning, self-efficacy, and decision-making for navigating complex labour markets.



The **Career Competencies 4.0 Framework**, validated through focus groups with employers and VET stakeholders, **defines the key hard and soft skills needed to adapt to ongoing structural changes in the global labour market**.

It comprises **18 competencies:** Communication, team working and collaboration, intercultural competence, leadership, organisation, problem solving, creativity and innovation, willingness to learn, stress tolerance and

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resilience, ethical competence, emotional competence, adaptability and flexibility, entrepreneurship, ICT and digital skills, literacy, numeracy skills (working with numbers), physical and manual competence, green competence and environmental awareness.
The aim of the framework is to help individuals align their career choices and aspirations with the rapidly evolving demands of the labour market and to support effective career navigation. It outlines a set of business-oriented hard and soft core skills relevant to the globalised labour market, drawing primarily on internationally recognised definitions from sources such as ESCO, OECD PIAAC, and the EU Key Competences Framework. Establishing a common understanding and shared language around future-oriented skills and competencies is essential for effective skills profiling and matching. Each competency is defined through two dimensions: **Learning Outcomes**, which describe the measurable knowledge, skills, and attitudes acquired through education or training, and **Labour Outcomes**, which reflect the impact of these competencies on employability, career progression, and alignment with labour market needs. Together, they ensure relevance for both curriculum design and workforce readiness.
The general theoretical background for the development of the Careers 4.0 Competencies Framework, recognises the importance of the lifelong learning in the global workplace environments, that addresses not only the cognitive, the emotional dimensions but also the social dimension of learning and skills development and the need to fully map the qualities and abilities of the individual who is required to perform adequately and flexibly in both familiar/routine and unfamiliar/unusual situations.

STEAM skills to thrive within Industry 4.0

In the era of **Industry 4.0**, which is characterized by large scale digital transformations due to automation, artificial intelligence, the Internet of Things (IoT), robotics, big data, and cyber-physical systems, **STEAM skills**—Science, Technology, Engineering, Arts, and Mathematics—play a central and transformative role. These interdisciplinary skills form the foundation for innovation, adaptability, and human-centric design in the digital economy.

- **Science & Engineering** provide analytical and problem-solving capabilities that are crucial for developing and managing smart systems, robotics, and sustainable industrial processes.
- **Technology** equips individuals with the ability to use, create, and adapt digital tools—essential for data analytics, programming, cybersecurity, and digital manufacturing.
- **Mathematics** underpins data analysis, algorithm design, and optimization, all of which are at the core of Industry 4.0 systems and decision-making processes.
- **Arts (Creative Thinking & Design)** introduces *creativity, empathy, and user-centric design* into technical fields, promoting innovation, communication, and ethical perspectives in technology development.
- **Interdisciplinary Thinking**: STEAM fosters collaboration across fields, which is vital in solving complex, systemic challenges such as sustainability, health tech, or smart cities.

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Also, in the context of Industry 4.0 and the rapidly evolving world of work, **STEAM** skills play a crucial role not only in technical proficiency but also in shaping **adaptive, creative, and resilient individuals**.

- Adaptability: STEAM learning cultivates critical and systems thinking, which helps individuals understand and respond flexibly to complex, uncertain environments. By engaging with open-ended problems and cross-disciplinary challenges, learners build confidence to pivot, reskill, or innovate as technologies and job roles evolve.
- Personal Growth: The integrative nature of STEAM encourages lifelong learning and self-reflection. Science and engineering develop logic and inquiry, while the arts and mathematics nurture introspection and ethical reasoning—skills that are essential for setting personal goals, making informed decisions, and navigating career transitions.
- Creativity: STEAM bridges logic and imagination. The inclusion of the Arts stimulates divergent thinking, storytelling, design, and innovation. This combination allows individuals to approach problems from new angles, envision possibilities, and contribute uniquely to technological and societal advancements.
- Resilience: By tackling iterative design processes, failure analysis, and experimentation, STEAM learners develop perseverance and a growth mindset. They learn to view setbacks as opportunities to learn and improve—essential traits in volatile, uncertain, complex, and ambiguous (VUCA) environments.

Within Career Guidance 4.0, STEAM education supports the development of employability and lifelong learning skills, promotes digital inclusion, and prepares individuals for green and digital transitions. Counselors are thus encouraged to promote STEAM pathways not only for technical professions but also for nurturing soft skills such as creativity, resilience, and adaptability, which are crucial in an evolving labor market.

Digital career management skills

Career management is an ongoing process of preparing, implementing, and monitoring career plans. Career management skills (CMS) refer to a range of competences which provide structured ways for individuals (and groups) to gather, analyse, synthesise and organise self, educational and occupational information, as well as the skills to make and implement decisions and transitions. Career management skills are the life, learning, training and employment skills which people need to develop and manage their careers effectively (European Lifelong Guidance Policy Network, 2014). According to Cedefop career management skills cover the following aspects: personal management (self-assessment of one's knowledge, capacities, interests, needs); learning path management (involvement with learning, and understanding the connection between learning and work); and career management (assess data about learning and employment opportunities, facilitate successful transitions between education or training pathways, and between education or training and work) (Cedefop; Council of the European Union, 2008; ELGPN, 2012; ELGPN, 2015).

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As the world of work becomes increasingly digital, traditional Career Management Skills (CMS) must evolve to meet the demands of the Industry 4.0 era. This shift calls for the integration of **Digital Career Management**, referring to the ability to effectively use digital tools and platforms to plan, develop, and navigate one's career in a rapidly evolving, tech-driven labour market. In this context, **Digital Career Management Skills (DCMS)** refer to the competencies individuals need to effectively manage their career development in the context of a digitally-driven labour market. These skills go beyond traditional career management and incorporate the ability to navigate digital tools, platforms, and data relevant to career planning, job searching, and lifelong learning. DCMS include digital literacy, online self-presentation, digital professional identity management, use of social media, information searching, digital job searching, continuous e-learning, virtual professional networking, digital self-employment and engaging with digital career guidance services. It's about navigating the digital world effectively for career development and lifelong learning.

As work becomes increasingly digital and decentralized, DCMS are essential for career resilience and employability in the digital age, to empower individuals navigating complex transitions, as well utilising technology tools and resources to design meaningful career paths.. In the Career Guidance 4.0 context DCMS are a central pillar for lifelong career development because:

- careers are no longer linear so individuals must continuously adapt, upskill, and rebrand.
- digital recruitment dominates and employers search, recruit, and vet candidates online.
- remote work and freelancing have increased the need for autonomous future-informed career navigation.
- digital skills gaps affect access to opportunities—those lacking DCMS may face exclusion.

Career guidance practitioners need to introduce DCMS elements into guidance programmes and services, aiming to the development of digital career management skills. Structured activities using digital career planning tools, such as e-portfolios, goal setting dashboards, progress tracking etc. as well as digital self-assessment can help individuals to map strengths, transferable competences, and gaps acquired across formal, non-formal, and informal settings. Provide motivation towards online microlearning navigation, utilising MOOCs, micro-credentials, and virtual e-learning platforms helps to personalise upskilling pathways and sustain long-term employability. Also, the integration of activities to develop digital job search skills, such as preparing e-CVs and social-media profiles, craft professional self-presentation videos, practise AI-mock interviews, monitor job-platform alerts and talent-marketplaces to equip clients responding rapidly to future-oriented career opportunities available.

Online Interactive Resources

OECD Teenage Career Readiness Dashboard

https://www.oecd.org/en/data/dashboards/teenage-career-readiness.html

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The Dashboard sets out data from the 2022 round of the OECD Programme for International Student Assessment (PISA) which included an unprecedented range of questions related to career development. The dashboard provides comparative data in relation to teenage occupational expectations (top 10 job plans for girls and boys), participation levels in career development activities and attitudes exploring confidence in career progression for all countries participating in PISA 2022. Many of the data points relate to predictors of better employment outcomes linked to teenage career development as identified within OECD analyses of longitudinal datasets in multiple countries. Longitudinal predictors group around the ways in which students actively explore potential futures in work, gain experience by undertaking tasks in workplaces, and think about their future plans. Within the dashboard, details are given of the specific questions and statements to which students responded. Links to wider relevant analyses are also provided. PISA 2022 data was collected from some 690 000 students aged 15-16 resident in 80 countries and economies. Data for all questions is not always available for every participating jurisdiction. This is the first time that comparative international data on teenage career development has been so easily available.

AI Online Interview Practice Tool
https://www.finalroundai.com/ai-mock-interview

Crafting Your Professional Summary + Creating a Video Pitch to Stand Out in Your Job Search
https://www.youtube.com/watch?v=Jc3MnfMJjIQ

Resources for further study

https://www.oecd.org/en/about/projects/career-readiness.html

The OECD Career Readiness project is designed to provide new advice to governments, schools, employers and other stakeholders on how to best prepare young people to visualise, plan and prepare for their working lives. Drawing on international datasets, the project identifies forms of career development that can be expected to enhance ultimate employment outcomes.

The project offers advice on how career guidance can be used strategically to address social inequalities, enable progression towards high priority occupational areas such as green jobs and develop student motivation and success. The team collaborates with jurisdictions to review guidance systems and share best practices.

Microlearning

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Industry 4.0 Entrepreneurship: Essential Characteristics and Necessary Skills

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Self-evaluation Questions

The following targeted multiple-choice questions are designed to help you evaluate your understanding of the first module of the course. They encourage you to reflect on the educational material presented in Module 1 and to assess how well you have grasped the basic concepts and theoretical background.

Which of the following best reflects the aim of Career Guidance 4.0 in empowering individuals?

A. To support individuals in navigating unpredictable career paths with adaptability and resilience
B. To encourage passive reliance on guidance professionals for career decisions
C. To help individuals secure lifelong employment in a single organization
D. To prioritize employer needs over individual career development

Correct Answer: A

What is a key characteristic of self-directed career learning in the digital age?

A. Dependence on formal education institutions for all career decisions
B. Waiting for external feedback before initiating any career move
C. Taking personal initiative to explore, plan, and manage one's career path using available resources
D. Avoiding technology when making career choices

Correct Answer: C

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Which of the following statements is TRUE?

A) Career readiness means having fixed occupational expectations from a young age.
B) Career ambition is not related to long-term employment outcomes once background factors are considered.
C) Career misalignment reflects a lack of understanding of the educational requirements for desired jobs.
D) Teenage career certainty requires young people to commit to a single career path for life.

Correct Answer: C

Which of the following is *not* considered a digital career management skill?
A. Creating a professional digital identity
B. Writing paper-based resumes for local job fairs
C. Monitoring job alerts on digital platforms
D. Engaging in virtual professional networking

Correct Answer: B

How do STEAM skills contribute to career adaptability in Industry 4.0?
A. By focusing solely on technical skills in STEM disciplines
B. By combining technical expertise with creativity and problem-solving
C. By replacing the need for traditional education pathways
D. By eliminating the importance of soft skills in employment

Correct Answer: B

What is the primary benefit of microlearning in the context of upskilling?
A. It promotes long, detailed academic courses
B. It focuses on rote memorization of outdated skills
C. It provides flexible, short-form learning aligned with evolving career needs
D. It discourages autonomy and lifelong learning

Correct Answer: C

Reflection Activities (Module 1: 6 activities)

The reflection activities and case studies are designed to enhance your experiential learning by motivating you to answer specific questions that connect your personal, professional, and social experiences with the conceptual knowledge provided in each module.

Activity 1: Case Study – Navigating Career Change in a Digital Economy

Activity Type: *Case Study*

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Learning Goals:

- *Deepen understanding of transitional labour markets and the evolving nature of careers in the context of digital transformation.*
- *Apply contemporary career development theories (e.g., Career Construction Theory, Protean and Boundaryless Career Theory, Social Cognitive Career Theory) to real-life transitions.*
- *Reflect on and propose guidance strategies that foster career adaptability, resilience, and self-efficacy in the face of automation and digitalisation.*

Expected Outcome: *Trainees will be able to identify the personal and systemic challenges associated with career disruption, assess internal and external resources for adaptation, and formulate meaningful, digitally relevant, and inclusive guidance pathways tailored to individual needs—especially for adults in mid-career transitions.*

Specifications:

- *Individual or Pair Activity*
- *Duration: 45–60 minutes*

Scenario:
Maria, 43, recently lost her job as an administrative assistant due to automation. She feels uncertain about her digital skills and lacks confidence in navigating online work tools and platforms. She is motivated to return to the workforce but is unsure whether to pursue a formal qualification or take advantage of short-term micro-credentialing programs. Maria is also concerned about the relevance of her past experience in the current job market.

Instructions for Trainees:

Drawing on the Career Guidance 4.0 framework and theories such as Career Construction Theory (Savickas), Protean Career Theory (Hall), Social Cognitive Career Theory (Lent & Brown), and the Strengths-Based Approach, respond to the following:

1. ***Analyse the scenario by identifying Maria's key challenges*** *and* ***her personal resources****.*
2. ***Propose two tailored pathways for Maria's upskilling and career development****, drawing from concepts such as microlearning, blended digital training, or co-careering communities.*
3. ***Reflect on group discussion or writing (300–400 words):***
    - *Based on your professional experience working with adults in career transitions, what guidance principles and tools would you apply to empower someone like Maria?*
    - *Consider how you would integrate digital tools, narrative techniques, and inclusive practices to foster agency, adaptability, and meaningful career construction.*

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- *How would you Incorporate strategies that reflect the values and learning preferences of adult learners in transition, particularly Gen Y and Gen Z*

Facilitator Tips: Encourage a group discussion to explore:

- how theoretical models helped shape trainees' understanding of the case.
- what assumptions or biases may arise when supporting clients with low digital literacy or disrupted career paths.
- how to create inclusive and psychologically safe environments for clients to re-imagine their careers.

Activity 2: ***Updated career pathways – Connecting Holland's Personality Types with Industry 4.0 Skills and Future Careers***

Activity Type: *Case Study*

Learning Goals:

- To help trainees understand the relationship between personality types and evolving career opportunities.
- To explore how Industry 4.0 impacts job roles across different personality profiles.
- To identify future-oriented skills relevant to each Holland type.

Expected Outcome: *Trainees will be able to*

Trainees will be able to:match Holland personality types with potential Industry 4.0 occupations., recognize essential ESCO and soft skills linked to their career interest type, reflect on personal and clients career goals in the context of future labor market trends.

Specifications:

- *Individual or Pair Activity*
- *Duration: 45–60 minutes*

Scenario:
Imagine you're exploring your future career in a world rapidly shaped by digital transformation and automation. Holland's Personality Types offer a starting point to understand your interests. Industry 4.0 offers a future-focused landscape of careers driven by technology and innovation. Your task is to bridge the two by identifying which new careers and skills align with your personality.

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***Matching Holland's Personality / Interest Types with the* ESCO & *Industry 4.0 skills* and occupations**

Realistic			
Description of type: Commonly has athletic or mechanical ability and prefers to work with objects, machines, tools, plants or animals, or to be outdoors. Likes to work with things as opposed to ideas or people and has preference for concrete problems over abstract issues.	**Key skills:** Hard skills: Mechanical skills, ICT skills, Technical Skills Soft skills: Organisation, adaptability, willingness to learn, Creativity Professional skills: Using and operating tools, equipment and machinery, designing, building, repairing, maintaining, working manually, measuring, working in detail, driving, working with plants	**Relevant ESCO Occupational sectors/ occupations** Science and Engineering Associate Professionals/ Information & communications professionals/ Science and Engineering Professionals/ Production and Specialized Services Managers/ Protective Services Workers/ Market-oriented Skilled Agricultural Workers/ Market-oriented Skilled Forestry, Fishery and Hunting Workers/ Subsistence Farmers, Fishers, Hunters and Gatherers/ Building and Related Trades Workers (excluding electricians)/ Metal, Machinery and Related Trades Workers/ Handicraft and Printing Workers/ Electrical and Electronics Trades Workers/ Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers/ Stationary Plant and Machine Operators/ Assemblers/ Drivers and mobile plant operators, Cleaners and Helpers/ Agricultural, Forestry and Fishery Labourers/ Labourers in Mining, Construction, Manufacturing and Transport/ Food Preparation Assistants/ Street and Related Sales and Services Workers/ Refuse Workers and Other Elementary Workers *Indicative occupations: Electrical engineering technician, mechanical engineering technician, electronics engineering technician, pilot, farmer, fisher, horticulturalist, builder, armed services personnel, mechanic, upholsterer, electrician, computer technologist, park ranger, sportsperson, chemical processing plant controller, metal furnace operator, aquaculture production manager, food production operator, animal feed operator, food safety specialist, street food vendor, food preparation assistant, paper slitter operator, block machine operator, surface miner, firework assembler, furniture assembler, photographic equipment assembler, leaflet distributor, building cleaner, room attendant*	*New occupations in the context of Industry 4.0* *Automation Technician, CAD Technician (Computer-Aided Design), Quality Control Inspector, Cybersecurity Analyst, Data Analyst, UX/UI Designer (User Experience/User Interface), Science and Engineering Professionals, Artificial Intelligence Engineer, Renewable Energy Engineer, Supply Chain Manager, Operations Manager, Cybersecurity Incident Responder, Digital Forensics Analyst, Precision Agriculture Technician, Smart Fisheries Technician, Agri-Tech Consultant, Building Information Modeling (BIM) Technician, Smart Manufacturing Technician, Digital Print Operator, Smart Home Installer, Smart Factory Technician, Industrial IoT Operator: Robotics Assembler, Autonomous Vehicle Operator, Smart Cleaning Technician, Precision Farming Labourer, Automated Kitchen Assistant, E-commerce Fulfillment Associate, Smart Waste Management Technician, Renewable Energy Specialist, Healthcare Robotics Engineer, Digital Operations Supervisor*

Instructions for Trainees:

Drawing on the Holland's career theory, reflect on the following:

1. *Using the provided table, answer the following questions and prepare the same table for Social Personality type :*
    - *What key skills (hard, soft, and professional) are associated with your personality type?*
    - *Which Industry 4.0 jobs relate to your type?*
    - *How do your personal interests align with these emerging roles?*
    - *Which traditional and hybrid Industry 4.0 occupations resonate with your type?*
    - *Can you find a role that blends two or more RIASEC traits? Describe how those traits show up in the job.*
    - *How would you use this update to enhance a client's career readiness?*
2. *Present your findings or discuss with co-trainees.*

Facilitator Tips: Encourage a group discussion to map their Holland type to both traditional and hybrid Industry 4.0 roles, explore how digital transformation touches every domain, and develop a personalized, lifelong-learning career roadmap that balances interest, emerging skills, and real-world labour-market trends.

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Activity 3: Simulation – Designing a Digital Career Identity

Activity Type: Simulation Exercise

Learning Goals:

- Explore digital career management skills
- Understand the role of online presence in employability
- Apply the principles of co-careering and strengths-based digital engagement in guidance practice

Expected Outcome:

Trainees will

- design a basic digital profile strategy and reflect on the implications of digital career identity construction
- consider how to empower younger and older clients to create authentic and strategic professional presences in a rapidly changing labour market.

Specifications:

- *Individual activity*
- *Duration:* 60–75 minutes

Scenario:
You are a career counselor working with George, a recent graduate who is struggling to create a digital professional identity. Although he is active on social media, he feels overwhelmed by career platforms and uncertain about what content or tone to use in building a credible and attractive profile for employers or collaborators. He is unsure where to begin, how to express personal strengths, or how to differentiate himself online.

Instructions for Trainees:
Informed by the co-careering approach, Career Guidance 4.0, and theories such as Boundaryless Career Theory, Strengths-Based Approach, and Narrative Career Counseling, complete the following steps:

- Explore platforms such as LinkedIn, Europass, or others. Identify 2–3 examples of effective digital profiles relevant to George's field. Note how individuals present themselves in terms of tone, values, skills, and personal branding.
- Based on your observations, prepare a brief digital identity-building guide for George, including actionable first steps George can take to begin building his profile and tips on how to express personal strengths and values authentically.
- Draft a sample summary that George could adapt for his online profile, reflecting both his strengths and his goals, while also appealing to potential employers or collaborators.
- *Reflect on group discussion or writing (300–400 words):*

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- How would you support George in maintaining and evolving his digital presence over time?
- How can co-careering principles guide his learning and identity-building process?
- Reflect on your own practices as a counselor: What lessons from your experience could help someone like George gain confidence and direction?
- How the role of the guidance practitioner is enriched to facilitate digital empowerment, especially for Gen Y and Z clients?

Facilitator Tip: Invite volunteers to present their summaries and offer peer feedback using a positive, strengths-based framework. Use this opportunity to model a **co-careering environment**, where shared learning and mutual support are central.

Activity 4: Reflection Journal – My STEAM Story

Activity Type: Personal Reflection Journal

Learning Goals:

- Recognize the role of interdisciplinary interdisciplinary STEAM (Science, Technology, Engineering, Arts, Mathematics) skills in fostering career adaptability, innovation, and resilience.
- Connect conceptual knowledge of career development theories - including Career Construction Theory, Social Cognitive Career Theory, Strengths-Based Approach, and the Psychology of Sustainability - with personal and professional experiences.
- Promote critical self-awareness regarding transferable competencies and client career development strategies in digitally evolving labour markets.

Expected Outcome:

Trainees will:

- identify and reflect on their own STEAM-related strengths and how they've shaped past or future career paths
- gain deeper insight into how to support clients in identifying and applying their own interdisciplinary strengths as part of personalized, future-focused guidance.

Specifications:

- *Individual activity*
- *Duration:* 45 minutes

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Instructions for Trainees:

Draft a personal reflection based on your own experience using a STEAM-related competency to address a work-related challenge or help a client. Use the guiding questions below to structure your reflection:

1. What was the situation or challenge you faced in your career practice or personal development?
2. Which STEAM-related skills did you apply—directly or indirectly—in that situation? How?
3. How did the use of that skill or mindset impact the outcome or learning process?
4. How might you support a client in identifying their own latent or under-recognized STEAM potential, especially in the context of career transition or upskilling?

Facilitator Tip: Encourage participants to consider broad and inclusive interpretations of STEAM: technical proficiency (e.g., using software), analytical thinking, problem-solving, visual design, or even creative storytelling (e.g., helping a client improve a portfolio or CV).

Activity 5: Group Roleplay – Supporting the self-directed career management

Activity Type: Roleplay (Group Work)

Learning Goals:

- Apply contemporary career development theories such as Career Construction Theory, Social Cognitive Career Theory, Strengths-Based Approach, and the Co-constructing Approach—to support self-directed learning and career management.
- Practice counseling strategies to enhance client empowerment, autonomy, adaptability, and motivation to navigate complex educational and professional decisions.

Expected Outcome:

Trainees will develop greater confidence and competence in guiding clients through self-directed learning and career management challenges.

Specifications:

- *Individual or Groups of 3–4 trainees*
- *Duration:* 60 minutes

Scenarios: (choose one / one per group):

Arianna, 26, recently completed a degree in humanities and has worked part-time in marketing, arts education, and community organizing. She enjoys each field and struggles to commit to one

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direction. She's curious and enthusiastic, but also anxious about choosing "the wrong path." She has recently started browsing online courses in UX design, social impact entrepreneurship, and digital storytelling—but feels overwhelmed and unsure how to prioritize or combine these interests.
Your task as counselor is to help Arriana clarify her values, explore the possibility of hybrid paths, and develop strategies for self-directed learning without feeling paralyzed by indecision.

Mateo, 34, has been freelancing for six years as a videographer and editor. He enjoys the creative freedom but feels stuck in short-term gigs and constantly anxious about income. He wants to expand his skillset to include digital animation or coding, but lacks structure and is unsure how to plan for long-term growth. He's also unsure how to balance learning with client work.
Your task as counselor is to support Mateo in constructing a self-directed learning plan that fits his lifestyle, increases his resilience, and helps him develop a sustainable freelance identity aligned with his evolving career goals.

Nia, 41, recently returned to work after a career break and is currently employed in a support role at a logistics company. Her manager encouraged her to explore training options to qualify for a more strategic role. She's highly motivated but finds the array of online learning platforms, certifications, and micro-credentials confusing. She fears wasting time or making the wrong choice.

Your task as her counselor is to help Nia define her goals, understand her learning style, and create a realistic, personalized upskilling roadmap that builds her confidence and decision-making power as a self-directed learner.

Instructions for Trainees:

For individual activity - Choose one of the client scenarios. Imagine you are the career guidance practitioner supporting this individual.

For group activity - One person plays the counselor, one the client, and the others observe. Another option is each group designates a counselor, a client, and observers. After 15–20 minutes of roleplay, rotate roles or proceed to the debrief discussion.

Based on your theoretical knowledge and experience identify the following:

- What cognitive, emotional, or motivational challenges emerged in the client's narrative?
- Which theoretical framework or approach would have helped you most in supporting client's learning autonomy and career empowerment?
- Think about specific tools, methods, reflective questions, and action-oriented strategies you would use in practice to move from exploration to decision.
- How does this scenario relate to real-life client experiences in your practice?

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- Reflect on how you can support clients in managing complexity and building confidence in self-directed career management.

Facilitator Tip: Encourage the group to share how they see these frameworks applying across diverse client groups, especially with Gen Y and Z, who value agency, feedback, and flexible learning ecosystems.

Activity 6: Mapping tailored Entrepreneurial Ecosystem

Activity Type: Case study / mini project

Learning Goals:

- Explore entrepreneurial and digital self-employment pathways through the lens of Career Guidance 4.0.
- Develop an understanding of how guidance professionals can effectively support clients pursuing non-linear, portfolio-based, and sustainable self-managed career paths
- Identify national, local entrepreneurial ecosystems components (tools, supports, barriers) that influence clients' entrepreneurial success in industry 4.0, especially for underrepresented or transitioning groups undergoing significant changes in their employment status, life stage, or socioeconomic context (e.g. displaced workers, NEETs, older adults etc.)

Expected Outcome:

Trainees will identify resources that support entrepreneurship and reflect on how to guide clients toward self-employment and relevant resilient career choices in Career Guidance 4.0.

Specifications:

- *Individual or group activity (3–4 people)*
- *Duration:* 60 minutes

Scenarios: (choose one / one per group):

1, Lina, 24, recently completed a degree in communication and media. She is creative, tech-savvy, and eager to combine her skills in social media, photography, and event planning into a freelance or portfolio career. However, she lacks business experience, doubts her ability to attract clients, and doesn't know how to price her work or market herself. She's heard of platforms like Fiverr and Canva Pro but doesn't know how to position herself professionally.

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Your task: Map the digital tools, funding schemes (e.g., startup vouchers), and mentoring resources that could help Lina build a multi-skilled self-employment path. Consider the emotional and strategic support she needs to gain entrepreneurial confidence.

2. **Farid, 35, i**s a mechanical engineer from Syria who arrived in your country three years ago. He has limited knowledge of the local language and business regulations but a strong entrepreneurial spirit. He wants to open a bicycle repair and resale shop in his community. Farid struggles with paperwork, lacks formal business training, and has no local network or financial backing.
Your task: Explore programs that support migrant entrepreneurship, such as integration-focused incubators, multilingual resources, microloans, and digital tools for inventory or payments. Identify legal, social, and financial barriers he may face and map guidance strategies that promote inclusion and empowerment.

3. Sofia, 42, left her career in retail management to raise her children and is now ready to return to work—but not to traditional full-time employment. She wants to launch a small online business selling handmade wellness products and offering workshops in holistic health. She's comfortable with social media but unsure how to handle e-commerce logistics, digital branding, or bookkeeping.
Your task: Identify support services for women entrepreneurs, online marketplaces, local craft business networks, and basic digital business tools. Map opportunities for guided upskilling, mentoring, or business community engagement, as well as common challenges for returners like Sofia.

4. Theo, 21, is a content creator with a modest YouTube channel and freelance video editing gigs. He wants to monetize his skills more consistently but is unsure whether to focus on building a personal brand, offering services on freelance platforms, or starting a niche production business. He's tech-fluent but lacks strategic direction and worries about financial instability.
Your task: Map platforms (e.g., Upwork, Fiverr etc), digital branding tools, youth entrepreneur networks, and funding opportunities (e.g., innovation grants). Include non-traditional supports like co-creative communities or peer learning. Address mental well-being and sustainability in self-managed careers.

Instructions for Trainees:

For individual activity - Choose one of the client scenarios. Imagine you are the career guidance practitioner supporting this individual.

For group activity - One person plays the counselor, one the client, and the others observe. Another option is each group designates a counselor, a client, and observers. After 15–20 minutes of roleplay, rotate roles or proceed to the debrief discussion.

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Based on the client scenario chosen and drawing from the most relevant theoretical models and your professional experience, research and create a visual ecosystem map tailored to a client profile, mapping:

- Digital tools and platforms for self-employment (e.g., gig platforms, online marketplaces, e-portfolios, etc.).
- Local/regional/national opportunities (e.g., incubators, grants, social entrepreneurship hubs, digital skills programs, migrant support services, women-led business initiatives).
- Common challenges (e.g., legal, cultural, digital literacy, financial access) and propose inclusive strategies to overcome them (e.g., mentoring, strengths-based coaching, peer networks).
- Career guidance implications: Describe how you, as guidance professionals, can support this type of client in understanding the ecosystem, building entrepreneurial self-efficacy, and co-designing viable career paths.
- Present your findings with a visual map (e.g., diagram, flowchart, infographic) and a 5–7 minute presentation.

Facilitator Tip: Encourage trainees:

- to share how this mirrors their own or their clients' entrepreneurial journeys, and the ability to co-design their own flexible, purpose-driven career ecosystems..
- to share insights especially focusing on how the chosen theories and tools adapt to each client's unique circumstances.
- to discuss how career guidance practitioners can remain relevant in guiding dynamic and unconventional career journeys.

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Module 2: Emerging trends and technologies affecting the industry 4.0 labour market - Fostering Labour market intelligence and Data Literacy

Learning scheme

Module 2, "Emerging trends and technologies affecting the labour market/ Labour market intelligence and Data Literacy in industry 4.0 " aims to provide guidance practitioners, VET trainers, and social inclusion professionals with the necessary knowledge on understanding and applying labour market intelligence, data interpretation, and use of advanced labour market forecasting tools so as to be able to offer tailored services that address the evolving needs of individuals. Trainees will gain insights into the latest labour market trends and new, adapted guidance methodologies to better support diverse client groups in navigating the challenges and opportunities of Industry 4.0.

Learning Objectives:

This module will support trainees to:

- Understand the impact of Industry 4.0 technologies, such as automation, artificial intelligence (AI), and the Internet of Things (IoT), on reshaping industries, job roles, and skill demands in the labour market.
- Analyze the concepts of digital transformation, sustainable development, and the environmental perspective (green guidance), recognizing their influence on career guidance practices and labor market trends.
- Identify new non-standard forms of employment and work methods (e.g., gig economy, remote and hybrid work models, digital self-employment/crowd work, teleworking, multi-tasking, and multi-employer work) and their implications for career development.
- Familiarize with data-driven tools for assessing labor market needs, including analytics, forecasting, and how these tools support career guidance and planning.
- Process updated career information related to education, training, employment trends, new forms of work, future job prospects, and the evolving skill requirements in Industry 4.0.

Expected Learning Outcomes:

By the end of this module, trainees will be able to:

- Demonstrate and integrate knowledge of the impact of Industry 4.0 technologies and megatrends in providing career information.
- Develop or provide digital career information material presenting the current labour market trends and prospects, based on digital transformation, sustainable development and environmental perspective and other contemporary factors.Provide data-driven career advice based on labour market trends and future skills needs.
- Use data analytics to recommend emerging job roles and sectors in demand.
- Help clients navigate non-traditional employment forms (e.g., freelancing, gig work, and entrepreneurship).

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Key words: Industry 4.0, Labour Market Analytics, Automation, Artificial Intelligence, Internet of Things (IoT), Digital Transformation, Sustainable Development, Green Guidance, Gig Economy, New forms of Employment

Motivation Questions

- What are the key Industry 4.0 megatrends influencing future labor market trends and the evolution of occupations and tasks?
- How can understanding data-driven labour market trends enhance guiding individuals in navigating future career transitions?

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Theoretical background

Understanding Transitionary Labour Markets Concepts and Indicators - Implications for Career Guidance Practice

Introduction

Labour markets today are experiencing profound transformations driven by structural forces such as technological innovation, climate change policies, demographic shifts, globalization, and evolving work organization models. These transformations give rise to what are referred to as transitionary labour markets—dynamic systems characterized by continuous reallocation of jobs across sectors, occupations, and regions, accompanied by changing skill demands and patterns of employment stability.

For career guidance practitioners, understanding the mechanisms and indicators of transitionary labour markets is essential. It allows them to support individuals in navigating career transitions, respond effectively to labour market disruptions, and foster inclusive participation in emerging economic sectors.

Transitionary labour markets are defined by non-linear career trajectories, where individuals experience frequent transitions between employment, training, unemployment, self-employment, or different forms of atypical work. This complexity reflects both the diversification of employment forms and the increasing volatility in labour demand across sectors.

Structural change—such as the green and digital transitions—leads to the contraction of traditional industries (e.g., coal mining, fossil fuel-based energy) and the expansion of others (e.g., renewable energy, ICT, and care economy). These transitions are accompanied by both

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job destruction (JD) and job creation (JC), often co-existing within the same regional or sectoral context.

Industry 4.0 megatrends as drivers of labour market changes

The Fourth Industrial Revolution, or Industry 4.0, refers to a series of rapid transformations in the design, manufacturing, operation, and servicing of production systems and products. The term “4.0” signifies that this is the fourth industrial revolution globally, succeeding the previous ones by creating quantum leaps in productivity and fundamentally changing lives across the world.

According to the McKinsey Global Institute (2012), technological innovation enabled by artificial Intelligence is happening ten times faster and at 300 times the scale or roughly 3000 times the impact of the Industrial Revolution. New software can be shared globally by millions of people immediately, or in a matter of a few months, after its development, even though it can take time to implement it due to complex regulation and market fragmentation.

The convergence of technologies that connect the physical, digital, and biological worlds will affect all sectors, economies, and industries. It builds upon the digital revolution and combines multiple technologies that are driving unprecedented transformations in the economy, businesses, society, and individuals. The internet, new forms of energy, digital technologies, and automation are altering how businesses and economies function. The immense possibilities for data collection and analysis among machines now enable faster, more flexible, and efficient processes for producing higher-quality goods at reduced cost.

Industry 4.0 has six main principles:

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- virtualization (virtual replicas of physical tasks as digital data),
- interoperability (connecting machines via the internet, enabling them to communicate with each other, and with humans),
- decentralization (autonomous decision making ability of interconnected systems),
- real-time capacity (simultaneous flow of information between systems, for better and quicker decision making),
- service orientation (the ability of the system to provide services and functions to stakeholders),
- modularity (adaptation of systems to possible changes or errors, addition or replacement of operational modules) (Szabó-Szentgróti et. al., 2021)

This revolution is transforming entire systems across (and within) countries, companies, industries, and society at large, while all major macroeconomic variables—GDP, investment, consumption, employment, trade, inflation, etc.—are expected to be impacted. Industry 4.0 relies on a series of new and innovative technological developments that serve as the main drivers of change:

- ***Information and communication technology (ICT):*** Used to digitize information and integrate systems at all stages of product creation and use, both within companies and across business boundaries.

- ***Cyber-physical systems:*** These systems use ICT to monitor and control physical processes and systems. They may include embedded sensors, smart robots that adapt to the product being created, and 3D printing devices (additive manufacturing).

- ***Communication networks:*** Including wireless technologies and the internet, which connect machines, products, systems, and people within factories and with suppliers and distributors.

- ***Simulation, modeling, and virtual/augmented reality (VR/AR):*** These technologies transform design and production processes, information management, and business administration, offering enhanced real-world experiences with graphics, sounds, haptics, and even smells. They have applications in aerospace, entertainment, media, education, and business.

- ***Cloud technology:*** Enables dramatic expansion in data sharing - within milliseconds - for individuals, businesses, machines, and production systems. With improved cybersecurity, nearly all IT services and web applications can now operate via the cloud, facilitating the collection, analysis, and exploitation of massive datasets either directly in production or through big data analytics and cloud computing.

- ***Artificial intelligence (AI) and decision-making/advanced robotics:*** Refers to technologies that simulate previously human-only cognitive functions. Algorithms that learn from our digital traces (machine learning, computer vision, sensors) can train smart robots to interact with each other, work alongside humans, and learn from them (Multiplicity).

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- ***Internet of Things (IoT):*** The connection between "things" (products, services, places, etc.) and people becomes possible through connected technologies and various platforms. Smart devices and objects with embedded computing and sensors connect to the internet and interact, allowing for enhanced communication, new data-based services, and advanced analytics capabilities.

- ***Cybersecurity:*** With increased connectivity and standardized communication protocols, the need to protect critical industrial systems and production lines from cyber threats is rising sharply. This necessitates secure, reliable communications, encrypted transactions, and advanced identity and access management for machines and users (e.g., biometric technology, blockchain, cybersecurity protocols).

- ***Converging technologies:*** Previously separate fields such as AI and machine learning, neuroscience, neurotechnology, robotics, nanotechnology, 3D printing, genetics, and biotechnology (genomics, genome editing, genetic engineering) are now merging and becoming major drivers of enormous change with unpredictable potential across medicine, research, education, industry, transport, and agriculture.This fusion of technologies is creating new sectors and transforming existing ones. This convergence drives demand for emerging roles in precision medicine, smart manufacturing, agri-tech, and tech-enabled education. Jobs such as genomic data analysts, robotic systems integrators, *additive manufacturing technicians*, neuroprosthetics and biomedical engineers, nanomaterials engineers and AI ethicists. There will be growing demand for professionals skilled in data governance, bioethics, and human-machine interaction, capable of responsibly guiding innovation at the intersection of technology and society.
- ***'Smart' technology:*** Refers to the integration of computing and telecommunication technology into other technologies that did not previously have such capabilities. What makes a technology 'smart' is its ability to communicate and work with other networked technologies, and through this ability to allow automated or adaptive functionality as well as remote accessibility or operation from anywhere. Ubiquitous sensor usage, expansion of wireless networks, smarter robots and machines, as well as more powerful computing at lower costs and enhanced big data analytics, will find applications across all sectors. Smart systems—homes, factories, farms, networks, or entire cities—will help address challenges such as supply chain management, energy use, traffic, smart parking, waste collection, intelligent lighting, climate change, and natural disaster response.
  (European Parliamentary Research Service [EPRS], 2015; World Economic Forum, 2016)

While these impending changes promise future prosperity and job creation, many of them also bring significant challenges that require proactive adaptation by businesses, governments, societies, and individuals. Emerging technologies present both vast opportunities and considerable risks and uncertainties, along with a host of legal and ethical concerns—especially regarding data protection, worker surveillance, product liability, intellectual property, and the unchecked use of powerful tools for the benefit of society. As entire industries adapt and new ones are born, many occupations will undergo fundamental transformation. (World Economic Forum, 2016)

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Labour Market Transformation in the Era of Industry 4.0 - *Reshaping Industries, Work Roles, and Employment Patterns*

Industry 4.0 is fundamentally transforming labour markets worldwide. The integration of digital technologies—such as artificial intelligence (AI), the Internet of Things (IoT), robotics, big data, and blockchain—into production systems is not only reshaping industries but also redefining job roles, skill requirements, and traditional employment structures. These transformations, driven by rapid technological advancements, are altering how, where, and by whom work is performed, leading to both significant challenges and promising opportunities.

Industry Reshaping and Job Role Evolution

Industry 4.0 enables unprecedented levels of automation, interconnectivity, and data-driven decision-making across all sectors. Traditional industries, such as manufacturing, logistics, healthcare, and agriculture, are being reimagined through smart technologies that optimize production processes, supply chains, and service delivery.

As a result, *job roles are evolving*. Routine, repetitive tasks—especially those in administrative or manual occupations—are increasingly being automated. Conversely, new roles are emerging that demand advanced cognitive, digital, and interpersonal skills. For instance, roles such as data analysts, AI engineers, cybersecurity specialists, digital transformation consultants, and robotics technicians are gaining prominence. Similarly, in service sectors, skills related to customer experience, digital communication, and platform management are growing in importance.

This shift underscores the need for lifelong learning and continuous upskilling. Workers must develop hybrid skill sets that combine technical knowledge with soft skills like adaptability, problem-solving, and collaboration. Educational systems and vocational training programs must pivot accordingly, incorporating digital literacy, computational thinking, and cross-disciplinary approaches into their curricula.

Key drivers of future labour market demands

Recent studies shed light on the transformative trends shaping the global labour market. Forecasts indicate that more jobs will be redefined than eliminated, as machines and automation continue to influence the evolution of occupations and become increasingly integrated into various tasks.

According to research by the McKinsey Global Institute (MGI, 2017), five key drivers will shape the future of labour demand worldwide and could generate millions of new jobs by 2030:

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1. **Ageing Populations and Increased Demand for Healthcare and Personal Care Services.** As the global population ages, demand for healthcare will surge. By 2030, there will be at least 300 million more people aged 65 and over than in 2014. MGI estimates that healthcare and related sectors could see job growth ranging from 80 to 130 million globally by 2030 due to ageing populations and rising incomes. This demographic shift will significantly increase spending on healthcare caregiving, and related personal services, **This includes increasing opportunities** in geriatric nursing, physical therapy, home healthcare, and administrative support, generating demand for doctors, nurses, healthcare technicians, home health aides, personal care workers, and nursing assistants. Conversely, **it may reduce the demand** for paediatricians and primary education teachers. The technology sector is also experiencing growth driven by the **need for accessible and user-friendly digital solutions**, leading to rising demand for experts in digital accessibility, software engineering, and assistive technology design. Moreover, as older adults seek active and enriching lifestyles, new job roles are emerging in **leisure, hospitality, and accessible tourism**—spanning event planning, accommodation design, and travel services tailored to evolving needs.
2. **Green transition investments in Renewable Energy, Energy Efficiency, and Climate Action.** The global shift toward a greener economy emphasizes sustainability, climate resilience, and reduced environmental impact. As countries invest in green transition goals and renewable energy sources (e.g. wind and solar), energy efficiency, and climate adaptation and mitigation, demand will rise for workers in construction, installation, and maintenance. These investments—driven by existing energy efficiency policies and international climate commitments like the Paris Agreement—could create up to 10 million new jobs in a baseline scenario and an additional 10 million in a more ambitious scenario. This transformation is driving job creation in areas such as: renewable energy, energy efficiency, sustainable agriculture, green building, and waste management. Emerging roles include positions in installation, maintenance, design, project management, and environmental monitoring. In addition, the circular economy, green transportation, environmental policy, sustainability reporting, and smart cities development are fostering employment in data analysis, compliance, innovation, education, and eco-tourism. These trends promote a shift in workforce priorities and require new sets of technical and interdisciplinary skills.
3. **Technological Advancements and the Expansion of Tech-Related Jobs.** The advancement of technology will boost **demand for roles such as computer scientists, engineers, and IT managers**. Total spending on technology is expected to increase by more than 50% between 2015 and 2030, with a significant portion focused on IT services—both in-house and outsourced. Though fewer in number than jobs in healthcare or construction, these roles tend to be high-paying. MGI estimates that 20 to 50 million new tech-related jobs could be created globally by 2030. The extensive digitalisation of tasks and services in virtually every sector increases the demand for roles in data analysis, quality assurance, content creation, UX design, IT support, cybersecurity, AI and machine learning, remote services, content management, web development, e-learning, digital marketing and digital consultancy.

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4. **Infrastructure and Housing Development.** To address infrastructure gaps and housing shortages, annual investment must rise to around 3.3 trillion USD—up from the current 2.5 trillion USD—equivalent to 3.8% of global GDP. This demand will create employment opportunities in both developing nations undergoing urbanisation and industrialisation, and advanced economies focused on maintaining and upgrading existing infrastructure. This could generate up to 80 million new jobs in a baseline scenario, or as many as 200 million globally in an accelerated scenario. **These include roles for architects, engineers, carpenters, machine operators, and both high- and low-skilled construction workers.**
5. **Rising Incomes and Consumer Spending in Emerging Economies.** As incomes increase, especially in emerging economies, global consumption could rise by 23 trillion USD from 2015 to 2030. This shift will drive job growth in sectors such as **consumer goods, leisure, finance, telecommunications, housing, healthcare, and education**. MGI estimates that rising income levels could create between 300 and 365 million new jobs worldwide.

As the labour market is undergoing profound transformations influenced by digitalization and emerging technologies, the green transition, demographic changes, and broader economic and social trends. These developments are reshaping employment landscapes, creating **new opportunities, and redefining skill demands across sectors.**

Rise of Non-Standard Forms of Employment and New Work Methods

Another defining characteristic of the Industry 4.0 labour market is the increasing prevalence of non-standard forms of employment (NSFE). These include freelance work, gig and platform-based employment, remote and hybrid working models, digital self-employment, and job sharing.

The **gig economy**, facilitated by digital platforms such as Uber, Upwork, and TaskRabbit, offers flexible work opportunities that can benefit those seeking autonomy or supplementary income. However, it also raises significant concerns regarding job security, social protection, and workers' rights. Many gig workers operate without employment contracts, health insurance, or access to training—prompting calls for new regulatory frameworks that balance flexibility with fairness.

Remote work, accelerated by the COVID-19 pandemic, has become a permanent feature of many industries, especially in knowledge-based sectors. While it provides benefits such as location independence and work-life balance, it also introduces challenges related to digital overload, isolation, and unequal access to technology. Employers are now rethinking organizational structures, performance evaluation, and workplace culture in light of this shift.

Digital self-employment is also on the rise, as individuals monetize digital skills—such as content creation, e-commerce, and software development—through online platforms. While this fosters entrepreneurship, it also exposes workers to income volatility and market uncertainties.

Job sharing and **task-based employment models** are gaining traction in specific sectors as organizations seek more agile and cost-effective staffing solutions. These methods allow

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employees to split roles or work in project-based capacities, promoting work-life balance and organizational flexibility but often lacking long-term stability.

Human-machine collaboration lies at the heart of Industry 4.0, where the strengths of humans—creativity, empathy, critical thinking—are combined with the precision, speed, and data-processing power of machines. Rather than replacing humans, intelligent systems such as AI, robotics, and automation increasingly serve as collaborative partners, supporting decision-making, enhancing productivity, and improving workplace safety. In fields ranging from manufacturing to healthcare and education, machines handle repetitive or dangerous tasks, while humans focus on strategy, innovation, and interpersonal roles. This evolving partnership requires new skills, particularly in digital literacy, data interpretation, and human-centric problem-solving, making continuous learning essential for adapting to collaborative work environments of the future.

The **Great Resignation**

The Great Resignation, also known as the Big Quit, refers to the unprecedented wave of voluntary job resignations that began in early **2021**, primarily in the United States, and later observed in other parts of the world. Driven by the COVID-19 pandemic, this phenomenon saw millions of workers—especially from sectors like hospitality, healthcare, and retail—leaving their jobs in search of better work-life balance, more meaningful employment, higher wages, remote work opportunities, or due to burnout and dissatisfaction with workplace conditions.

Key drivers included:

- Reassessment of life and career priorities during the pandemic
- Demand for flexible or remote work
- Low wages and lack of advancement opportunities
- Toxic workplace cultures or poor management
- A rise in entrepreneurial and freelance ambitions

The Great Resignation signaled a shift in power dynamics between employers and employees, prompting many organizations to rethink their talent management, workplace culture, and employee well-being strategies.

Entrepreneurship and Business Innovation Pathways in Industry 4.0

Entrepreneurship and self-employment are becoming vital avenues for individuals seeking independence, flexibility, and the ability to shape their professional paths. Starting a business or working as a self-employed professional allows people to align their careers with their personal goals, skill sets, and interests. The digital economy, low-cost online tools, and access to global markets have lowered traditional barriers to entry, making entrepreneurship more accessible than ever before.

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Successful entrepreneurship typically requires knowledge of funding options—such as personal savings, loans, grants, and crowdfunding—as well as familiarity with business planning, legal requirements, and regulatory frameworks. Business support programs, incubators, and mentorship opportunities play a crucial role in guiding new entrepreneurs through the process of launching and sustaining a business.

Industry 4.0 has revolutionized the landscape of entrepreneurship and business innovation by integrating advanced digital technologies such as artificial intelligence, the Internet of Things (IoT), big data analytics, and automation into business processes. This shift has opened new pathways for entrepreneurs to develop innovative products, services, and business models that are more responsive to customers and market needs. Despite the promising opportunities, entrepreneurship in Industry 4.0 also presents challenges, demanding continuous learning and adaptability from entrepreneurs due to rapid technological and socio-economic changes and the need to address cybersecurity, data privacy, and ethical considerations in digital business models. Career guidance 4.0 must highlight entrepreneurship as a valid and valuable pathway, supporting individuals with tailored training, development of digital literacy, and innovation skills, access to digital tools, and networks that foster entrepreneurial resilience and growth. Meaningful entrepreneurial opportunities and new emerging and resilient pathways in the industry 4.0 include:

Digital entrepreneurship increasingly emphasizes the importance of hybrid skills that combine technical knowledge with creativity, problem-solving, and business acumen. Formal and informal learning routes—including micro-credentials, online courses, vocational training, and innovation labs—play a crucial role in equipping aspiring entrepreneurs with the necessary competencies to navigate the complexities of the digital economy. Moreover, ecosystems such as incubators, accelerators, and innovation hubs provide essential support structures, offering mentorship, funding, and networking opportunities to nurture start-ups and innovative ventures.

The **social economy**—encompassing social enterprises, cooperatives, nonprofits, and community services—places priority on social and environmental impact over profit. This sector offers inclusive and diverse job opportunities, particularly in roles such as administration, program management, advocacy, fundraising, communications, training, and community outreach. Participatory leadership models and a values-driven approach foster a work environment focused on purpose, collaboration, and sustainability. Additionally, this sector supports skills development and entrepreneurship, especially in areas like sustainable business, finance, event planning, artisanal production, and creative industries. Because these organizations value social and environmental impact over profit, they often champion diversity, flexible work arrangements, and supportive leadership models—conditions that particularly benefit people with disabilities (PwDs), newcomers, and other vulnerable or low-skilled groups.

Micro-entrepreneurship is an approach to entrepreneurship that emphasizes the creation of small businesses designed to meet the needs of a specific market niche or community. Micro-entrepreneurship refers to small-scale, often solo or family-run businesses that utilise digital technologies to create flexible and innovative economic activities. In the context of Industry 4.0, micro-entrepreneurs can harness tools like social media, e-commerce platforms,

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mobile apps, and cloud computing to reach wider markets, streamline operations, and personalize customer experiences, reducing entry barriers and enabling more people to start and grow businesses with relatively limited resources. The rise of micro-entrepreneurship aligns with the gig economy and freelance work trends, where individuals take ownership of their careers by offering niche products or services. Digital skills and agile business practices are crucial for micro-entrepreneurs to adapt quickly to market changes, innovate continuously, and sustain their ventures in a competitive environment.

The **gig or platform economy**[4] is defined as an economy in which digital technologies enable the gathering of groups around a specific task — often across borders — while platforms simply connect buyers with sellers[5]. The European Commission also notes that a large part of the latter operates under the category of the collaborative economy, which offers opportunities not only to individuals seeking greater flexibility in their work but also to those who would have fewer chances of securing a permanent job. Examples include ride-hailing apps, food delivery apps, and holiday rental apps. Gig workers, also known as independent contractors, engage in freelance and/or side-employment, involving diverse tasks ranging from ridesharing to freelance services and digital content creation, enjoying flexibility in their schedules and payment methods. In the gig economy, individuals take on temporary, flexible jobs or tasks, typically facilitated by online platforms and mobile apps. These platforms connect workers with customers or clients seeking specific services or tasks. Gig economy opportunities continue to expand across various fields, including: Freelance writing and content creation, Online tutoring and digital education, Graphic design and illustration, Administrative and virtual assistant services, Web development and UX/UI design, Social media management, Delivery and transportation services, Marketplace sales and e-commerce, Online surveys and market research, App and usability testing. These roles offer flexibility in scheduling, location, and payment methods, making gig work an appealing alternative to traditional employment. While gig work provides autonomy and the opportunity to diversify income sources, it also typically lacks traditional employment benefits such as healthcare coverage, retirement plans, and job security., posing challenges especially for vulnerable groups who may rely on such benefits. Also gig economy opportunities reflect the increasing demand for digital skills, entrepreneurial mindset, and adaptability in a decentralized and technology-driven job market.

Occupations, jobs and skills - concepts, distinctions and classifications

This chapter introduces the fundamental distinctions between occupations, jobs, and skills, offering a structured understanding of how they are defined and classified in labour market analysis. It explores international frameworks used to categorize work and competencies, supporting effective guidance, workforce planning, and skills matching. Understanding these classifications is essential for interpreting labour market trends and supporting career development in dynamic economies.

To begin, we need to clarify the following key concepts :

[4] also known as “sharing economy”, “platform economy” or “crowd work”

[5] A European agenda for the collaborative economy - supporting analysis, 2016.

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A **job** is defined as “a set of tasks and duties performed, or meant to be performed, by one person, including for an employer or in self employment” (ISCO-08)

Occupation refers to a broad category that describes a type of work performed, typically involving similar tasks and required skills across different workplaces. The concept of occupation is defined as a “set of jobs whose main tasks and duties are characterized by a high degree of similarity”. A person may be associated with an occupation through the main job currently held, a second job, a future job or a job previously held (ISCO-08).

A position refers to a specific job role within a company or organization, detailing the individual’s responsibilities, tasks, and work context.

“Skills” are defined as the combination of knowledge and experience required to achieve a particular physical or mental work (the ability to do something good). It refers to the ability to apply knowledge and use know-how to perform tasks, duties and solve problems of a given job (ISCO-08, Cedefop, 2014; European Parliament and Council of the European Union, 2008a).They can be described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments)” (European Commission, 2017). Skills are distinguished in generic skills, used in a variety of occupations and professional skills related to a specific profession. **Basic or core skills** represent the foundation for interacting with others and for developing and learning as an individual e.g. ability to understand, speak, read and write language(s), to work with numbers and measures and use digital devices and applications. **Hard skills** are strictly job-specific, closely connected with knowledge, easily observed, measured and trained. They constitute the core occupational requirements of a job. **Soft skills** are non-job specific, are cross-cutting across jobs and sectors, closely connected with intangible personal attitudes and competences (confidence, discipline, self-management) and social competences (teamwork, communication, emotional intelligence). This makes them more difficult to be quantified and developed. **Transversal or transferable skills** are versatile skills gained through work, education, or life experiences that can be applied across different jobs, sectors, or contexts.

“Competence” is broader and is more than just knowledge and skills. It refers typically to the ability of a person - facing new situations and unforeseen challenges - to use and apply knowledge and skills in an independent and self-directed way to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context (OECD, 2005, ESCO Handbook, 2019). Competency is described also as the ability to perform particular tasks and duties to the standard of performance expected in the workplace, applying all relevant skills, knowledge and attitudes consistently over time in the required workplace situations. Competencies may be gained in a number of ways including through formal or informal education and training, experiences in the workplace, general life experience and/or any combination of the above ILO (2015).

In the modern workforce, **jobs are commonly grouped into categories based on the nature of the work, the skills involved, and the level of education typically required**. One of the

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most familiar distinctions is between “blue-collar” and “white-collar” jobs—terms that help differentiate between roles focused on manual or technical labor and those centered around office-based, often professional tasks. Beyond these traditional classifications, other categories like “pink-collar” and “green-collar” jobs have emerged, reflecting the evolving demands and values of today’s labour market.

White-collar jobs refer to professional, managerial, or administrative occupations that are primarily based on cognitive or clerical work rather than manual labour. These roles are typically found in offices, schools, hospitals, and service-oriented sectors. They often require higher levels of formal education, such as university degrees, and are usually salaried positions with fixed working hours. The nature of white-collar work emphasizes mental tasks, organizational responsibilities, and problem-solving within structured environments. Examples of white collar jobs are: Lawyers, accountants, teachers, IT professionals, Office administrators, civil servants, marketing executives, Healthcare professionals (e.g., doctors, pharmacists). **White-collar professions are being reshaped by AI and data analytics**, streamlining administrative tasks but also requiring higher digital literacy and adaptability as decision-making becomes more data-driven.

Blue-collar jobs involve manual or physical labour and are commonly associated with industries such as manufacturing, construction, transportation, and maintenance. These occupations may be skilled or unskilled and often require vocational training or apprenticeships rather than academic qualifications. Workers in blue-collar roles are frequently paid on an hourly basis or by output, and the work may involve shifts, physical exertion, or outdoor conditions. The focus of blue-collar work is on tangible production, repair, or operational tasks. Examples of :blue-collar jobs are: Construction workers, plumbers, electricians, Factory workers, mechanics, welders, Drivers, warehouse workers, miners. **Automation and robotics are transforming traditional blue-collar roles**, reducing the need for routine manual labor while increasing demand for technically skilled workers who can operate, maintain, and troubleshoot smart machines.

Grey-Collar Jobs combine elements of both blue- and white-collar work, involving physical tasks alongside technical or cognitive skills. Found in sectors like healthcare, technology, and public safety, these roles require both hands-on expertise and problem-solving abilities.Grey-collar workers play a crucial role in bridging manual and intellectual work, ensuring the smooth functioning of essential services across diverse industries. Examples include IT support technicians, paramedics, police officers, and radiology technicians. **Grey-collar workers are increasingly vital in managing complex systems that combine manual and cognitive tasks**, with Industry 4.0 requiring them to adapt to hybrid roles involving tech operation, troubleshooting, and human oversight.

Brown-collar jobs refer to occupations in sectors that have a significant environmental impact, particularly in industries reliant on highly polluting processes or environmentally harmful industries, particularly those likely to be affected by the green transition. These jobs are typically in high-carbon sectors, such as fossil fuel extraction, coal mining, oil and gas extraction, heavy

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manufacturing, or certain types of industrial transportation. While these roles often involve skilled manual labour similar to blue-collar work, what distinguishes them is their high carbon footprint and vulnerability to structural change resulting from environmental and climate policies. Examples of Brown-Collar Jobs include: Coal and lignite miners, Workers in oil refineries or steel mills, Long-haul truck drivers using diesel fleets. **Workers in brown-collar occupations may face increased risk of job loss due to the green transition policies** and may require targeted support for retraining or career shifts. Employees in traditional energy or chemical plants.Industry 4.0 impacts brown-collar jobs by introducing advanced technologies like drones, robotics, and IoT into fields such as security, sanitation, and disaster response. Automation enhances efficiency and safety but may reduce demand for certain manual roles. At the same time, it creates a need for upskilling in tech-based tools and systems.

Green-Collar Jobs involve roles focused on environmental sustainability, aiming to reduce ecological impact and support the transition to a greener economy. These jobs span sectors like renewable energy, conservation, sustainable agriculture, and eco-friendly construction. They often require higher-level or specialized technical or scientific skills and are increasingly in demand due to climate change and environmental policy shifts. Green-collar jobs are key to building a sustainable future, helping protect natural resources, lower emissions, and create long-term environmental and economic resilience. Examples include: renewable energy technicians, green construction workers, solar panel technicians, wind energy engineers, environmental consultants, urban farmers, and green construction workers. **Industry 4.0 accelerates the growth of green-collar roles** through smart energy systems, environmental monitoring, and sustainable tech solutions, demanding cross-disciplinary skills in both tech and environmental science.

Pink-Collar Jobs are service-oriented roles traditionally associated with women, though now filled by all genders. These positions focus on caregiving, education, customer service, and hospitality, often requiring strong interpersonal and emotional skills. Pink-collar workers are essential to the wellbeing of society, providing care, education, and support across key sectors—often under challenging conditions and with less recognition or pay than other professions. Examples include nurses, teachers, childcare workers, flight attendants, and retail staff.While less impacted by automation due to their interpersonal nature, **pink-collar jobs are evolving with the integration of digital tools in service delivery** (e.g., telehealth, online education), requiring upskilling in digital communication and technology use.

It is important to note that the distinctions between white-collar, blue-collar, and brown-collar jobs are not absolute or fixed. In today's evolving labour market, many occupations exhibit hybrid characteristics that combine elements from multiple categories. For example, some blue- and brown-collar roles are increasingly incorporating digital skills or adapting to environmental standards, leading to the emergence of new, transitional occupations such as green construction technicians or logistics workers using sustainable technologies. Understanding these classifications helps practitioners map career trajectories, identify upskilling needs, and guide clients in transitions toward sustainable and resilient employment.

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Occupation classifications provide a structured way to group jobs based on similar tasks and duties, enabling consistent analysis, comparison, and planning across labour markets.

The **International Classification of Occupations (ISCO)** seeks to facilitate international communication about occupations by providing a framework to make internationally comparable occupational data available, and by allowing international occupational data to be produced in a form that can be useful for research as well as for specific decision-making and action-oriented activities. The current version, known as ISCO-08, was published in 2008 and is the fourth iteration, following ISCO-58, ISCO-68 and ISCO-88.

ESCO (European Skills, Competences, Qualifications and Occupations) is the European multilingual classification of Skills, Competences and Occupations. ESCO works as a **dictionary,** describing, identifying and classifying professional occupations and skills relevant for the EU labour market and education and training. Those concepts and the relationships between them can be understood by electronic systems, which allows different online platforms to use ESCO for services like matching job seekers to jobs on the basis of their skills, suggesting trainings to people who want to reskill or upskill etc. ESCO provides descriptions of **3,039 occupations and 13,939 skills** linked to these occupations, translated into 28 languages (all official EU languages plus Icelandic, Norwegian, Ukrainian, and Arabic). The aim of ESCO is to **support job mobility across Europe and therefore a more integrated and efficient labour market**, by offering a "common language" on occupations and skills that can be used by different stakeholders on employment and education and training topics.

The **International Standard Industrial Classification of All Economic Activities (ISIC)** is a standard classification of economic activities arranged so that entities can be classified according to the activity they carry out. The categories of ISIC at the most detailed level (classes) are delineated according to what is, in most countries, the customary combination of activities described in statistical units and considers the relative importance of the activities included in these classes. It is used to categorize economic activities based on similarities in inputs, processes, and outputs. ISIC Rev.4 emphasizes the nature of the production process and supports consistent classification across sectors. Widely used in national and international statistics, ISIC enables comparability in data related to employment, production, and GDP, and supports the development of national statistical systems.

Sector is defined as a group of companies that have the same economic activity. Information provided on sectors within the Skills intelligence is structured on the basis of NACE rev. 2 classification. The **Statistical classification of economic activities in the European Community**, abbreviated as **NACE**, is the classification of economic activities in the European Union (EU); the term NACE is derived from the French ***N**omenclature statistique des **a**ctivités économiques dans la **C**ommunauté **e**uropéenne*. Various NACE versions have been developed since 1970. NACE is a four-digit classification providing the framework for collecting and presenting statistical data according to economic activity in a wide variety of European statistics in the economic, social, environmental, and agricultural domains. In 2023, NACE Revision 2

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update 1 (NACE Rev. 2.1) was established. It will be progressively rolled out in all relevant statistical domains from 2025 onwards.

The **Statistical classification of products by activity**, abbreviated as **CPA**, is the classification of products (goods as well as services) at the level of the European Union (EU).Product classifications are designed to categorise products that have common characteristics. They provide the basis for collecting and calculating statistics on the production, distributive trade, consumption, international trade and transport of such products. CPA product categories are related to activities as defined by the Statistical classification of economic activities in the European Community (NACE). Each CPA product - whether a (tangible or intangible) good or a service - is assigned to one single NACE activity. This linkage to NACE activities gives the CPA a structure parallel to that of the NACE at all levels. The CPA is part of an integrated system of statistical classifications, consisting of international classifications developed mainly under the auspices of the United Nations Statistical Division and European classifications developed mainly under the auspices of Eurostat, as well as other regional and national classifications. This system makes it possible to compare statistics across countries and across different statistical domains. CPA has a hierarchical structure with six levels, each identified with a specific code. For CPA Version 2.2 (applicable from 2025 onwards), the number of positions at each level is as follows:

- first level: 22 *sections* (alphabetical code);
- second level: 87 *divisions* (two-digit numerical code);
- third level: 284 *groups* (three-digit numerical code);
- fourth level: 644 *classes* (four-digit numerical code);
- fifth level: 1 432 *categories* (five-digit numerical code);
- sixth level: 3 359 *subcategories* (six-digit numerical code).

Estimating the Impact of Industry 4.0 on labour market - Reviewing concepts and indicators of transitory regional labour markets

Undoubtedly, the 4th Industrial Revolution will bring unprecedented changes to the nature of work across all industries and professions through new technologies. Estimates suggest that the impact of automation and artificial intelligence (AI) is happening ten times faster and is 300 times greater than the changes brought by the Industrial Revolution of the late 18th and early 19th centuries—making it roughly 3,000 times more powerful (McKinsey Global Institute, 2015).

The key uncertainty in assessing whether this impact will be positive or negative lies in the extent and speed at which automation replaces human labor.

Researchers identify two critical variables (McKinsey Global Institute, 2017, World Economic Forum, 2016) :

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- Rapid disruption and automation cause immediate displacement of workers, leading to unemployment or the need for upskilling and redeployment to new roles (**destruction–displacement effect**).
- Technological progress drives demand for new goods and services, fostering the creation of new jobs, businesses, and industries (**productivity–capitalization effect**).

Understanding labour market dynamics

To fully capture employment dynamics, it is essential to understand key indicators such as Job Creation, Job Destruction, and Job Replacement. These indicators go beyond net employment change, offering deeper insights into the hidden mechanisms shaping labour markets, by helping:

- Reveal underlying labour market shifts that net growth alone cannot show
- Identify the drivers behind employment gains and losses, such as business openings or closures, across time and space
- Understand regional resilience through the micro-level processes driving change
- Analyse how broader economic trends impact local job markets
- Trace intra-regional and intra-sectoral labour flows, which are often missed in net employment figures
- Recognise the spatial and temporal complexity of labour demand

This approach also allows us to detect patterns of industrial transformation and restructuring:

- High job creation and destruction signal sectors in transition
- High creation with low destruction points to growing industries (e.g. tech, renewables)
- Low creation with high destruction indicates declining sectors (e.g. coal, traditional retail)

Such insights are crucial for designing balanced labour market policies, supporting job security, and planning targeted reskilling/ upskilling and career development programs for displaced workers.

Job Creation (JC)

Job Creation (JC) generally refers to the emergence of new employment positions, typically through firm expansion, technological innovation, or sectoral growth.

Gross Job Creation refers to the total number of **new job positions** created in a specific location (e.g., a factory, company, or region) during a certain period. These are **entirely new jobs** that didn't **exist before**—not jobs that were refilled or transferred.

Example: If a company opens a new production line and hires 4 additional workers, those 4 positions are considered newly created jobs.

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New Jobs may come from:

- **Start-ups**: New companies hiring staff.
- **Expansion of existing businesses**: Existing companies growing and needing more employees.

Gross Job Creation Index: This index measures the **total number of new jobs created**, **without** subtracting the number of jobs lost. It's simply a count of how many new positions have been added.

Gross Job Creation Rate: This rate shows **how fast new jobs are being created** compared to the number of people already employed at the beginning of the period. It's expressed as a percentage and calculated as:

$$\text{Gross job Creation Rate} = \frac{Jobs\ created}{Total\ employment\ at\ starting\ time\ point} * 100$$

Example: If a company had 100 employees at the beginning of the year and created 10 new jobs: **Gross Job Creation Rate** = 10 / 100 x 100 = **10%**.

Net job creation shows the overall increase or decrease in employment by subtracting the number of jobs lost from the number of new jobs created during a specific period. It helps us understand whether the labour market is growing or shrinking.The net job creation rate compares this net change to the total number of jobs at the beginning of the period, giving a clearer picture of employment growth or decline.

Example: A region had **1,000 jobs** at the beginning of the year. During the year, **150 new jobs were created**, but **50 jobs were lost**.

$$\text{Net Job Creation Rate} = \frac{Jobs\ created - Jobs\ axed}{\Tau\Sigma\tau\Chi\gamma\alpha\sigma\eta\ \kappa\alpha\iota\ \Epsilon\rho\gamma\alpha\sigma\iota\alpha otal\ employment\ at\ starting\ time\ point} * 100$$

- **Net Job Creation** = 150 (created) − 50 (lost) = **100 jobs**
- **Net Job Creation Rate** = (100 / 1,000) × 100 = **10%**

This means that the region's total employment grew by 10% over the year.

Why it matters: Gross job creation data is a valuable tool for guidance practitioners because it shows where new jobs are actually being generated—whether in certain sectors, regions, or industries. This helps practitioners align their advice with real labor market trends, making career guidance more relevant and targeted. For example, if data shows a rise in job creation in the renewable energy or care sectors, counselors can direct clients toward training and

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opportunities in those areas. If job growth is concentrated in specific regions, they can support mobility or remote work options.

Net job creation data helps identify whether a sector or region is truly expanding and provides realistic insight into job market trends, allowing career guidance to be based on net employment opportunities rather than gross gains alone. The net increase shows real growth in employment, helping guidance practitioners understand which sectors or regions offer expanding job opportunities, so they can better support career planning and reskilling.

In general, this kind of information allows practitioners to better match people with growing fields, advise on skill development, and collaborate with employers creating new roles. In addition, it helps individuals prepare for actual job opportunities, makes career services more responsive to labour market needs, and ensures that public training and employment policies are based on evidence rather than assumptions.

Job Destruction (JD)

Job destruction (JD) refers to the elimination of existing positions, whether due to economic decline, automation, or structural reorganization, depending on the total number of jobs that have been lost in a company, industry, or region over a certain period. For example, if 3 jobs are cut in a plant, that's considered job destruction. At a broader level, it includes job losses due to plant closures or downsizing.

The **Gross Job Destruction Rate** shows the percentage of jobs lost relative to the total number of jobs at the start of the period. It's calculated as:

$$\text{Gross Job Destruction Rate} = \frac{Jobs\ axed}{Total\ employment\ at\ starting\ time\ point} * 100$$

Gross Job Destruction Rate = (Jobs axed / Total employment at starting point) × 100

Example: If a region had **1,000 jobs** at the beginning of the year and **80 jobs were lost**, the Gross Job Destruction Rate is: (80 / 1,000) × 100 = **8%**

Why it matters: Understanding **job destruction** is crucial because it signals where employment is declining and helps identify vulnerable sectors, regions, or groups of workers. When jobs are being lost—due to automation, economic downturns, company closures, or industry restructuring—this directly affects people's livelihoods and career prospects.

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This indicator helps guidance professionals understand which sectors are shrinking, allowing them to better support individuals at risk of job loss and to guide transitions into more stable or growing fields. More specifically, tracking job destruction trends helps in several ways:

- **Early intervention:** Practitioners can support workers in at-risk industries before job loss happens, offering reskilling or upskilling options.
- **Informed counseling:** It allows advisors to guide individuals away from declining sectors and toward emerging ones with more stable or growing employment prospects.
- **Policy and planning input:** Aggregated data on job destruction can inform local or national employment policies and training programs, ensuring they are responsive to current labor market needs.
- **Targeted support:** Vulnerable groups (e.g. low-skilled, older, or marginalized workers) in shrinking sectors can be prioritized for support and reintegration strategies.

In short, understanding job destruction is essential to help people prepare for change, avoid long-term unemployment, and transition toward sustainable careers.

Understanding Net vs. Gross Employment Change

Employment shifts are often described as the movement of jobs from declining sectors to expanding ones, such as high-tech manufacturing, information technology, and pharmaceuticals. As a result, regional labour markets that attract a high concentration of these growing industries may experience expansion, while those dominated by outdated industries may face decline. However, the dynamics of job allocation are more complex. Beyond shifts across industries and regions, changes also occur within sectors and among individual plants or firms in the same region. This internal reallocation of employment is equally significant.

Net employment change (or growth)

When we look at employment data, we often focus on ***net employment growth*—representing the overall change in the number of jobs over a given period,** that is the difference between the number of jobs created and the number of jobs lost during a given period. It describes how much **total employment** has increased or decreased between two time points.

Let:

- **Et** be total employment at the end of the period
- **Et-1** be total employment at the beginning of the period
- **JC** be jobs created during the period
- **JD** be jobs destroyed (axed) during the period

We use the following equations:

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1. **Net employment growth** = Et – Et-1
2. Et = Et-1 + JC – JD
3. From (1) and (2): Net employment growth = JC – JD

This shows that **net employment growth is simply the difference between jobs created and jobs lost**. It gives the overall picture, but does not reflect the full scale of labour market activity happening underneath.

For example, if a company had 100 employees last year and still has 100 today, the net employment change is zero. However, this doesn't tell the whole story.

Imagine a company that replaces 5 secretaries with 5 computer programmers. The **net job change** is zero, because the total number of jobs stayed the same. But something important has happened: **5 jobs were destroyed**, and **5 new ones were created**, requiring very different skills. This is what we call **gross employment change**—it captures both job creation and job destruction, regardless of whether the total number has increased or not.

Why it matters: At a regional level, this matters because employment doesn't just shift across industries (e.g. from manufacturing to IT), but also within them—between different plants, companies, and even types of roles. **A region might appear stable in terms of net employment, while in reality, it is undergoing major transitions that affect the skills in demand.**

For career guidance professionals, the understanding of **net employment growth** is crucial. It helps them anticipate labor market changes, guide people toward training for growing occupations, and support those whose roles are being phased out. By tracking both job creation and destruction—not just the net result—we gain a much deeper picture of how work is evolving, who is affected, and what support is needed.

Gross employment change (or growth)

Gross employment change is an indicator of labor market dynamics representing the total number of job movements in the labour market—both new jobs created (hiring) and jobs eliminated (layoffs or separations). It is calculated as the sum of job creation (JC) and job destruction (JD), and it gives us insight into how dynamic a labour market is. This movement is also called **job reallocation**, as it tracks how employment opportunities shift between different plants or firms within a region over time. A high gross employment change indicates a labour market with a lot of activity—new people being hired, others leaving or losing jobs. This is known as **labour market churn.**

The Labour Market Churn Rate is calculated as (Jobs Created + Jobs Destroyed) / Total Employment:

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$$\text{Labour Market Churn rate} = \frac{JC + JD}{Total\ employment}$$

This rate reflects how often jobs are changing hands—either because companies are expanding or contracting, or simply because workers are being replaced. For instance, a company may hire new workers to replace those who left (job replacement), or to grow its operations (job expansion). Similarly, job separations might happen due to downsizing, but also because workers leave for better opportunities elsewhere.

Why it matters: **Gross employment change**—the sum of job creation and job destruction (JC + JD)—is a critical indicator that provides a more nuanced view of labour market dynamics than **net employment change** (JC - JD) alone. While net change shows the overall increase or decrease in jobs, gross change reveals the underlying movement: how many jobs are being created and lost, regardless of the net result.

This distinction matters because a **region with zero net job growth might still experience significant churn**, indicating labour market instability, a need for re-skilling, or growing job precarity. On the other hand, **a region can exhibit high gross employment change while maintaining low net employment change** when the number of job creations and job losses are nearly balanced. While the net employment growth rate (JC − JD) shows the overall increase or decrease in jobs, it does not capture the intensity of job flows happening underneath the surface. This is why gross employment change is crucial—it reveals the degree of labour market turnover, or churn, and helps assess the stability and precarity of employment in a region.

Interestingly, the same net employment growth rate can correspond to very different types of regional labour markets. For example, a 5% net employment growth rate could result from:

- 5% job creation and 0% job destruction: This indicates a very stable labour market, likely found in sectors such as public administration, healthcare, or education. The low churn suggests strong job retention and low precarity, with minimal labour displacement.

- 10% job creation and 5% job destruction: This reflects a somewhat stable labour market. Jobs are both being created and destroyed, but the balance still supports moderate growth with manageable transitions. This scenario suggests some movement and reallocation of workers, but with less disruption.

- 35% job creation and 30% job destruction: This suggests a volatile or less stable labour market. The same net growth rate (5%) is achieved, but through intense hiring and firing. Such patterns are common in more precarious sectors like hospitality, construction, or retail, where job turnover is high, employment tends to be short-term or seasonal, and workers frequently move between positions—sometimes involuntarily. The high churn

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rate here implies greater job insecurity and a stronger need for reskilling and career support.

Therefore, analysing only net employment change can hide underlying job market instability. In contrast, gross employment change reveals how dynamic and volatile a labour market truly is—showing both job creation and destruction. This makes it essential for understanding regional labour trends and designing effective policies and career guidance strategies.

Job Replacement

Job Replacement refers to the process where a vacated position is filled by another person, **without any net increase in total employment**. This happens when an employee leaves a job—whether by resignation, retirement, or dismissal—and the employer hires someone new for that same role. Because the total number of positions remains the same, this is **not counted as job creation**, even though someone has been newly hired.

While job replacement is **quantitatively neutral**—it doesn't change employment figures—it can still represent significant **qualitative shifts** in the labour market. For example, the incoming worker might have a different skill set, use newer tools or technologies, or take on expanded responsibilities. This is especially relevant in evolving industries where job roles are continuously being redefined. In practice, job replacement can also indicate important trends, such as:

- **Generational turnover**, when younger workers replace retiring employees.
- **Upskilling or reskilling**, if new hires are expected to perform more complex tasks.
- **Organizational change**, where even unchanged job titles may involve new functions.

Thus, while job replacement may seem static in numbers, it often reflects **ongoing transformations in work content, qualifications, and productivity demands** within the labor market.

Job Displacement

Concerns are rising about whether enough jobs will exist due to automation. One of the most debated consequences of Industry 4.0 is the displacement of existing jobs due to automation and artificial intelligence. Labour markets, however, adapt to changing demand driven by technology. Estimates by the World Economic Forum (2018, 2020) suggest that while millions of jobs may be lost to automation by 2030, even more could be created—provided that economies successfully adapt and workers are reskilled. The McKinsey Global Institute (2017) estimates that 8–9% of jobs in 2030 will be new occupations that don't exist today.

The challenge lies in the mismatch between the pace of technological change and the ability of workers, educational institutions, and policy systems to keep up. Regarding the risk of automation for occupations and tasks in the coming decades due to AI, the estimates largely

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depend on how quickly businesses adopt automation, considering both the high costs of implementation and the wages of skilled AI specialists.

Job polarization is expected to increase, with middle-skill jobs declining and low- and high-skill jobs growing disproportionately. Demand for routine manual and cognitive jobs will fall, but many occupations will evolve as workers take on new tasks. Repetitive, standardized work will increasingly be done by robots. AI systems are set to replace many tasks currently performed by workers in administrative white-collar roles—for instance, 30% of corporate audits will be handled by AI. New employees and those with a secondary education level are especially impacted by the rise of industrial robots. Research shows that less than 5% of workers face a high risk of job loss due to automation, compared to 40% of employees with only secondary education (Arntz, M., Gregory, T., & Zierahn, U., 2016).

Jobs at high risk of automation are typically those involving repetitive tasks in predictable or routine environments —such as machine operation, food preparation, or data processing. Roles most susceptible include:

- Low-skilled jobs in manufacturing, agriculture, construction, and basic services (e.g., cleaning, driving, sales).
- Routine positions in transport, production, and mining (e.g., machine operators, warehouse staff, cooks, supervisors).
- Administrative support roles like secretaries, office assistants, and entry-level finance or accounting staff.
- Customer-facing jobs in hospitality, retail, and food services.

Workers in these roles will need to adapt by learning new tasks. In some cases, employment may even grow—if demand for services outpaces the rate of automation.

Automation is expected to have less impact on jobs that rely on human qualities such as people management, creativity, emotional intelligence, and complex decision-making—areas where machines struggle to match human abilities. Occupations in unpredictable or hands-on environments, like gardening, plumbing, childcare, and eldercare, are also less likely to be automated by 2030 due to technical limitations.

Jobs less susceptible to automation include:

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- Highly skilled, specialized, and well-compensated roles involving complex, non-routine tasks.
- Positions in unpredictable or regulated settings where human judgment is essential.
- Occupations requiring leadership, critical thinking, and social or emotional interaction.
- Manual jobs that demand dexterity, adaptability, and on-the-spot problem-solving.
- Creative and caregiving roles that involve negotiation, empathy, and personal connection.

Examples include healthcare professionals, engineers, IT experts, educators, senior managers, gardeners, and plumbers. However, even some high-skill professions—such as doctors, lawyers, journalists, and accountants—may see aspects of their work automated in the near future. (McKinsey Global Institute 2017; Frey & Osborne 2013; Schwab 2016; World Economic Forum 2018; OECD 2018.)

Moreover, **entirely new fields are emerging**—such as digital wellness, algorithmic auditing, and AI ethics—that did not exist a decade ago.

It is generally estimated that with sufficient economic growth, innovation, and investment, new job creation can offset the effects of automation. However, a bigger challenge lies in protecting decent work and ensuring workers have the skills and support needed to transition into new roles. Countries that fail to manage this shift may face rising unemployment and wage declines. Policymakers and business leaders must therefore balance harnessing automation's benefits with supporting workforce transitions. Large-scale efforts in retraining, skills development, and career guidance provision for workers moving from declining to emerging jobs will be essential worldwide. (McKinsey Global Institute, 2017; Frey & Osborne, 2013; Schwab, 2016; World Economic Forum, 2018; OECD, 2018.)

Productivity vs capitalization

Productivity gains from Industry 4.0 technologies and capitalisation of these gains shape labour market dynamics by creating new opportunities but also posing challenges in job displacement and income inequality.

Productivity refers to the efficiency with which inputs (like labor and capital) are converted into outputs (goods or services). In the context of Industry 4.0, productivity increases largely due to automation, advanced robotics, artificial intelligence, and digital technologies that enhance how work is performed.

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- Impact on labour market: Higher productivity can lead to economic growth and increased competitiveness. It can also reshape jobs by automating routine tasks and augmenting human capabilities in complex tasks.

- Challenge: While productivity gains can lead to higher wages and better standards of living, they can also cause job displacement if workers are not reskilled or redeployed effectively.

The **capitalization effect** in economics often refers to how increased productivity or improvements in assets (including human capital, physical capital, or technology) translate into higher economic value, wages, or returns.

- Impact on labour market: Capitalization effect can mean that as firms invest more in capital (machinery, technology, training), the value of labour also increases because workers become more productive and can generate higher output. This can raise wages and employment opportunities in sectors benefiting from such investments.

- Challenge: It can also exacerbate inequalities if the gains from increased capital and productivity are unevenly distributed, favoring highly skilled workers or owners of capital.

Spatial Dynamics and Labour Mobility

Labour market geography has evolved significantly over the past 25 years, reflecting structural, technological, and policy-driven transformations. Economic geographers have shifted from purely quantitative to more qualitative and mixed-method approaches. The focus has expanded from unemployment to broader concerns like non-employment and employment quality. Local labour markets are now seen as socially embedded and institutionally shaped, not just economically defined. Spatial dynamics of commuting vs. migration, and perceptions of opportunity, play a key role in labour market access. There is growing recognition of the influence of labour market intermediaries in shaping job outcomes. Policy attention has turned to creating 'healthy' labour markets that balance demand, supply, and inclusion. Persistent spatial concentrations of worklessness challenge both researchers and policymakers. Devolution of policy levers invites more regional and local interventions. Looking ahead, mobility and flexibility are central to understanding adaptive labour markets amid demographic and global pressures (Green, 2006).

In this respect, transitional labour markets are also influenced by geographical reallocation of employment. Job creation and destruction are measured at the location of the workplace (e.g., plant or subsidiary), not the residence of the worker. This distinction is critical when considering regional policies, commuting patterns, or corporate structures that span multiple locations.

Career guidance professionals must recognize:

- The importance of intra-firm mobility (e.g., transfers between branches).
- The regional implications of corporate decisions (e.g., opening or closing facilities).

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- The potential for labour displacement or concentration, particularly in vulnerable or transition-intensive regions.

Understanding Labour Market Information (LMI) & Skills Intelligence

Accurately interpreting labour market trends and skill needs is more critical than ever in today's fast-changing world. Traditional forecasting alone can no longer capture the complexity of modern labour markets. Instead, skills intelligence—built through diverse methods, inclusive stakeholder engagement, and cross-sector collaboration—offers a more comprehensive and actionable understanding. This chapter explores how combining labour market information (LMI) with robust skills anticipation approaches enables better planning in education, training, employment policies—and crucially, in career guidance provision.

High-quality LMI and skills intelligence are essential tools for career guidance professionals, enabling them to support individuals in making informed choices throughout their lifelong career journey. By translating complex data into accessible insights, guidance services help learners and workers understand evolving job opportunities, anticipate future skill needs, and plan meaningful learning and career pathways. Sound skills intelligence relies not only on robust methods but also on inclusive, multi-level stakeholder collaboration. Engaging actors across education, employment, and society ensures that skills anticipation reflects real needs and informs effective decisions.

Balancing skills demand and supply enables what Cedefop terms 'permaskilling'—investing in both people and quality jobs. For career guidance, this means empowering individuals not only to respond to current opportunities but also to proactively shape their futures in resilient and fulfilling ways. By aligning skills needs and aspirations at all levels, skills intelligence strengthens career development systems and supports inclusive, evidence-based decision-making.

A comprehensive understanding of LMI and Skills Intelligence requires a review of the following key related concepts:

Skills intelligence is the outcome of an expert-driven process of identifying, analysing, synthesising and presenting quantitative and/or qualitative information on skills and labour market. Skills intelligence helps translate megatrends and aspirations of key stakeholders at national, regional, local and sectoral level into labour market trends and skill needs.Skills intelligence is the result of skills assessment and anticipation: activities aimed at evaluating current and future skill needs in the labour market in a strategic way by using consistent and systematic methods (Cedefop, 2024).

Skills need assessment is the process of identifying skill gaps and shortages, and evaluating the capacity of qualification systems (education and training provisions, funding schemes, etc.) to meet the needs of the economy;

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- this can take place at the national, regional, local, or sectoral level and aim at providing a comprehensive analysis of current skill needs and the implications of past trends for the future; it can provide information on emerging skill needs or likely future skill gaps;
- this may be provided quantitatively (e.g. with reference to the changing number of people employed in an occupation, or with a certain level of qualification), or qualitatively (e.g. with reference to providing descriptive information about the changing skill profiles within jobs); (Cedefop glossary, 2025).

Skills needs anticipation is the process of identifying skills the economy will require in the short, medium or longer term, using skills intelligence, to achieve a better balance between skill supply and demand, and to promote economic development through targeted skills investments by individuals, countries, regions, sectors or enterprises.

Common tools for skill needs assessment and anticipation include: skills forecast; skills foresight; tracking surveys; big data analysis; and skills surveys. (ILO, 2015; Cedefop).

Skills anticipation methods in the EU are based on **general LM analysis, quantitative forecasting models, qualitative methods, employer surveys, sector studies and surveys of workers/graduates, scenario development.** Statistical/survey estimates are used where reasonably reliable information is available and the demand for detail is not that great. On the other hand, econometric (or similar) estimates are used where the survey estimates cannot provide the level of detail required)**.** Estimates and projections of labour market indicators are based on the design and application of econometric models that are used to produce estimates of labour market indicators in the countries and years for which no real data exist. The existing models are designed to use the relationship between the various labour market indicators and their macroeconomic correlates (such as per capita GDP, GDP growth rates, demographic trends and country and time dummy variables) in order to produce estimates of the labour market indicators where no data exist. Estimates use specific labour market indicators such as unemployment, employment by sector and status, labour productivity and working poverty, among others, with many estimates disaggregated by age and sex (ILO, 2010). Other models use a modular approach, with the following main elements: (a) the demand side (skill needs), focusing on employment (jobs); (b) the supply side, focusing on available skills, the number of people economically active and the qualifications they hold; (c) imbalances, comparing the demand and supply side modules, adopt common data, methods and models for all countries to produce a comprehensive and consistent set of skill projections. The database draws primarily on Eurostat sources, including demographic data, national accounts (NA) and the labour force survey (LFS). Individual country experts are involved in peer review and results validation. However, the use of common models and assumptions does not always allow incorporation of local data and factors that may affect skill supply and demand. Therefore, other country-specific

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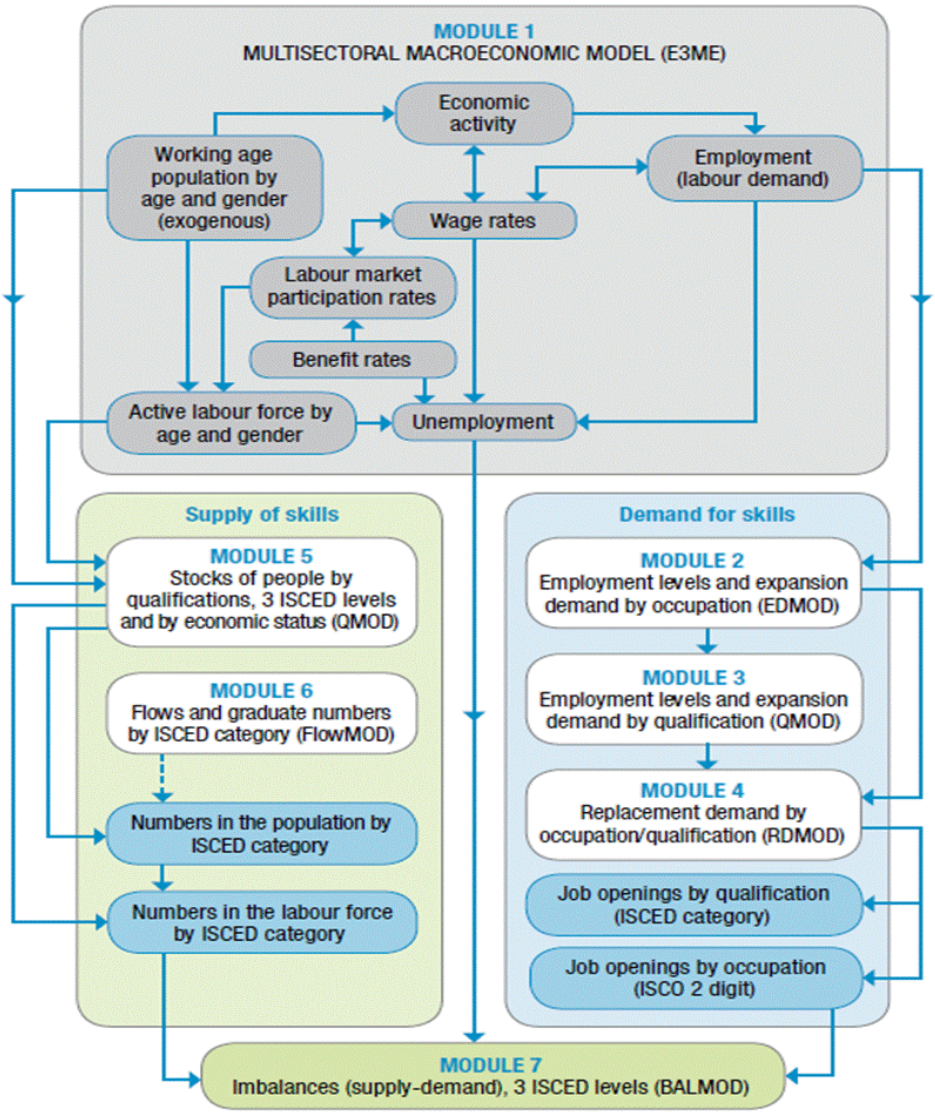
information might be needed to complement the results.The modelling of skill supply and demand consists of the multisectoral macroeconomic module, used to form projections of labour demand (employment) at sectoral level and labour supply (the economically active labour force) by demographic group, modules to cover employment levels and expansion demand for occupations and qualifications, module covering RD and looks at qualification supply model (stocks) and modules focusing on the supply of skills as measured by the highest qualification held, analysing stocks and flows, respectively, while also a specific module reconciles skill demand and supply (Cedefop, Eurofound, 2018).

Figure 1. **Modelling skill supply and demand**



Source: Cedefop, Eurofound, 2018.

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Indicators models, applied in the euro area and individual G7 economies, on a near-term assessment also take particular account of projections from a suite of statistical models using high frequency indicators to provide estimates of near-term quarterly GDP growth, typically for the current and next quarter or so. This analysis builds on the work of Sédillot and Pain (2003) and Mourougane (2006) in using short term economic indicators to predict quarterly movements in GDP by efficiently exploiting all available monthly and quarterly information. These models typically combine information from both "soft" indicators, such as business sentiment and consumer surveys, and "hard" indicators, such as industrial production, retail sales, house prices etc. and use is made of different frequencies of data and a variety of estimation techniques. The procedures are relatively automated and can be run whenever major monthly data are released, allowing up dating and choice of model according to the information set available (OECD, 2011).

There are also **foresight and forecasting approaches** applied either at national level covering the whole economy or – in the case of foresights – at sector level for one or more sectors within the economy. ***Qualitative foresights*** require less formalised and less extensive data inputs, they do not feature quantitative modelling of labour market relations and are easier to set up initially. Foresights depend on the inputs from key experts and stakeholders, as a highly interactive tool of social dialogue with representatives of the private sector ***Quantitative* skills forecasts** offer a consistent and detailed picture of future developments by sector, occupation, qualification or skills, based on the availability of adequate labour market data, both in quality and in the data series length, combining (modules generating) supply by qualification, demand by sector, occupation, and possibly skills or qualification. Both qualitative and quantitative elements can be mixed to develop a skills anticipation model or method (ET, Cedefop, ILO. 2016).

Labour market information describes the condition of the labour market, past and present, as well as future projections. It makes clear where work opportunities are increasing or decreasing, what occupations exist, what you need to study to become a professional in that occupation, what is required to take up an occupation, how one can find a job, change job or progress in a career (Cedefop LMI toolkit)

Labour market information systems are mechanisms or processes for gathering, organising and providing information about the state of the labour market and/or professions and jobs. This includes recording changes taking place within the labour market, employment, jobs and the professions.Such systems often include databases linked to ICT systems and accessible via the internet. They are usually designed to be used by career counsellors and also by clients on a self-help basis (ELGPN glossary, 2014).

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Interpreting Skills Gaps and Trends in the Labour Market

Transitionary labour markets often reveal or exacerbate skills mismatches—gaps between the competencies demanded by employers and those offered by the workforce. These can emerge from both supply and demand sides:

- Supply-side mismatches:
  - Underskilling: Workers lack the competencies required by their current role.
  - Overskilling: Workers possess skills not fully utilized in their role.
  - Horizontal mismatch: Workers employed outside their field of education or training.

- Demand-side mismatches:
  - Skill shortages: A lack of suitably qualified candidates in the labour market.
  - Skill gaps: Workers are available, but lack specific skills required by employers (e.g., digital literacy, data analysis).

Understanding skills gaps and labour market trends involves analysing the mismatch between the skills employers need and the skills available in the workforce. This process is essential for shaping effective education, training, and employment policies and for supporting career guidance and workforce planning.

Cedefop Skills intelligence tool, building on over a decade of experience in developing and disseminating skills intelligence, blends analytical and research work to provide better and more synthetic evidence on current and future skills and labour market trends. Narrative-driven visualisations are used to help skills intelligence users understand what is trending in occupations, sectors, countries, and skills. It provides a set of indicators that help monitor and interpret these trends, focusing on both skills demand and supply, as well as the alignment between them. The indicators draw on data from Cedefop's second European Skills and Jobs Survey (ESJS2) and incorporate future estimates based on Cedefop Skills forecast employment projections. Key indicators include:

- Hard-to-fill vacancies: Jobs that employers report as difficult to recruit for, often due to skill shortages or mismatches.
- Skills underutilisation: When workers possess more skills or qualifications than their job requires, indicating a potential oversupply or misalignment.
- Employment by sector: Information on a broad sector level (such as Business services), or a more detailed sector level, where available in the classification (such as Financial and Insurance Activities), about employment structure and recent and expected future trends related to jobs and skills within the sector.
- Employment by occupation: Trends in the number of people employed in different occupational categories, which reveal shifts in labour market demand.

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- Employment by qualification level: Monitoring how jobs are distributed across levels of education, helping assess the demand for high-, medium-, or low-skilled workers.
- Mismatch by qualification level: Identifies the proportion of workers whose qualifications do not align with the requirements of their job.
- Skills needs from employer surveys: Employer-reported skill needs, often identifying specific technical or transversal skills in demand.
- Online job vacancies analysis: Real-time data from job postings showing emerging trends in occupations and required skills.

Cedefop's Skills Intelligence tool offers interactive dashboards that allow practitioners to explore labour market trends across EU countries. These include insights on skills demand by occupation and sector, emerging and declining job roles, and future employment projections. Users can compare data across time, regions, and qualification levels to support evidence-based career guidance and education planning. Occupation dashboards contain a description as well as key facts and indicators relevant to particular occupation. Dashboards also offer links to other indicators relevant to skills, jobs and the labour market, as well as links to qualitative information on the occupation (data insights or blog articles). By regularly reviewing relevant dashboards, career guidance professionals can better understand labour market trends, identify emerging skills needs, and provide individuals with timely, relevant information to support informed career decisions and successful transitions.

Integration of skills intelligence into career guidance practice

Transitionary labour markets are the defining feature of contemporary employment systems. They call for new ways of understanding employment change, skills development, and individual career management. For guidance practitioners, embracing this complexity is necessary. By grounding their work in robust labour market concepts and evidence, they can empower individuals to navigate uncertainty and seize the opportunities of economic and social transformation.

For career guidance professionals, navigating the complexities of transitional labour markets is key to delivering relevant and responsive career guidance support by.

1. Adopting a dynamic and regional perspective: Tailor support based on local labour market trends, recognizing the potential for volatility and opportunity within specific sectors or regions.
2. Promoting adaptability and resilience: Help clients develop transferable skills, embrace continuous learning, and prepare for multiple career transitions across their working life.
3. Supporting inclusive transitions: Pay special attention to vulnerable groups (e.g., low-skilled workers, women, youth, ethnic minorities) who may be disproportionately affected by structural changes.
4. Using labour market information (LMI) critically: Go beyond net employment figures to explore gross employment flows, sectoral transformations, and skills demand to guide clients effectively.

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5. Fostering cooperation with employers and training providers: Co-create pathways that address both current mismatches and future skill needs in a proactive, forward-looking manner..

Career guidance practitioners can use LMI databases and tools to support clients' well informed and timely career decisions by:

- **Translating complex labour market trends into accessible career information.** Practitioners can interpret and communicate up-to-date LMI—such as high-demand occupations, emerging skills, or declining sectors—in ways that are understandable and relevant to diverse individuals (students, jobseekers, career changers). This helps users see realistic options and future prospects.

- **Linking individual profiles to labour market opportunities.** By comparing a person's skills, interests, and qualifications with current and projected labour market needs, practitioners can suggest fitting career paths or alternative roles where transversal skills are transferable.

- **Promoting future-oriented career planning:** Using LMI from sources such as Cedefop's skills forecasts, guidance professionals can help individuals anticipate changes and make proactive learning or career moves, rather than reacting to unemployment or job loss.

- **Supporting transitions and lifelong learning:** Understanding occupational trends enables practitioners to guide individuals through key life transitions—school to work, unemployment to employment, or mid-career shifts—by suggesting relevant upskilling or reskilling pathways aligned with labour market needs.

- **Addressing misinformation and biases:** Career choices are often influenced by outdated perceptions or social pressures. Reliable LMI helps practitioners provide objective, evidence-based information that challenges stereotypes and expands clients' understanding of available and viable options.

- **Empowering career self-management:** Integrating LMI into career education and guidance sessions builds clients' capacity to independently seek out and interpret labour market trends, making them more adaptable and resilient in navigating their careers.

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Online Interactive Resources

Cedefop Labour market information (LMI) toolkit

Integration of labour market information into lifelong guidance making use of ICT tools - training modules, resources and tools for guidance practitioners

The International Classification of Occupations (ISCO)

The **International standard classification of occupations**, abbreviated as **ISCO**, is an international classification under the responsibility of the International Labour Organization (ILO) for organising jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job. ISCO is intended both for use in compiling statistics and for client-oriented uses such as the recruitment of workers through employment offices, the management of migration of workers between countries and the development of vocational training programmes and guidance.

Labour Force Statistics (LFS, STLFS, RURBAN databases)

Labour force statistics and the related ILOSTAT databases serve as a foundation for monitoring and assessing many of the pertinent issues related to the functioning of labour markets.

Statistical classification of economic activities in the European Community (NACE)

The 'statistical classification of economic activities' in the European Community, abbreviated as NACE, is the classification of economic activities in the European Union (EU).

Statistical classification of products by activity (CPA)

The statistical **c**lassification of **p**roducts by **a**ctivity (CPA), is the classification of products (goods and services) in the European Union. The CPA product categories are related to the economic activities of the statistical classification of economic activities (NACE).

***ILO* Worker and sector profiles (PROFILES database)**

Provides definitions for groups of occupations and/or sectors recombined based on the International Standard Classification of Occupations (ISCO-08 or previous versions) and/or the International Standard Industrial Classification of All Economic Activities (ISIC rev. 4 or previous versions).

Skills intelligence online tool

Skills intelligence tool built by Cedefop provides skills intelligence visualisations based on a set of Indicators originate from various sources and several datasets, utilising the Skills forecast, the European skills and jobs survey, and Skills OVATE and complemented by official statistics produced by Eurostat, such as the European Labour Force Survey (EU-LFS), European Survey on Income and Living Conditions (EU-SILC) and ICT usage in households and by individuals.

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European Union Labour Force Survey (EU LFS)

The EU-LFS is a large household sample survey providing quarterly results on labour participation of people aged 15 and over and on people outside the labour force.

European Classification of Skills, Competences, Qualifications and Occupations (ESCO) and the Digital Labour Market - video

The Digital Revolution has changed the way recruitment is done in the labour market. In this video, testimonials of professionals from major digital companies highlight the difficulties in recruiting the right people with the right skills for the changing digital labour market. The European Classification of Skills, Competences, Qualifications and Occupations (ESCO) classification offers a multilingual effective solution to the current job matching skill challenges. It makes the recruitment process easier by linking employers with the right job applicants.

CompNet

The Competitiveness Research Network (CompNet) is a research network originally founded by the European System of Central Banks in 2012 to foster the debate on competitiveness issues among policy institutions and researchers. The Network is the producer of a top standard micro-founded dataset covering productivity indicators for some 20 European countries.

EU Social Economy Gateway https://social-economy-gateway.ec.europa.eu/index_en

Resources for further study

Skills and labour market
https://www.cedefop.europa.eu/en/themes/skills-labour-market
Skills and changing workplaces
https://www.cedefop.europa.eu/en/themes/skills-changing-workplaces

Cedefop (2024). Roadmapping the skills revolution - Cedefop skills intelligence in action, virtual get-together organised by Cedefop
(Invited key stakeholders and users of skills intelligence to discuss the opportunities for moving skills intelligence forward, and reflect on challenges in analysing, providing, and using skills and labour market data and qualitative information.) https://www.youtube.com/watch?v=eIdk4ZQAuAU

Cedefop (2024). *Next generation skills intelligence for more learning and better matching: skills anticipation trends, opportunities and challenges in EU Member States*. Luxembourg: Publications Office. http://data.europa.eu/doi/10.2801/180485

Cedefop (2024) Making skills intelligence actionable

Cedefop (2019) Crafting skills intelligence - How Cedefop transforms information on skills into powerful evidence for decision-making, blog article.

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ILO EMPLOYMENT TRENDS UNIT (2010) Trends Econometric Models: A Review of Methodology https://www.ilo.org/publications/trends-econometric-models-review-methodology

ILOSTAT COVID-19 and labour statistics **https://ilostat.ilo.org/topics/covid-19**

IOE Brief - understanding the Future of Work

ELGPN (2014) Lifelong Guidance Policy Development: Glossary https://www.elgpn.eu/glossary

Szabó-Szentgróti, Gábor & Végvári, Bence & Varga, József. (2021). Impact of Industry 4.0 and Digitization on Labor Market for 2030-Verification of Keynes' Prediction. Sustainability. 13. 7703. 10.3390/su13147703.

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Self-evaluation Questions

Targeted multiple-choice questions will support self-evaluation within the second module of the course, helping learners to actively reflect on the educational content of Module 2 and assess their grasp of the key concepts and theoretical foundations.

1. What is the primary purpose of labour market intelligence (LMI) in career guidance?

A. To match workers only to current job vacancies
B. To identify the political impact of digitalization
C**. To assess and anticipate skills needs for informed decision-making**
D. To monitor employee performance in real time

2. Which of the following is considered a key *megatrend* driving Industry 4.0?

A. Manual data entry
B. Fossil fuel expansion
C. **Human-machine collaboration**
D. Reduced use of smart technology

3. Which job role is considered most vulnerable to automation according to Industry 4.0 projections?

A. Psychologist
B. **Warehouse worker**
C. Research scientist
D. Project manager

4. What is a major driver of job creation in the green transition?

A. Decrease in industrial manufacturing
B. **Investments in renewable energy and climate action**
C. AI-based automation in retail
D. Outsourcing of low-skilled jobs

5. What best describes the *job displacement vs job creation* dynamic in Industry 4.0?

A. Automation creates more jobs in all sectors equally
B**. Automation displaces routine jobs but creates new ones requiring different skills**
C. All low-skilled jobs will be replaced permanently
D. There is no significant impact on employment trends

6. What is the main benefit of using data analytics in career guidance?

A. Reduces the need for human counsellors
B. **Helps recommend emerging job roles and sectors based on trends**
C. Allows prediction of an individual's personality
D. Automatically matches every individual to a job

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Reflection Activities (Module 2: 6 activities)

Activity 1: Megatrends Mapping – Understanding Industry 4.0 and the Future of Work

Activity type: Group Mapping & Analysis

Learning goals:

- Develop an understanding of key Industry 4.0 megatrends and their sectoral impacts.
- Strengthen analytical skills in identifying how technological and societal shifts influence occupations, skills, and work organization.
- Enhance the ability to anticipate and interpret labour market changes relevant to career guidance practice.
- Foster collaborative problem-solving and systems thinking in analysing the future of work.

Expected outcome:
Trainees will deepen their ability to connect trend analysis with practical implications for career transitions and guidance strategies, especially for clients navigating fast-changing labour markets.

Specifications:
Format: Individual or group activity (3–4 people)
Duration: 455 minutes

Instructions for Trainees

You are given a list of six key Industry 4.0 megatrends below.

1. Choose one economic sector (per group) (e.g., healthcare, logistics, education, tourism, agriculture, manufacturing).
2. Discuss and map:
    - Which of the megatrends influence this sector the most?Which megatrend did your group find most disruptive or transformative for the sector you explored?
    - How do these megatrends influence not only occupations but also the nature of work (e.g., autonomy, collaboration)?
    - How are existing occupations within the sector likely to evolve?
    - What new roles or skills might emerge in response?
3. Create a simple "megatrend map" showing connections between the trends, job changes, and skill shifts in your sector.

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List of Megatrends:

1. Automation and Robotics – Increasing use of machines and robotic systems in various industries.
2. Artificial Intelligence (AI) and Machine Learning – The growing ability of machines to process data and make decisions.
3. Digitalization and Big Data – Rise in digital systems managing massive data flows.
4. Sustainability and Green Technologies – Transition toward eco-friendly practices and jobs.
5. Human-Machine Collaboration – Integration of human skills with intelligent systems.
6. Demographic Change and Globalization – Ageing populations, migration, and global competition.

Tips for Facilitator:

Provide handouts listing the six megatrends. Support groups in choosing varied sectors to ensure diversity in insights. Encourage group discussion and reflections about:

- the challenges career practitioners might face in keeping up with sectoral changes due to Industry 4.0,
- how can understanding relevant megatrends support their work with young people or adults in career transition
- In what ways they can integrate megatrend knowledge into guidance materials or sessions

Activity 2: Labour Market Storyboards – Job Displacement vs Job Creation

ActivityType: Case study/ Role Play

Learning Goals:

- Understand the dynamics of job displacement and job transformation in the context of automation.
- Develop the ability to analyze task-level impacts of automation on specific occupations.
- Strengthen creative thinking and career transition planning skills.
- Practice empathetic and future-focused guidance approaches for clients facing labour market disruption.

Expected Outcome:

Trainees will envision the journey from an at-risk role to an emerging or evolving occupation, applying analytical and strategic thinking to identify transferable skills and propose upskilling pathways to support clients in navigating technology-driven career changes.

Specifications
Format: Individual or group activity

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Duration: 45 minutes

Instructions for Trainees:

You are assigned one of the following occupations that are considered at risk due to automation:

- Data Entry Clerk
- Retail Cashier

Your task is to build a 4-part storyboard including:

1. Panel 1 – Describe the current job and its key repetitive tasks.
2. Panel 2 – Identify what aspect of the job is being automated.
3. Panel 3 – Propose a new or evolving role emerging due to automation.
4. Panel 4 – Outline a career transition pathway with new skills required.

Then reflect /discuss the following issues:

- How easy or difficult was it to imagine a positive transition for the role at risk?
- What skills were transferable from the old job to the new one?
- How can you support clients who feel anxious or fearful about automation?
- What labour market information sources would you use to track emerging roles in real time?
- How can you incorporate future-oriented thinking into career conversations?

Facilitator Tips:

Encourage use of real-time labour market data to support storyboard realism. Highlight positive job transitions and transferable skills. Promote future-oriented, strengths-based dialogue to manage client anxiety around automation.

Activity 3: Explore Green jobs

Activity Type : Case study

Learning Goals

- Understand and apply sustainability-oriented career guidance theories and participatory approaches to enhance career decision-making, such as the Psychology of Sustainability, Green guidance approach, Thriving with Social Purpose framework .
- Strengthen career awareness of green job markets, required competences, and tools for informed career planning.
- Utilize a strengths-based approach to identify Luisa's capabilities and align them with emerging green roles.

Expected outcome:

Trainees will demonstrate increased awareness of future oriented green competencies and employment trends, linked to green guidance practices. They will be able to critically reflect on

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barriers and enablers to transitioning into sustainable careers, especially for youth, focusing on meaningful work and long-term societal and individual well-being.

Specifications

- Duration: 45 minutes
- Format: Individual or group activity

Scenario:
Luisa is a 20-year-old high school graduate living in a coastal town that has recently experienced the effects of climate change—rising temperatures, water shortages, and extreme weather. Deeply concerned about the future of the planet, she has developed a strong sense of responsibility toward environmental protection and wants her career to reflect her values. She is energetic, digitally literate, and active on social media platforms, where she often shares content about sustainability and eco-conscious living. However, despite her passion, Luisa feels uncertain and overwhelmed by the vague notion of "green jobs." She's unsure whether her interest can translate into a viable career path that offers stability and purpose. During a career counseling session, Luisa shares:
"I'm passionate about fighting climate change, but I don't know what careers are out there. Can I really make a living doing something meaningful for the planet? What are my options? And what kind of skills do I need to get there?"

Instructions for Trainees

Your task is to support Luisa by identifying viable green career pathways and outlining a counseling strategy based on sustainability-related theories and collaborative methods. Your steps to help Luisa clarify her values and understand the environmental impact of career choices should include;

- Use the GreenComp Framework to identify sustainability competences and discuss what defines a "green" job. Agree on the skills she needs to pursue a green career.
- Explore green occupations using ESCO (e.g., keywords like "solar," "waste," "sustainable").
- Consult Cedefop's labour market insights on green skills and workplace green transformation.https://www.cedefop.europa.eu/en/publications/9197 https://www.cedefop.europa.eu/en/themes/skills-labour-market

- Select three green occupations suitable for Luisa, considering both emerging and traditional roles.

Tips for Facilitator: Encourage trainees to reflect on challenges might clients face in accessing or transitioning into sustainable work and green careers, and how guidance practitioners can promote well informed green career awareness.

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Activity 4: Exploring LMI and Interpreting Skills Intelligence Data

Activity Type: Case study Simulation

Learning goals:

- Develop skills in accessing and interpreting labour market and skills intelligence data using trusted tools such as Cedefop's Skills Intelligence platform.
- Understand how to translate labour market forecasts into meaningful, client-centred career guidance.
- Build confidence in using LMI to support evidence-based decision-making in career planning, especially for international mobility within the EU.
- Enhance awareness of ethical and inclusive use of data in guidance practice.

Expected outcome:
Trainees will be able to identify current and future job trends in the EU labour market, assess emerging skills and qualification needs, and promote realistic and future-focused career planning, aligned with digital transition and the changing world of work.

Specifications
Format: Individual or group activity
Duration: 45 minutes

Scenario:
John, 23, recently completed his undergraduate studies in health sciences and is now considering postgraduate options to specialize as a health associate professional. He's interested in areas like diagnostic imaging, community health, and digital health technologies but feels uncertain about which path offers the best long-term prospects. John is particularly keen on working abroad in the EU and wants to align his choice with current and future labour market demand across member states. He is seeking reliable information on emerging roles, skill needs, and mobility opportunities in the European health sector.

Instructions for Trainees: :

- Visit Cedefop skills intelligence tool https://www.cedefop.europa.eu/en/tools/skills-intelligence to search for health sector skills forecast.
- Search for interactive dashboards that allow you to explore labour market trends across EU countries.
- Map insights on skills demand in the health sector, including emerging and declining job roles, the impact of digital transition and AI, and future employment projections.
- Compare data across time, regions, and qualification levels to support evidence-based career guidance and education planning.
- Based on the forecast, discuss how to help John understand:what roles are growing, what key skills are in demand, what training or postgraduate course might help him enter the field.
- Reflect on your competency and readiness to use labour market and skills intelligence data to provide informed and future oriented career information.

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Facilitator Tips:

Encourage trainees to reflect on their confidence in interpreting labour market data and any challenges they encountered when translating forecasts into practical guidance. Prompt discussion on how skills intelligence can enhance the relevance and accuracy of career advice, which client groups benefit most from data-driven support, and how to ensure its ethical, inclusive, and client-centred use in practice.

Activity 5: Highlight local career opportunities in resilient sectors for NEETs

Activity Type: Case study

Learning goals:

- Explore resilient economic sectors with potential for youth employment in remote regions.
- Develop ability to use labour market data tools to identify localized career guidance pathways.
- Develop inclusive career guidance strategies towards sustainable and future-oriented career choices.

Expected outcome:
Trainees will be able to identify resilient and emerging local career opportunities relevant to NEETs and formulate tailored guidance strategies using LMI tools and updated labour market insights.

Specifications

- Format: Individual or group activity
- Duration: 60 minutes

Scenario:
Giulio, 26, is a young NEET from a coastal village in Sicily, Italy. After dropping out of vocational school, he has struggled to find stable work. Although he has experience in seasonal tourism and informal construction jobs, he feels disconnected from the labour market and uncertain about his future. Giulio is now seeking career guidance to explore opportunities in sectors that offer stability and growth in his local region. He expresses an interest in practical work and wants to contribute to his community without having to move far from home.

Instructions for Trainees: :

- Visit **YOUTHShare Research Center - Youth Employment Monitor** and EURES (EURopean Employment Services)
- Search for local labour market trends in resilient sectors, such as Green economy, Blue economy, Circular economy, Health and care services, Digital services, Sustainable tourism and agrifood.
- Identify 3 local job roles or training pathways suitable for Giulio.
- Outline a career guidance strategy tailored to his background, interests, and location.

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- Consider challenges (e.g., skill gaps, mobility, lack of awareness) and propose realistic support measures.

Facilitator Tips:

Encourage trainees to reflect on the social and economic barriers NEETs may face and how guidance professionals can promote engagement and motivation of diverse disadvantaged groups, with the use of data-informed decision-making tools (like labour market monitors) in career guidance practice.

Activity 6: Skills intelligence challenge

Type of activity: simulation game

Learning objectives:
- develop basic skills in labour market data analysis
- Identify skill gaps and forecasted job trends
- Translate data into career guidance insights

Expected outcomes:
Trainees will use open-access LMI platforms and datasets to identify trends, risks, and opportunities in a given region or sector, so as to provide updated career information and future informed guidance.

Specifications:
- Individual or group activity.
- Duration: 45 minutes.

Description:

Scenario

Marko, 30, has a solid background in administrative work but feels his current role offers limited growth opportunities. He's motivated to upskill and explore career pathways with greater stability and long-term prospects. Additionally, he is seriously considering working abroad in the EU, particularly in countries with strong demand for administrative, business support, or tech-enabled service roles.
Marko is unsure what sectors are growing, which new skills are needed, or how to choose an upskilling path that aligns with both local and international labour market demand. He wants guidance that is data-informed, realistic, and future-proof.

Instructions for Trainees

Your goal is to support Marko in identifying promising career directions and mobility opportunities based on labour market intelligence (LMI). To do this, you will analyze labour market data across 3–4 selected EU countries and propose informed guidance. You may choose different countries based on your own context.

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1. Explore LMI platforms such as CEDEFOP Skills Intelligence, EURES Labour Market Information, ESCO (European Skills, Competences, Qualifications and Occupations), National platforms (e.g., skills observatories, job trend dashboards, training databases)
2. Investigate and Compare:
    - Top growing sectors in each country (particularly those related to administration, business services, digital transformation).
    - In-demand occupations and key skills in administrative, support services, or related hybrid roles (e.g., digital, soft, and transversal skills).
    - Upskilling or training opportunities available in those countries (including adult education programs, EU-supported training, or language requirements).
3. Suggest upskilling pathways that Marko could pursue, including mobility considerations (language, qualification recognition, social integration supports).

Facilitator Tip:

Encourage trainees to compare national and EU-level data to show how mobility choices may differ by region. Emphasize the importance of combining LMI with individual values, goals, and context.

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Module 3: Digital career planning within industry 4.0 – Using Digital Career Guidance Tools and Methods

Learning scheme

Module 3, "Digital career planning in industry 4.0 – Using Digital Career Guidance Tools and Methods" aims to provide guidance practitioners, VET trainers, and social inclusion professionals with the knowledge and skills needed to effectively use digital career guidance tools and innovative methods to assist individuals in navigating the rapidly evolving labour market.

Learning Objectives:

This module will support trainees to:

- Familiarize with digitized methods and media, as well as digital communication and collaboration practices essential for modern career guidance services.
- Acquire knowledge on the effective use of advanced Labour Market Information LMI & skills intelligence databases and other digital and automated tools, gamified assessment platforms, career chatbots, and career management applications ("serious games").
- Utilize digitized methods and advanced technologies for career education and exploration activities, incorporating innovative tools.

Expected Learning Outcomes:

By the end of this module, trainees will be able to:

- Identity and utilise technology systems and methods for organizing, classifying and sharing information (e.g. Modern electronic archiving tools and data management systems, Blockchain & microcredentials systems etc.).
- Communicate with clients via virtual counseling sessions and different tools of synchronous-asynchronous communication (e.g. telephone helplines, video communication, email communication, live webinars with chat function, chatbots etc.)
- Support clients in exploring personal skills as well as learning and employment opportunities, using digital platforms, career chatbots, psychometric gamified assessment and job matching etc)
- organise and use digital interactive career education experiences supported by advanced technologies (Virtual - Augmented Reality) e.g. virtual career days, 3D career videos, career serious games, virtual workplace simulations, etc.

Key words:
Digital Career Guidance, gamification, serious games, Virtual Reality (VR) and Augmented Reality (AR)

Motivation Questions

- How can digital tools and emerging technologies transform the way we support individuals in making informed and empowered career choices in a rapidly changing world of work?

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- What digital tools do you utilize in your work as a career guidance practitioner, and how do you believe they contribute to enhancing the quality of the services you provide?

Suggested Learning Content

- The role of technology in modern career guidance - Overview of digital tools in career counseling and digital career planning within Industry 4.0
- Digital Tools for Career Education & Exploration - Career chatbots and AI-driven guidance tools. Gamification and serious games: Enhancing career assessments and decision-making
- Blockchain and microcredentials: Digital validation of skills and qualifications
- Labour Market Intelligence (LMI) & Skills Intelligence Databases - How to access and use LMI platforms to inform career counseling
- Collaborative and Communication Tools in Career Counseling - Digital platforms for client communication and feedback. Creating personalized career plans using digital tools. Enhancing client engagement through interactive and visual technologies. Managing digital career portfolios and online presence (LinkedIn, personal websites)
- Utilise the Careers 4.0 digital tools

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Theoretical background

3.1 The Digital Transformation of Career Guidance in Industry 4.0

i. The Role of Career Practitioners in a Digital World

The world of work is undergoing radical change, driven by Industry 4.0—a revolution powered by technologies such as artificial intelligence (AI), automation, big data, and smart systems. These changes are reshaping occupations, creating new roles, and demanding new skills at a rapid pace (Eurofound, 2023). Individuals now face a more complex and less predictable labour market, where adaptability and lifelong learning have become essential.

In this evolving environment, career practitioners play a vital role. Their responsibility has shifted from offering static, one-time advice to supporting individuals in managing their lifelong career development in a digitized, dynamic world. They are increasingly called upon to help clients make sense of continuous change, identify emerging opportunities, and develop strategies to stay employable.

As emphasized by Euroguidance (2024), this requires practitioners to act not only as advisors, but as facilitators of career adaptability, digital navigators, and partners in exploration. Effective digital career guidance is no longer simply about introducing tools, but about enabling people to make informed, autonomous decisions about their futures — decisions that are aligned with their values, motivations, and a constantly changing labour market.

The use of ICT in career guidance can be understood not only as a tool to support services, but also as an alternative delivery method and even an agent of systemic change (Watts, 2010; Kettunen, 2017). ICT enables practitioners to deliver career services across time and space, personalize support through automation, and foster collaborative learning and co-careering via digital platforms (Kettunen, Vuorinen & Sampson, 2015; Kettunen, 2017). As technology evolves, its integration into guidance services is no longer optional but essential for future-facing practice.

The European Lifelong Guidance Policy Network (ELGPN) emphasizes that integrating ICT into career guidance should go beyond service-level decisions. It requires a jointly agreed cross-ministerial strategy and a shared conceptual framework across sectors like education, training, employment, and social policy (Kettunen, Vuorinen & Ruusuvirta, 2016). ELGPN (2015) outlines ICT's roles not only as a tool or alternative, but as an **integrative agent** and **administrative backbone** for quality assurance, data collection, and policy alignment.

Practitioners must therefore be digitally competent, future-oriented, and inclusive, using technology to enhance—not replace—the relational, reflective core of guidance.

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ii. Digital Competence and Core Practitioner Skills

To provide high-quality, responsive career services in the context of Industry 4.0, practitioners must acquire a range of digital skills. These are outlined in several European frameworks, such as the DIGCOMP for Educators (European Commission, 2022) and the ICCDPP Guidelines (2020), and reflect the multifaceted role of the modern career professional.

The EU's DigComp framework offers a structured way for career practitioners to assess and build their digital competences. It defines five key areas: information/data literacy, communication/collaboration, digital content creation, safety, and problem solving. Integrating DigComp into professional development allows practitioners to set goals, track progress, and tailor their learning pathways (European Commission, 2022). These competencies are essential for delivering accessible, ethical, and future-oriented career services.

Therefore, the key digital competence areas for career practitioners include:

- **Information & Data Literacy** Practitioners must be able to identify, evaluate, and interpret digital labour market information (LMI), helping clients access reliable insights into skills demand, sectoral trends, and training opportunities. They must also guide clients in navigating digital information overload and avoiding misinformation.
- **Digital Communication & Collaboration** Effective engagement requires fluency in various digital channels such as email, chat apps, video calls, and collaborative platforms. Practitioners should tailor communication styles to different client groups, offering synchronous and asynchronous options, and fostering a sense of connection in online interactions.
- **Digital Content Creation** Developing clear, attractive, and interactive materials (e.g., infographics, CV templates, reflection tools) enhances client engagement and learning. Tools like Canva or Google Slides can be used to co-create personalised career content that supports exploration and planning.
- **Safety** Digital safety is critical in career services, especially when handling sensitive personal information. Practitioners must understand privacy regulations (e.g., GDPR), apply data protection practices, manage cyber risks, and educate clients about digital safety and well-being. Ensuring secure communication, encrypted storage, and informed consent is foundational to ethical practice.
- **Problem Solving** Practitioners need to identify digital challenges, assess client needs, and choose or adapt tools creatively and flexibly. This includes finding solutions to access issues (e.g., low digital literacy), adapting digital tools to diverse populations, and innovating service delivery in response to evolving client expectations or technological changes.
- **Adaptability and Lifelong Learning** Beyond technical competence, career professionals must maintain an agile mindset. Continuous professional development is key—especially through **Technology-Enhanced Learning (TEL)** environments such as MOOCs, peer learning platforms, or blended learning models (Bimrose & Brown, 2019). These not only build practitioner competence, but also foster international learning communities and identity transformation across roles and systems.

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iii. Equity, Access, and Digital Inclusion

While digital tools can enhance access and innovation in guidance services, they also risk exacerbating inequality. Not every client has equal access to technology, fast internet, or digital literacy skills. Practitioners must address these disparities by ensuring services remain inclusive, flexible, and accessible.

Some inclusive practices include:

- Offering hybrid models, combining digital with in-person support.
- Selecting user-friendly platforms with intuitive interfaces.
- Providing additional support or training for clients unfamiliar with technology.
- Ensuring language, accessibility, and cultural relevance are factored into all digital content.

Example: For clients with limited literacy or digital skills, a practitioner may replace text-heavy platforms with voice-guided apps or offer guidance via WhatsApp voice messages. For NEET youth or migrant populations, they might integrate visual storytelling tools and group sessions in community centres.

Inclusion is not simply about providing access to technology—it's about designing services that meet clients where they are and removing digital barriers to career empowerment. As Euroguidance (2024) states, equity must be embedded in every digital solution.

3.2 Tools for Digital Career Exploration and Education

Career guidance professionals need to be aware of—and skilled in using—platforms that support career self-exploration, labour market awareness, and skill matching. There are several digital tools that can assist them in their daily practice, such as job platforms, skill matching tools, career chatbots, synchronous and asynchronous guidance tools.

1. Job and Labour Market Data Platforms

Labour Market Information (LMI) systems are a core component of career information systems (CIS), offering structured and accessible data to support informed career decisions. These systems provide insight into employment trends, qualifications, skill demands, and occupational forecasts (ELGPN, 2014; Attwell & Hughes, 2019). When well-integrated, LMI tools enhance both individual guidance and broader policy strategies. The use of **big data analytics** and artificial intelligence in LMI systems is transforming career guidance by offering "real-time" insights into market trends and educational outcomes (Fondation Robert Schuman, 2020; Bright, 2015). While promising, these tools also raise questions about data quality and ethics, requiring practitioner awareness and user education.

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Labour Market Information (LMI) platforms provide users with structured insights into current and future job trends, required skills, and job opportunities. Career practitioners can use LMI and skills intelligence platforms to ground their guidance in real-time and forecasted labour market trends. Platforms such as CEDEFOP's Skills Panorama or ESCO provide accessible, structured data about in-demand occupations, emerging sectors, required skills, and regional job market dynamics. This information helps practitioners offer targeted advice to clients on training opportunities, job availability, and future-proof career pathways.

EURES – European Job Mobility Portal EURES Offers job search by country, information on living and working conditions, and a CV builder. **Use for practitioners**: They can use it to support clients in exploring mobility within Europe, understand sectoral trends and explore job offers and application procedures

ESCO – European Skills, Competences, Qualifications and Occupations https://esco.ec.europa.eu Framework that links skills with occupations and qualifications. **Use for practitioners**: They can help their clients exploring transferable skills, guiding vocational training paths and aligning CVs to market language

Skills Intelligence (by CEDEFOP) https://skillspanorama.cedefop.europa.eu European-wide skills forecast data, future job needs, and sectoral analyses. **Use for practitioners**: They can use it to back guidance with evidence and tailor suggestions to national/regional labour needs

2. Self-Exploration & Career Matching Tools

Self-exploration and career matching tools are essential components of career guidance, designed to help individuals gain deeper insight into their personal characteristics—such as interests, values, personality traits, and skills—and connect them to suitable educational or occupational pathways. These tools typically include interest inventories, values clarification questionnaires, personality typologies, competence assessments, and platforms that suggest career options based on user profiles. They are commonly used by practitioners in both individual and group settings to guide discussions, support reflection, and facilitate early-stage career planning. Their structured formats allow users to identify patterns in their preferences and abilities, contributing to more informed and confident career decision-making.

While these tools are powerful, they are often developed to reflect specific national education and labour systems. Therefore, career practitioners are encouraged to explore tools tailored to their own country's context. This can be done by checking national Euroguidance or EURES sites, exploring resources provided by Ministries of Education or Labour, or examining materials used by local schools, guidance centres, or universities. Using country-specific keywords can help locate relevant resources.

Careers4.0 platform (careers4-0.eu) is this kind of tool that will assist career practitioners to find out the interests and skills of their clients and match them with job opportunities.

Other country-based tools:

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Cyprus:

https://www.moec.gov.cy/ysea/en/,

Greece: MyCareer/MySkills https://e-stadiodromia.eoppep.gr Career self-assessment, job values, interests, career decision, e-portfolio.

Italy:

Romania: www.amn.ro

Spain: https://www.educaweb.com/orientacion/intereses-profesionales/

3. Career Chatbots, AI and Virtual Assistants

Career chatbots, AI-driven guidance systems, and virtual career assistants are emerging digital tools designed to support career practitioners by offering real-time, automated, and personalized assistance to individuals navigating their career paths. Using artificial intelligence (AI) and natural language processing (NLP), these tools simulate conversations with users, answer questions about occupations or study paths, suggest options based on user input, and sometimes help with CV writing, job searching, or goal setting. They are accessible 24/7, manage large volumes of queries, and provide instant feedback—making them useful both as standalone information sources and as supplements to one-on-one guidance sessions.

For career practitioners, such tools are valuable in saving time, offering initial assessments or recommendations before a session, and maintaining engagement between meetings. Examples include **Jobiri** (https://www.jobiri.com), an AI-based career advisor, available in Italian and English, which supports job search, CV creation, and career planning.

These tools illustrate how AI can complement human expertise by providing scalable, accessible, and interactive career support across various stages of guidance. Practitioners are encouraged to explore similar tools available in their national contexts to enhance the range and flexibility of the services they provide. They can significantly increase the efficiency and accessibility of career services, allowing practitioners to focus on in-depth counseling (Saraswathi et al., 2014; Bright, 2015). When designed ethically, chatbots can also learn from practitioner feedback, improving responses over time and becoming valuable partners in digital service delivery.

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4. Digital Tools for Online Guidance (Synchronous / Asynchronous)

Effective career counseling today requires flexibility in communication formats, enabling practitioners to meet clients wherever they are—physically and digitally. Using synchronous tools (real-time communication like video calls) and asynchronous tools (delayed communication like emails or recorded webinars) allows for inclusive, timely, and adaptable interactions. Practitioners can use these tools in one-to-one and group counseling, virtual job interviews and simulations, online career workshops, and employer info sessions. They also support interactive screen-sharing for reviewing CVs or digital portfolios and for recording sessions (with consent) for clients to revisit later.

a. Video Conferencing Tools – Real-Time Career Counseling

These platforms are essential for delivering one-on-one or group career sessions, virtual career fairs, and live guidance workshops.

1. **Zoom** (https://zoom.us): Offers private sessions, breakout rooms for group activities, and screen sharing. Free plan includes unlimited 1:1 meetings and 40-minute group calls.

2. **Google Meet** (https://meet.google.com): Seamlessly integrates with Google Calendar, includes live captions, and supports up to 60-minute group meetings for free.

3. **Microsoft Teams (Free Version)** (https://www.microsoft.com/en/microsoft-teams): Includes structured scheduling, document sharing, and whiteboard features.

4. **Jitsi Meet** (https://meet.jit.si): Open-source, no registration required, suitable for spontaneous or low-barrier access sessions.

b. Email Communication – Professional and Asynchronous Still a powerful asynchronous tool, email allows for structured follow-up, resource sharing, and record-keeping. Recommended platforms include Gmail, Outlook.com, and Yahoo Mail. Best practices include using client folders, email templates, scheduling messages, and ensuring GDPR compliance.

c. Messaging Applications – Instant Asynchronous Support

Messaging apps offer a quick, informal, and accessible channel for staying connected with clients between sessions. These tools are widely used across Europe and allow for sharing updates, documents, reminders, and motivational content in a secure and user-friendly format.

1. **WhatsApp** (https://www.whatsapp.com): Useful for reminders, quick support, and sending voice notes.
2. **Viber** (https://www.viber.com): Supports multimedia communication and is popular in many European countries.

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d. Webinar Tools – For Large-Scale Guidance Events

Use webinars to run national or cross-border career days, employer panels, or skill workshops.

1. **Zoom Webinars**: Supports interactive features like Q&A, polls.
2. **YouTube Live**: Useful for live streaming events with interactive comment sections.

e. Tools for Personalized Career Plans

1. **Canva** (https://www.canva.com): Use career templates, goal trackers, and vision boards.
2. **Trello** (https://trello.com): Organize career phases into boards and cards.
3. **Google Docs** (https://docs.google.com): Co-write action plans, embed resources, and track progress.

f. Interactive Tools for Engagement and Reflection

Clients are more likely to engage with career guidance when it's visual, participatory, and interactive. Interactive technologies such as **Padlet**, **Jamboard**, **Mentimeter** provide dynamic, user-friendly platforms that enhance digital communication and collaboration. These tools are especially useful in group sessions, career education workshops, and remote guidance scenarios where maintaining client engagement is crucial.

1. **Padlet** (https://www.padlet.com): Padlet allows users to create virtual boards where clients can post text, images, videos, links, or documents. It's visual, intuitive, and great for asynchronous or real-time collaboration. The free version allows up to 3 boards and can be shared via link or QR code without requiring sign-up from clients.

2. **Mentimeter** (https://www.mentimeter.com): Mentimeter is a presentation tool that allows you to create live polls, quizzes, word clouds, and interactive Q&A sessions. Clients respond from their own devices, making it ideal for group sessions. The free plan allows 2 questions and 5 quiz slides per presentation, while no registration is needed for participants—only a shared code. It's also great for large groups and anonymous participation.

g. Managing Digital Career Portfolios and Online Presence

A strong digital presence is crucial in today's labour market. Career practitioners can support clients in developing online portfolios that showcase their skills, achievements, and professional identity across platforms. These portfolios can be used for job applications, training opportunities, or showcasing achievements in a digital-first world.

Key Tools and Uses:

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- **Europass** (europa.eu/europass)
  EU-standard tool for building multilingual CVs and storing certificates. Ideal for clients applying across Europe. Practitioners can guide clients in building structured portfolios using the Europass profile and CV builder.
- **LinkedIn** (linkedin.com)
  Acts as an online CV and networking platform. Practitioners can help clients improve their profiles, build networks, and search for jobs or internships.
- **Canva** (canva.com)
  A free design tool to create visual CVs, personal branding materials, or project portfolios. Great for creative industries and engaging young people in storytelling.
- **About.me** (about.me)
  A simple landing page tool that collects key links (CV, LinkedIn, blog). Practitioners can use it to help clients establish a clean, professional online identity.

h. Gamification and Serious Games

Gamification and serious games are powerful tools that enhance user engagement, motivation, and self-reflection in career guidance. By simulating real-world challenges and career decisions, they help users develop self-awareness, discover interests, and assess their strengths and values in an interactive format. These digital tools are particularly effective with younger populations and can make abstract concepts like career planning more tangible.

Practitioners can use gamified tools:

- During classroom sessions or workshops as self-exploration activities.
- To complement traditional assessments with dynamic, scenario-based tasks.
- For remote engagement through interactive homework or discovery challenges.

Incorporating gamification not only captures attention but also promotes learning by doing, fostering long-term engagement with career planning.

One example is the **C-GAME**: https://play.c-game.eu/ It's a serious game platform that allows users to explore career pathways, test knowledge, and develop career management skills. These tools are designed to help young people reflect on preferences and competencies in a non-traditional learning environment, making the guidance experience enjoyable and memorable.

By integrating gamification into guidance practice, career professionals can promote active exploration, build soft skills, and maintain higher motivation levels among clients.

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3.3 Digital Innovations in Skills Validation and Experiential Career Learning

As the nature of work evolves, career guidance must adapt to help individuals navigate increasingly complex learning and employment pathways. Traditional qualifications are no longer the sole markers of competence; instead, people acquire skills in varied, often informal ways. At the same time, digital technologies are transforming how individuals explore careers, assess their strengths, and engage with potential futures. Two developments—microcredentials and immersive learning tools—are reshaping how practitioners support clients in recognizing their skills and making informed career choices.

i. Microcredentials and Digital Badges in Career Development

Microcredentials are small, modular certifications that validate the acquisition of specific skills or knowledge. Unlike full degrees or diplomas, they offer a flexible and often faster way to showcase learning. Digital badges and microcredentials are increasingly used to recognize learning acquired through online platforms, short courses, and workplace training. Blockchain-based systems enhance the trustworthiness of these credentials by ensuring secure, tamper-proof storage and verification. In the context of career guidance, they serve as valuable resources for making invisible learning visible, especially for clients who lack formal qualifications or have non-linear career paths.

Platforms such as the **Open Badges** https://openbadges.org allow clients to securely store, share, and verify their skills across Europe.

Career practitioners can support clients by helping them identify relevant learning opportunities, assess the credibility of badge issuers, and integrate these credentials into their career portfolios or job applications.

For example, a young adult with no formal post-secondary education has completed various online digital marketing courses. A practitioner helps them consolidate these into a digital badge portfolio via Europass or LinkedIn, increasing their visibility to potential employers and improving self-confidence.These tools enable clients to demonstrate lifelong learning in a more personalized, modular way and support upskilling efforts in a fast-changing labour market.

As new forms of digital learning and validation emerge, career professionals must support clients in interpreting and integrating microcredentials, digital badges, and online portfolios. Digital tools offer flexible pathways to recognize informal and non-formal learning, enabling individuals to showcase lifelong learning efforts (Cedefop, 2019; Bimrose & Brown, 2019).

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ii. Immersive Technologies for Experiential Career Learning

Immersive learning technologies, such as virtual reality (VR), augmented reality (AR), and interactive simulations, open up new possibilities for career exploration and decision-making. These tools enable clients to experience simulated work environments or career scenarios, offering a rich, experiential understanding of different professions. For instance, VR workplace tours can take clients inside a hospital, construction site, or logistics hub, providing a realistic view of roles and settings that they might otherwise never access.

Career practitioners can use these tools to enhance workshops, spark conversations about job fit, or support clients who struggle with abstract or text-heavy guidance formats. They can have immersive experiences in schools or VET settings to introduce careers students haven't physically accessed, to provide alternatives for NEETs or people with disabilities to explore occupations safely and interactively and to organize career workshops where users try simulations and reflect on their choices, values, and skills.

These experiences are particularly effective with young people, early school leavers, and others with limited work exposure. By simulating real-life challenges and decisions, immersive technologies not only boost engagement but also foster deeper career self-awareness and confidence.

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3.4 Applying Careers 4.0 Digital Guidance Information System for Young People in practice

a. Overview

https://www.careers4-0.eu/

The **Careers 4.0 Digital System**, developed within the Erasmus+ project *Careers4.0*, offers a comprehensive, digitally enhanced career guidance tool designed to support young people in navigating the opportunities of the rapidly evolving Industry 4.0 labour market. Grounded in the **Holland RIASEC model**, the system combines personality and interests-based career orientation with the identification of digital and green skills required for new and emerging job roles. It equips young people with insights, competencies, and tools to make informed, self-directed decisions about their career paths in the digital and sustainable economy.

The core of the system lies in the creation of **personalized career pathways** aligned with each individual's personality type and skill profile, enriched by interactive technologies like the **metaverse, career chatbot, skill assessment, and infographic-based job intelligence**. Careers4.0 offers an engaging, gamified experience that fosters self-awareness, future-oriented planning, and adaptability to the 4.0 labour market.

The Careers4.0 Digital Guidance System is a holistic, youth-friendly, and forward-looking career planning ecosystem that merges self-assessment, labor market intelligence, and digital innovation. Grounded in the trusted RIASEC model and tailored for the realities of the Industry 4.0 and Green Economy, the platform offers:

- Step 1 – Chatbot: AI-driven skill assessment and guidance
- Step 2- Immersive Metaverse-based self-discovery
- Step 3 – Job sector exploration and learning

Designed for use by **career advisors, educators, and VET professionals**, Careers4.0 serves as a robust support system to engage and empower the next generation in creating their own future in a complex and opportunity-rich world.

STEP 1 – Skills Evaluation via Career Chatbot

Objective: To help users identify their skills profile and discover gaps in relation to 4.0 labour market expectations.

The **Career Chatbot** in the Careers4.0 system is an AI-based digital counselor that interacts with users to evaluate their readiness for the digital and green economy. It uses structured quizzes to assess 18 core skills, identified as essential in the Industry 4.0 context.

Key features include:

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- A 72-question quiz, completed through conversational interaction with the chatbot.
- Each question assesses one of the following skill areas: Digital Literacy, Problem solving, Teamwork, Innovation, Digital Skills, Environmental awareness, Stress tolerance, Emotional competence, Entrepreneurial skills, Organisation, Physical-manual skills, Communication, Ethical competence, Intercultural competence, Willingness to learn, Adaptability, Leadership and Numeracy.
- Upon completion, the system provides a **personalized skill profile**, showing the user's competency levels on a scale and mapping them to relevant job sectors.
- The chatbot results can be used by practitioners as a **guide for improvement**, proposing training or upskilling paths aligned with the user's lower-scoring areas.
- Career advisors can use these insights to tailor coaching sessions, match clients with VET opportunities, or direct them toward suitable employment sectors.

Example of skill - assessment diagram

STEP 2 – RIASEC Metaverse Career Environment

Objective: To guide users in discovering their work personality type and related job sectors using an immersive and engaging virtual experience.

The foundation of the Careers4.0 system is the RIASEC model, which categorizes individuals into six types: *Realistic, Investigative, Artistic, Social, Enterprising,* and *Conventional*. These types correspond to preferences for certain tasks and working environments. The RIASEC **Metaverse Career Environment** uses this model as a gamified simulation tool, helping users explore their fit in different job domains.

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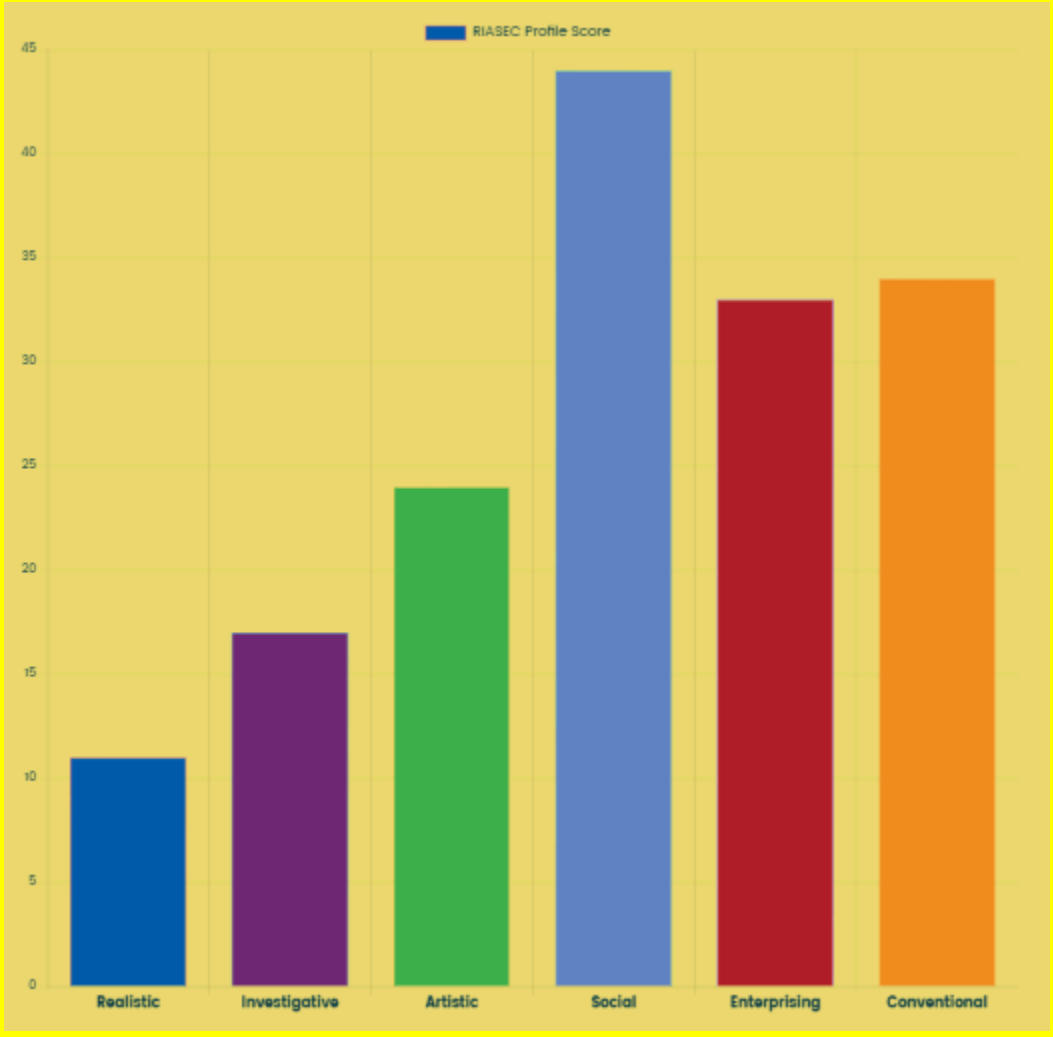
The virtual experience includes:

- **Six interactive metaverse rooms**, each representing one RIASEC personality type. Each room simulates an industry-relevant working environment.
- Digital twins (cyber-physical systems) that showcase actual tools, machinery, or environments used in the relevant professions.
- Users must find 10 objects in each room, read descriptions, and answer a short question gauging their interest in using that tool and engaging in similar work.
- After exploring all rooms (60 objects/questions), users receive a **personalized RIASEC profile diagram**, showing their scores across all 6 types.

This immersive exploration enhances self-reflection and motivates youth to relate their interests to specific sectors of the Industry 4.0 economy. Following this, the user will be guided to explore sector-specific infographics aligned with their RIASEC scores to investigate real-world job roles, tasks, and required competencies.



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STEP 3 – Career Information & Sector Exploration

Objective: To provide engaging, up-to-date, and accessible information on job opportunities and emerging labour market trends.

Understanding the rapidly changing world of work is critical for effective career planning. The Careers4.0 system provides visually engaging, accessible resources that inform users about the future of jobs, skills, and sectors, focusing especially on green and digital transitions.

Main components include:

- Infographic-Based Sectoral Insights: Users can explore 19 occupational sectors, including AI & Robotics, Green Energy, Cybersecurity, Smart Manufacturing, Creative Industries, Digital Education, eCommerce, HealthTech, and more.
- Each infographic includes key job titles, future trends, required soft and hard skills, and VET pathways.
- All content is youth-friendly, inclusive, and designed for use in both independent exploration and guided group sessions.

This section helps bridge the gap between self-knowledge (RIASEC and skills profiles) and real-world possibilities, enabling informed and proactive career decisions.

Online Interactive Resources

CEDEFOP Skills Panorama https://skillspanorama.cedefop.europa.eu - Interactive data visualizations on labour market trends, skills forecasts, and country comparisons.

ESCO (European Skills, Competences, Qualifications and Occupations) https://esco.ec.europa.eu Match skills to occupations; explore job profiles and required competencies.

Europass https://europa.eu/europass/en Build CVs, skill profiles, and digital portfolios.

EPALE – Electronic Platform for Adult Learning in Europe https://epale.ec.europa.eu Online community of adult learning professionals, webinars, blogs, and learning resources.

CEDEFOP's Online Tools Online tools | CEDEFOP Several tools for career practitioners, including European skills index, Matching skills, Resources for guidance (decision making tool), Skills forecast etc.

OpenEduHub – EU Academy https://academy.europa.eu Offers interactive training modules from EU institutions on digital skills, AI, green skills.

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Resources for further study

DIGCOMP for Educators (European Commission, 2022) Digital Competence Framework for Educators (DigCompEdu) Understand practitioner digital competence at multiple levels. **DOI**: 10.2760/159770

EFT. International trends and innovation in career guidance
https://www.etf.europa.eu/en/publications-and-resources/publications/international-trends-and-innovation-career-guidance-0

CEDEFOP: DIGITAL TRANSITIONS IN LIFELONG GUIDANCE: RETHINKING CAREERS PRACTITIONER PROFESSIONALISM (2021)
https://www.cedefop.europa.eu/files/6202_en_0.pdf

ILO – Career Guidance and COVID-19: Delivery under the Pandemic
https://www.ilo.org/publications/career-guidance-policy-and-practice-pandemic-0 Policy and practice briefs on how guidance adapted digitally during crisis conditions.

NICE Handbook for the Academic Training of Career Guidance and Counselling Professionals (2016) **https://www.nice-network.eu/pub/** Offers competence frameworks, including digital capability, for counsellors.

Euroguidance Publications https://www.euroguidance.eu/resources/publications Toolkits and research briefs on mobility, ICT in guidance, and professional training.

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Self-evaluation Exercises

1. What is a key role of digital tools in modern career guidance?

A. Replacing in-person counselling with automated systems
B. Enhancing the relational and reflective aspects of guidance
C. Automating all aspects of career planning
D. Minimising practitioner involvement in client exploration

2. What does ESCO primarily offer to support career guidance?

A. A searchable database of job vacancies across Europe
B. Training courses for jobseekers
C. Interactive modules for career decision-making
D. **A taxonomy linking skills, occupations, and qualifications**

3. How do gamification and serious games enhance career assessment?

A. By providing entertainment to reduce client stress
B. By engaging users through simulated, scenario-based career decisions
C. By helping users memorise industry terminology
D. By removing the need for practitioner support

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4. Which principle supports digital inclusion in career guidance?

A. **Offering hybrid models and accessible tools**

B. Prioritizing automation over human contact

C. Delivering services exclusively online

D. Using only English-language platforms

5. What is a key function of the Careers4.0 platform's chatbot?

A. Guiding users through infographic-based sector exploration
B. Delivering practitioner-focused training modules
C. Assessing user skills through a 76-question quiz
D. Generating tailored CVs using uploaded job ads

6. What does the RIASEC metaverse in Careers4.0 allow users to do?

A. Review infographic-based job market trends in specific sectors
B. Explore simulated environments aligned with career interests
C. Complete a skills gap analysis for upskilling suggestions
D. Access training resources specifically designed for practitioners

Reflection Activities (Module 3: 5 activities)

Activity 1: Skills Identification Using the Chatbot Assessment

Activity Type:

Interactive Case Simulation

Learning Goals:

- Understand how to guide clients through the chatbot-based skills assessment
- Learn to interpret the skills profile and map it to potential sectors
- Identify skill gaps and develop improvement strategies

Expected Outcomes:

- Career practitioners gain confidence using the chatbot for skills profiling
- Ability to provide actionable feedback based on assessment results

Specifications: Individual or pair work

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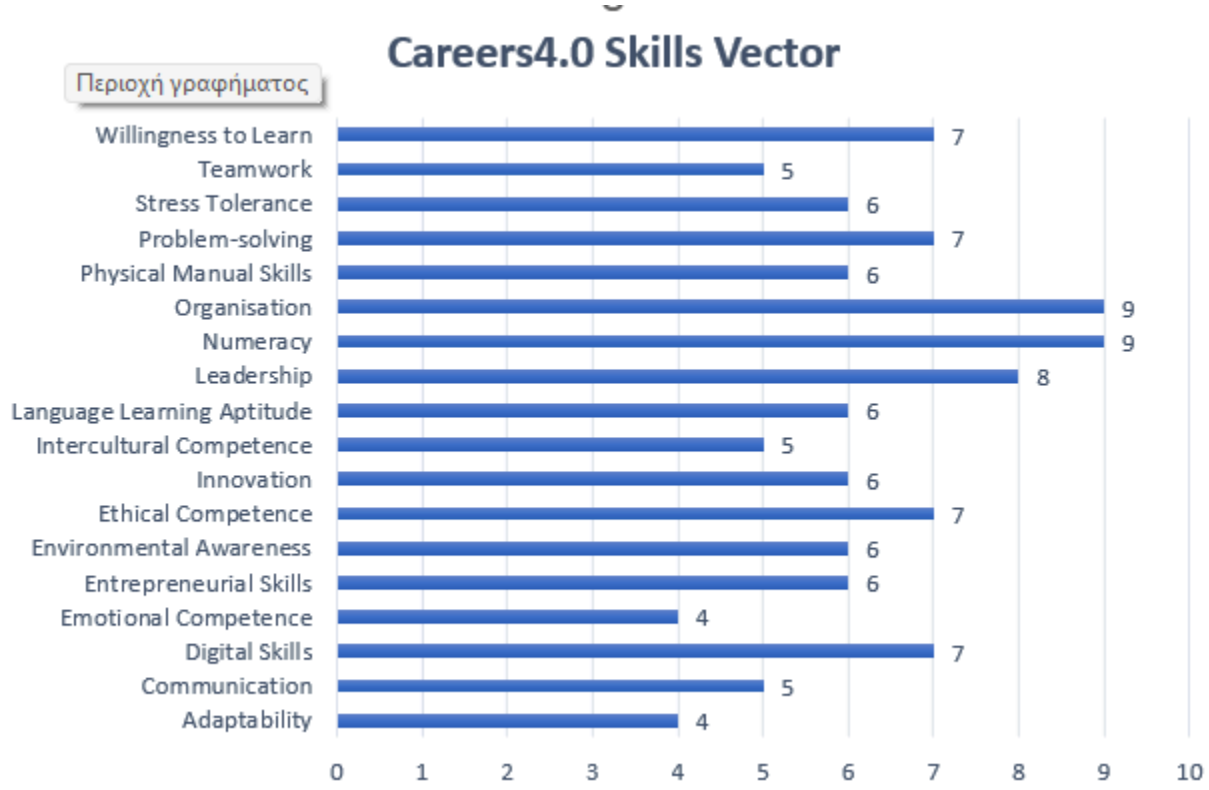
Duration: 45 minutes

Description of Tasks

Case Study: Helen, 17, Greece

Helen is a 17-year-old high school student who enjoys working with others and helping people feel heard and supported. She likes assisting her younger brother with homework. Helen is warm, empathetic, and a great communicator, but she doubts whether she has the “real” skills needed to pursue a career in a helping profession. She’s not confident with technology and has never used tools like digital apps for learning or communication.

Helen’s Skills Profile



Task for Practitioners:

1. Look at the skills profiling diagram of Helen (provided above).
2. Analyze the skill profile generated- Identify Helen’s top strengths and weakest areas.
3. Map Helen’s strengths and needs to social-oriented job sectors in the platform
4. Brainstorm three upskilling strategies for Helen’s lower-rated skills (especially digital skills and adaptability) using short-term VET, workshops, or blended learning.

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5. Role-playing how you would explain the results to Helen to boost her confidence and guide her toward an action plan.

Facilitator Instructions:

- Divide trainees in groups of 3-5
- Provide a printout or digital version of Helen's skill diagram
- Share the skill infographics (provided in platform or printed).
- Encourage trainees to role-play how they would explain the results to Helen to boost her confidence and guide her toward an action plan.
- Lead a group debrief:
    - What assumptions did you make?
    - How do we support students with low confidence despite strong interpersonal skills?
    - How do we talk about digital upskilling without overwhelming them?

Activity 2: Exploring Interests in the RIASEC Metaverse

Activity Type:

Exploration and Self-Reflection Case

Learning Goals:

- Learn how to guide clients through the RIASEC metaverse
- Understand how interest profiles align with job sectors
- Get acquainted with the virtual rooms and the tools inside them, so practitioners can confidently describe and explain them to their students

Expected Outcomes:

- Practitioners can interpret RIASEC diagrams and connect interest types with job sectors
- Become confident in helping young people understand and explore their interests in an engaging and structured way

Specifications: Group (3–4 participants) or individual activity

Duration: 45 minutes

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Description of Tasks:

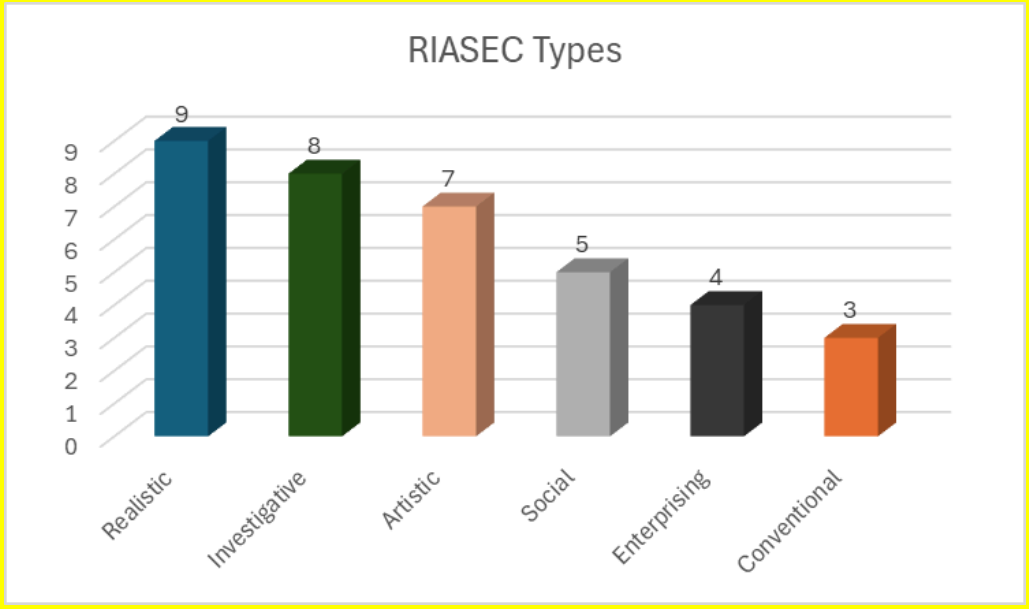
Case Study: Alex, 17

Alex is a quiet, thoughtful high school student with a strong interest in science and technology. He spends hours building models and experimenting with electronics at home. He's particularly good at solving practical problems and understanding how machines work. However, Alex often doubts his social abilities and isn't sure how to talk about his interests in a professional context.

He recently visited the school counsellor because he wanted to be more certain about what careers match his interests. He wants help "translating" what he enjoys into real job sectors and professions that suit him.

After navigating the six rooms of the RIASEC metaverse and engaging with interactive tools, Alex's interest profile appeared as follows:

Alex's RIASEC Profile (Results After Metaverse Exploration)



Task for Practitioners:

1. Navigate the RIASEC metaverse as if you are Alex, exploring the tools and environments in all six rooms.

2. Review Alex's RIASEC diagram: Investigative (9), Realistic (8), Conventional (7).

3. Reflect on which interactive tools Alex must have reacted to most positively and what kind of working environments he would seem most comfortable in.

4. Based on his top types, recommend three career fields or job sectors that align well with his profile.

5. Suggest concrete ways for Alex to explore these careers in real life

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Facilitator Instructions:

- Provide access to the virtual RIASEC metaverse, or share screenshots and descriptions of each room and tool.
- Offer printed or digital versions of the RIASEC diagram for Alex.
- Share the Careers4.0 sector list and example job roles for each type.
- Lead a discussion about:
  - How practitioners can guide students from interest exploration to concrete career ideas
  - How to adjust guidance for students with low confidence or unclear goals
  - Methods/ activities for explaining the value of personality-interest fit in career choices

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Activity 3: Using Infographics to Explore Career Sectors

Activity Type:

Case study

Learning Goals:

• Familiarize with infographic-based career information tools

• Practice matching client profiles with sectoral information

• Create inspiring activities that support career awareness through visuals

Expected Outcomes:

• Practitioners confidently use infographic data during counseling

• Can guide clients toward sustainable and future-oriented opportunities using sector insights

Specifications: Group activity (3–4 participants) or individual exploration

Duration: 45 minutes

Description of Tasks:

C**ase Study: Sofia, 18**

Sofia comes from a rural background and has always felt a strong connection to nature and her local environment. She enjoys being outdoors, helping her grandparents on their small farm, and participating in environmental clean-up events organized by her school. She's hands-on, practical, and interested in protecting the planet but unsure how that translates into a career. She's not confident with digital tools and has never had formal job experience. However, she is motivated, responsible, and likes working in a team. She recently spoke with her school career advisor, saying:

“I’d love a job where I can make a difference for the Earth—but I don’t know what’s really out there.”

After some sessions with the counsellor, it came out that her career path will be explored with a focus on these three job sectors:

- Food Industry
- Agriculture, Forestry & Fishing
- Environmental Protection

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Tasks for Practitioners:

1. Access three sectoral infographics (one per sector listed above).
2. Review Sofia's strengths and motivations based on the scenario.
3. Identify job roles across the three sectors that could align with her interests and character.
4. Highlight the key skills required for those roles and check which ones Sofia already has.
5. Propose concrete next steps Sofia could take to move toward one or more of these roles
6. Simulation Activity – Role-Play Scenario:

In pairs, one participant plays the career counselor, and the other plays Sofia. Together, they create a visual "Career Trail Map" based on one of the jobs from the infographics. The counselor guides Sofia to identify:

- What skills she needs
- Who could support her development
- What short-term steps she could take
- Where she can go to explore more information

They then switch roles and repeat the process with a different job option.

Facilitator Instructions:

- Form small groups (3–4 participants) or assign individually
- Provide printed or digital versions of the infographics

Encourage the group to come up with creative ways to use infographics in peer or group activities with young people (e.g. class debates, poster creation, role simulations)

- Lead a discussion about:

o How did the infographics support your guidance conversation with "Sofia"?

o What challenges did you face when translating sectoral data into practical next steps?

o How might this simulation be adapted for real-life classroom or counseling sessions?

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Activity 4: Simulated Guidance Session – The Full Careers4.0 Journey

Activity Type: Role-Playing Case Simulation

Learning Goals:

- Practice delivering a complete, integrated guidance session using the Careers4.0 tools
- Learn to communicate assessment results in a client-friendly way
- Build strategies for encouraging clients and co-creating next steps

Expected Outcomes:

- Practitioners can deliver structured guidance using digital tools and diagrams
- Increased confidence in interpreting combined skills and interest profiles
- Ability to help clients connect their profile to real-world career sectors and actions

Specifications: Group role-play (3 participants: counselor, client, observer) or individual activity (provide career program planning)

Duration: 1 hour

Description of Tasks:

Case Study: Lukas, 20

Lukas left university after completing one year in an economics program. While he did well academically, he found the learning approach didn't suit him—it felt disconnected from his interests and practical mindset. Lukas enjoys working part-time in logistics, where he organizes shipments, streamlines tasks, and helps resolve scheduling issues. His manager often compliments his ability to see "the big picture" and keep operations smooth. However, Lukas is feeling uncertain. His parents want him to make concrete career plans soon, and he feels overwhelmed by options. He's not sure how to match what he's good at with real jobs.

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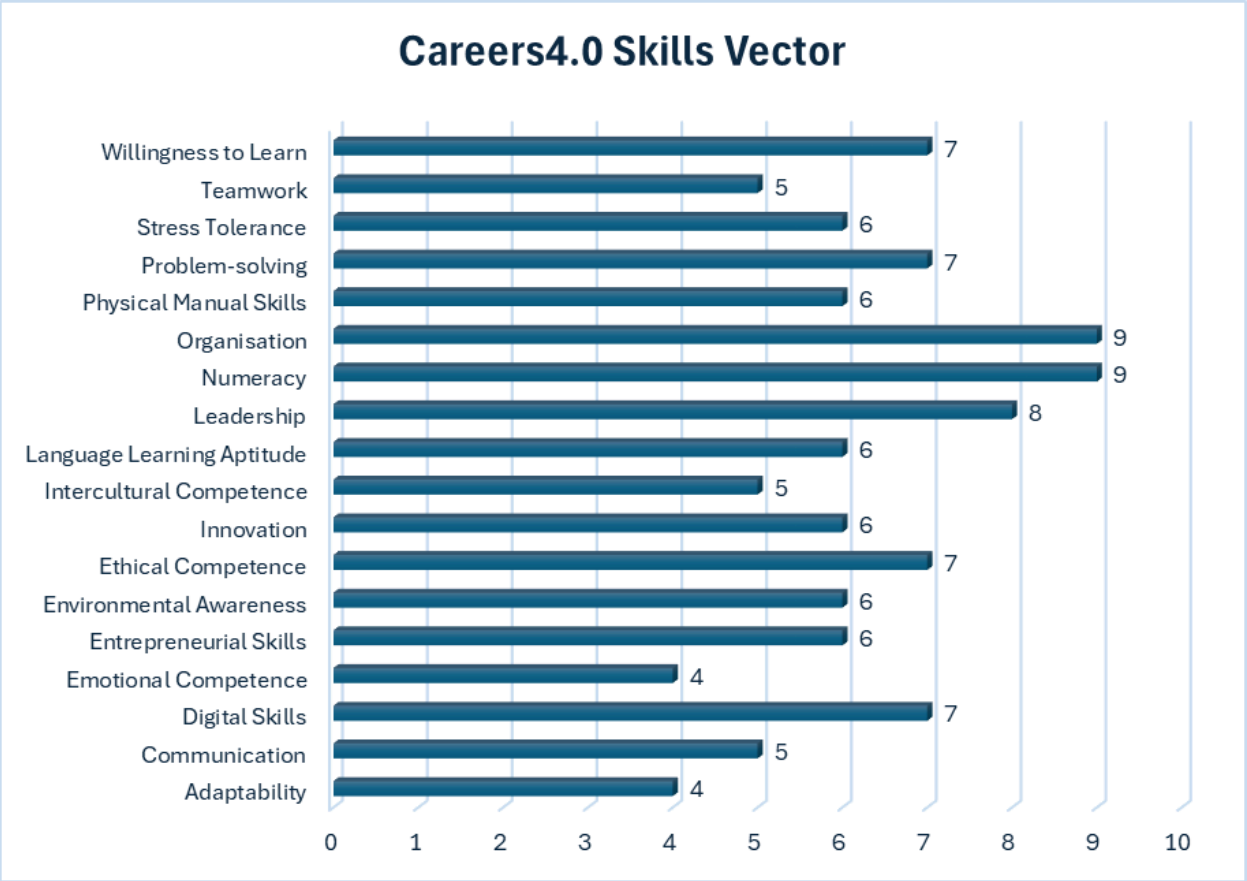
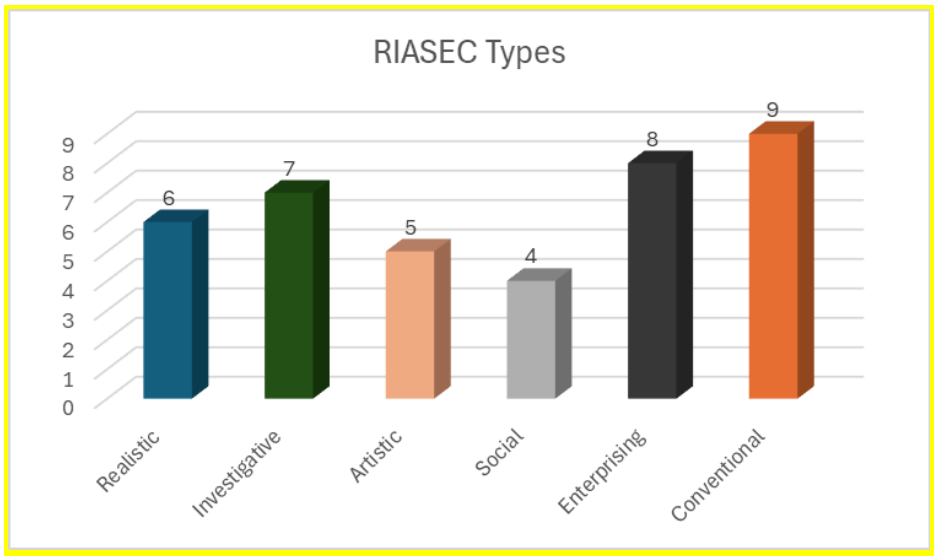
Lukas's skills profile diagram



Lucas's RIASEC types diagram



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Instructions for Group Role-Play

(Counselor – Client – Observer format)

Counselor role

1. Start the Conversation

- Counselor welcomes Lukas and acknowledges his situation and concerns
- Explore his background and current state of mind

2. Review the Skills Assessment

- Present the Skills Diagram
- Highlight strengths
- Point out areas for growth
- Consider which sectors might benefit from his high scores and where development might be needed
- Ask: “Which of these strengths do you find easiest to use?” “Have any of the lower-rated skills ever held you back?”

3. Explore the RIASEC Interests

- Present the RIASEC Diagram
- Discuss top types
- Ask:“Does this reflect how you like to work or solve problems?”

“Which environments felt most natural in the metaverse?”

4. Map Skills and Interests to Job Sectors

- Match profile to 2–3 sectors
- Use infographics to show examples of jobs and needed skills
- Ask:“Do any of these job areas feel like a fit for your strengths and interests?”

5. Co-Design Next Steps

- Guide Lukas to identify 2–3 concrete next actions

Observer Role

After the session, the observer shares feedback:

- Was the session client-centered and encouraging?
- Were tools (diagrams, sector info) explained clearly?
- Did the counselor help Lukas take ownership of his journey?

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Facilitator Instructions:

- Assign roles and rotate if time allows
- Provide each group with: Lukas's skills assessment diagram, Lukas's RIASEC interest profile, Printed or digital infographics
- Encourage participants to stick to the script structure
- Remind Observers to take notes using the guidance criteria (clarity, empathy, structure, engagement).
- Allocate 15–20 minutes per session, then 5–10 minutes for feedback
- Facilitate a reflective discussion using the questions below.

Instructions for Individual Activity

(For solo practitioners)

Practice structuring and delivering a complete guidance session independently.

1. **Read Lukas's Case Study Thoroughly**
    - Reflect on his emotional and situational state
    - Write down 2–3 key concerns Lukas might express
2. **Review the Skills Assessment**
    - Examine Lukas's strengths and growth areas in the diagram
    - Write a short interpretation (max 150 words) as if explaining it to Lukas
    - Reflect: "Which skills would Lukas be proud of? Which might limit him?"
3. **Explore the RIASEC Interests**
    - Review the RIASEC diagram
    - Note down his top 2 types and how they relate to his part-time work
    - Answer: "Does this RIASEC profile align with Lukas's behavior and preferences?"
4. **Map to Career Sectors**

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- Choose 2–3 sectors using the provided infographics
- For each, write a short rationale (1–2 sentences) explaining why this sector could be a fit
- Reflect: “What would I say to Lukas to help him visualize working in this field?”

5. **Design a Guidance Summary and Plan**
   - Write a brief “session summary” (max 250 words) as if it were notes from a real client session
   - List 2–3 actionable steps Lukas could take next (e.g., informational interviews, short courses, internships)
6. **Self-Evaluation**
   - Review your own session summary using these reflection prompts:
     - Was the tone supportive and client-centered?
     - Did I clearly explain tools and diagrams?
     - Did I offer realistic, helpful next steps?
     - How would I improve my communication next time?

Reflective Discussion Questions (Group or Individual)

1. What part of the session felt natural or easy to facilitate?
2. Which part was more challenging, and why?
3. How did you explain the skills and RIASEC diagrams in an accessible way?
4. Did the client (real or imagined) feel engaged and understood?
5. How would you adapt this exercise for your real-life context or clients?
6. What tools or resources would make this easier to do regularly?
7. What would you do differently if you facilitated this again?

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Activity 5: Designing an Online Career Planning Session for a Teenager

Type of activity: Reflective Exploration

Learning Goals:

- Reflect on how to structure an effective online career guidance session.
- Explore digital tools for communication, collaborative planning, and skills exploration.
- Use ESCO to identify in-demand skills and relevant occupational profiles
- Understand how to visually co-design a career action plan with young clients.

Expected Outcomes:

- Identify suitable digital platforms for conducting online guidance sessions with youth.
- Discover career planning tools and resources.
- Understand how to navigate ESCO to explore skills and qualifications related to different occupations.
- Develop a concept for a collaborative career planning process using digital tools.

Specifications: Small group or individual reflective activity
Duration: 30'

Case scenario:

John is a 17-year-old high school student who completed the skills and interests assessment on the Careers4.0 platform. The results have shown that he is interested in pursuing a career in the engineering sector. He has booked an online session with a career guidance practitioner to explore next steps and co-design a career development plan.

As a practitioner, you are preparing for the session and need to explore:

- What **digital tools** you will use to conduct and facilitate the session.
- How to **co-create** an engaging and clear career action plan with the client (online).
- How to **use ESCO** to identify relevant engineering careers and the skills/competencies associated with them.

Reflection Questions & Tasks:

- **Online Communication Tools** Which digital platforms are most suitable for 1:1 online sessions with teenagers? What features are important to keep young clients engaged (e.g., screen sharing, chat, whiteboard)?
- **Career Planning Tools** What online tools (e.g., **Canva**, **Google Docs**, **Padlet**) could be used to co-create and visually present a career plan together with a young client?
- **ESCO Exploration Task** Go to ESCO and search for engineering-related occupations (e.g., (e.g., "Civil Engineer", "Smart home engineer"). Identify 3 key

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skills required for one of these roles. What **qualifications** or knowledge areas are typically associated with the role?

Instructions for Facilitator:

- Introduce the purpose of the activity: to reflect on tools and strategies for planning an online session with a young client.
- Divide participants into small groups (3–4 people) or have them work individually.
- Provide access to **ESCO** and encourage real-time exploration of the portal.
- After the activity, facilitate a brief group discussion to share tools, insights, and ideas.

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Module 4: Inclusivity and Social Equity in Career Guidance 4.0

Learning scheme

Module 4: "Inclusivity and Social Equity in Career Guidance 4.0" aims to equip guidance practitioners, VET trainers, and social inclusion professionals with the essential knowledge and skills needed to understand, identify, and implement accessible and adapted career guidance services, materials, and tools. This module emphasizes promoting equity and inclusion by addressing the diverse needs of various client groups. It focuses on combating the digital divide, fostering labour market inclusion, and ensuring equal opportunities for all in the workforce.

Learning Objectives:

This module will support trainees to:

- Understand the core principles of diversity, equity, social justice, and just transition within the context of career guidance, to create more inclusive career development services.
- Identify the importance of inclusivity in career guidance and how to tailor services to meet the unique needs of underrepresented, vulnerable, or marginalized groups, including individuals facing discrimination, social exclusion, or other forms of inequality in their professional development.
- Explore the challenges faced by diverse groups in the context of Industry 4.0, particularly in overcoming the digital divide, and understand the barriers to labour market inclusion faced by groups such as NEETs, long-term unemployed individuals, low-skilled or older workers, migrants, refugees, persons with disabilities, and other marginalized populations.
- Analyze the impact of social exclusion on professional development and career opportunities for vulnerable groups, and learn how career guidance can be adapted to provide equal opportunities for professional growth in a rapidly evolving digital economy.
- Develop strategies to promote social responsibility and inclusion in career guidance practices, focusing on ensuring that all individuals, regardless of their background or circumstances, can access career guidance services that support their integration into the labour market.
- Learn how to create and implement accessible career guidance tools and materials that cater to the diverse needs of various client groups, ensuring equitable access to information and resources in an increasingly digital world.

Expected Learning Outcomes:

By the end of this module, trainees will be able to:

- Design and deliver accessible career guidance services, materials, and tools that cater to the unique needs of diverse client groups, promoting equity and inclusion in career development practices.
- Assist clients from marginalized groups (e.g., NEETs, long-term unemployed, persons with disabilities, etc.) in identifying and overcoming barriers to employment, particularly within sectors impacted by digitization, automation, and technological advancements.

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- Collaborate with educational institutions to promote inclusive training, upskilling, and reskilling opportunities that empower marginalized groups to gain the skills necessary for success in the modern labour market.
- Work with employers to encourage inclusive hiring practices, ensuring that workplaces embrace diversity and create supportive environments for individuals from underrepresented or vulnerable groups.
- Advocate for and implement strategies that foster diversity in the workplace, ensuring that marginalized individuals are given equal opportunities to thrive in the job market and within their professional roles.

Key words:
Social Justice, Digital Inclusion, Marginalized Groups, Inclusive Hiring, Just Transition, Digital Divide

Motivation Questions

- How can inclusive career guidance services help bridge the gap for marginalized groups and ensure they have equal opportunities in a rapidly evolving job market within industry 4.0 ?
- What are the key challenges and opportunities in using digital career guidance tools for clients who may lack access to technology, and how can we ensure these clients are not left behind in the transition to a digital workforce?

Suggested Learning Content

- Inclusivity and Social Equity in Career Guidance 4.0 - The role of career guidance in promoting diversity, social equity, social justice, just transition, and inclusivity.
- Challenges faced by underrepresented groups in career development within industry 4.0 (e.g., NEETs, long-term unemployed, persons with disabilities, refugees).The digital divide and its impact on career development opportunities
- Strategies for overcoming digital and social barriers to employment in Industry 4.0. Promoting Inclusive Training and Upskilling Opportunities. Promoting Inclusive Hiring Practices and Employer Collaboration to create diverse work environments.
- Tailoring career guidance services to meet the unique needs of diverse populations. Using and creating accessible career guidance materials and tools for vulnerable groups. Empowering clients to navigate the changing job market through tailored guidance, mentorship, coaching, and community career development services

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Theoretical background

Inclusivity and Social Equity in Career Guidance 4.0

In an era marked by rapid digital transformation, Career Guidance 4.0 emerges not only as a technologically enriched approach to vocational support but also as a platform that must firmly anchor itself in the principles of inclusivity, social equity, and social justice. As we transition into the Fourth Industrial Revolution—shaped by automation, artificial intelligence, and digital platforms—the importance of equitable access to career opportunities becomes more urgent than ever. Career guidance in this context cannot simply aim to prepare individuals for the future of work; it must ensure that *all* individuals, regardless of their socio-economic status, ability, age, gender, ethnicity, or legal status, are equipped and supported to thrive within it.

At the heart of this shift lies a renewed commitment to inclusivity, which entails dismantling the barriers—technological, social, structural—that marginalize specific populations from full participation in education, training, and employment. Social equity, in this framework, demands not uniform solutions but differentiated support that responds to the lived realities of diverse individuals. Rather than offering equal treatment to all, socially equitable career guidance provides resources and opportunities tailored to the needs of the most disadvantaged, so that they too may pursue dignified, meaningful, and sustainable careers.

The digitalization of work and learning has brought both opportunities and risks. While online tools and platforms offer scalable solutions for career guidance, they can also exacerbate existing inequalities. The so-called "digital divide"—referring to disparities in access to digital infrastructure, devices, and skills—remains a major obstacle, especially for underrepresented groups such as NEETs (young people not in education, employment, or training), the long-term unemployed, people with disabilities, refugees and asylum seekers, low-income individuals, and residents of rural or underserved areas. Without deliberate interventions, these populations risk being left behind in the evolving labor market.

Career Guidance 4.0 must therefore be designed with inclusivity as a foundational principle. First, it must ensure that all individuals have access to guidance services that are both affordable and available in formats suited to their realities—whether through community-based centers, mobile apps, hybrid programs, or remote counseling. This requires extending the reach of public services and fostering partnerships with civil society and grassroots organizations that already work with marginalized groups.

Moreover, guidance models need to be informed by theories and frameworks that explicitly account for issues of access and equity. The Psychology of Working Theory (Blustein) and Social Cognitive Career Theory (Lent & Brown), for instance, offer valuable lenses for understanding how structural constraints, self-efficacy, and environmental supports shape career decision-making. They help professionals move beyond an individualistic understanding of career development toward a more contextualized and justice-oriented practice.

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Technology itself must also be approached critically. Career professionals are increasingly called upon to serve not just as guidance experts but as facilitators of digital inclusion. This involves training clients in basic digital literacy, introducing them to online job platforms, helping them build digital identities, and ensuring that guidance tools are accessible to users with disabilities or low digital fluency. Accessible formats—such as screen-reader-friendly platforms, simplified language, multilingual resources, and mobile-compatible applications—are essential to widen participation.

Equally important is the cultural and contextual responsiveness of guidance practices. Standardized approaches often fail to account for the rich diversity of life experiences, cultural norms, and socio-economic constraints among client populations. Effective guidance must therefore be dialogical and reflexive, actively seeking to validate clients' identities and life stories, rather than imposing normative career paths. This means incorporating narrative techniques, life design approaches, and career construction theories that position the individual as the co-author of their professional journey.

Career professionals must also play the role of community connectors, linking individuals not only to job vacancies but to relevant networks, support services, and learning opportunities. This includes working with employers to promote inclusive hiring practices, advocating for fair treatment of gig workers and migrants, and fostering workplace environments that embrace diversity, equity, and inclusion. Moreover, mentorship, coaching, and peer support—especially when designed for specific vulnerable groups—can help foster confidence, career clarity, and resilience among those who face compounded disadvantages.

In sum, inclusivity and social equity in Career Guidance 4.0 require a paradigm shift from standardized service delivery to adaptive, personalized, and justice-driven guidance. This involves rethinking who has access to support, how that support is delivered, and whose needs and aspirations are centered in the process. As career professionals step into this new digital landscape, they must do so not merely as facilitators of employability, but as advocates for fairness, agents of empowerment, and architects of inclusive futures.

Challenges Faced by Underrepresented Groups in Career Development within Industry 4.0

The arrival of Industry 4.0 has brought forth unprecedented transformations in the world of work. Powered by technologies such as artificial intelligence, big data, automation, and the Internet of Things (IoT), the Fourth Industrial Revolution is reshaping how jobs are created, performed, and connected to broader societal trends. However, these changes do not affect everyone equally. While some individuals are well-positioned to seize emerging opportunities, others—especially those already marginalized in the labor market—face increased risks of exclusion. Underrepresented groups such as NEETs (young people Not in Education, Employment, or Training), the long-term unemployed, persons with disabilities (PwDs), and refugees encounter structural, technological, and psychological barriers that hinder their ability to navigate and thrive in this new world of work.

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One of the most pressing challenges is access to relevant skills and training opportunities. The pace at which digitalization advances often surpasses the capacity of traditional education and vocational training systems to include marginalized groups. NEETs, for example, may lack access to affordable or targeted upskilling opportunities, and may disengage from the labor market due to low self-efficacy, socio-economic instability, or limited support networks. Similarly, the long-term unemployed often experience “skill atrophy” over time, meaning that the longer they remain out of work, the more disconnected they become from evolving employer expectations and technological norms. Re-entering the workforce in a digital economy without targeted guidance, flexible learning formats, or personalized support is profoundly difficult.

Persons with disabilities (PwDs) face additional systemic barriers, often stemming from a lack of inclusive infrastructure and tools. Many digital platforms and career development resources are not designed with accessibility in mind, excluding people with sensory, cognitive, or mobility challenges. Moreover, stereotypes about productivity, adaptability, or "fit" persist in employer attitudes, further limiting access to inclusive hiring opportunities and career advancement. Beyond physical or technical obstacles, the attitudinal barriers remain deeply entrenched in many work cultures.

For refugees and migrants, career development within Industry 4.0 is complicated by language barriers, legal restrictions on employment, interrupted education, and credential recognition issues. Even highly qualified individuals often experience “brain waste”—their skills underutilized or dismissed—due to an inability to navigate host country systems or to meet strict formal requirements. Furthermore, social and cultural exclusion can prevent refugees from accessing professional networks and mentorship that are increasingly critical in network-driven economies.

Across all these groups, a shared barrier is the digital divide—not just in terms of hardware or internet access, but in the confidence, literacy, and support structures needed to engage meaningfully in digital work and learning environments. In Industry 4.0, where remote work, e-learning, and digital self-promotion are becoming the norm, lacking such competencies can quickly lead to long-term exclusion.

Career guidance practitioners must therefore operate with heightened awareness and sensitivity to these dynamics. Traditional models of career development—which often assume a level playing field and emphasize individual agency—must be adapted to reflect the structural inequalities embedded in contemporary labor markets. This means designing guidance services that are flexible, culturally competent, and rooted in a justice-oriented framework. Interventions must not only support individuals in acquiring skills but also challenge systemic barriers, advocate for inclusive policies, and connect clients with supportive networks and opportunities that match their lived realities.

In conclusion, while Industry 4.0 holds the potential to democratize work and learning through technology, it also risks deepening social and economic divides. Unless career guidance is explicitly geared toward inclusion, equity, and tailored support, underrepresented groups will continue to face compounding disadvantages. The challenge for Career Guidance 4.0 is not merely to keep pace with technology, but to ensure that no one is left behind in the transition toward a digitally-driven labor market.

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The Digital Divide and Its Impact on Career Development Opportunities

In the context of Industry 4.0 and Career Guidance 4.0, the promise of digitalization is immense. It includes democratizing access to information, creating flexible learning and work opportunities, and enabling real-time labor market insights and interactive guidance tools. However, alongside this promise lies a persistent and deeply rooted barrier: the **digital divide**. This divide, broadly defined as the gap between those who have access to digital technologies and the skills to use them effectively and those who do not, has become a critical issue in the pursuit of inclusive career development.

The digital divide operates across multiple dimensions. The most visible form is the **infrastructure gap**—the absence of affordable and reliable internet connections, digital devices, and assistive technologies. This is particularly common in rural areas, low-income households, refugee camps, and underserved communities. Yet the digital divide is not merely about access. It is also about **digital literacy and confidence**: the ability to navigate online platforms, engage in digital learning, manage a professional identity online, and utilize career services through digital means. Many individuals—especially older adults, people with disabilities, NEETs, migrants, and long-term unemployed persons—may lack the competencies, trust, or support systems needed to fully participate in digital career ecosystems.

The implications for career development are significant. In a labor market where job applications, recruitment processes, skill-building, and networking are increasingly digital, those who remain offline or under-skilled risk **total exclusion** from economic participation. For example, job portals, online job-matching algorithms, e-portfolios, and AI-driven career planning tools are fast becoming standard tools for employability. Without adequate digital support, vulnerable individuals may not even know these tools exist, let alone how to use them.

This divide also undermines **lifelong learning opportunities**. Microlearning, MOOCs, e-mentoring, and digital credentials—all pillars of modern upskilling—assume a baseline level of digital fluency. Yet, many adults in transition or from marginalized backgrounds struggle to access or complete such programs due to lack of technical knowledge, confidence, or digital support. The result is not only skill stagnation but also a growing sense of disempowerment, which can negatively impact self-efficacy and career identity.

Importantly, the digital divide is **not neutral**. It intersects with existing inequalities—educational, economic, geographic, linguistic, and social—and often **amplifies** them. For example, while an urban, university-educated jobseeker may benefit from AI-powered career services, a low-income single mother in a rural area without Wi-Fi, digital equipment, or digital training may face triple exclusion: from employment, from upskilling, and from career guidance services themselves.

Career Guidance 4.0 must therefore adopt a **dual role**: embracing digital innovation while simultaneously addressing the ethical and practical challenges posed by unequal access. This involves designing **hybrid guidance services**—combining in-person and digital formats—ensuring materials are accessible to people with disabilities and different learning styles, and using **low-tech solutions** (e.g., SMS-based notifications, phone consultations) where needed.

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Furthermore, guidance professionals should act as **digital literacy facilitators**, especially for clients at risk of exclusion. This includes assessing digital competence as part of career counseling, offering structured digital upskilling pathways, and collaborating with community organizations to provide training and equipment access. Inclusive platforms should provide multilingual interfaces, accessible navigation, audio-visual support, and clear language, in addition to personalized feedback and moderated peer learning spaces.

Ultimately, bridging the digital divide is not just a technical task—it is a matter of **social justice**. Ensuring equal digital access and support is essential to ensuring that all individuals, regardless of background or circumstance, can actively participate in shaping their careers in a digital age. If unaddressed, the digital divide will not only deepen labor market segmentation but will also undermine the broader goals of fairness, inclusion, and empowerment that Career Guidance 4.0 seeks to uphold.

Strategies for Overcoming Digital and Social Barriers to Employment in Industry 4.0

The rapid transformation of work in the context of Industry 4.0 has created both extraordinary opportunities and stark inequalities. While automation, artificial intelligence, and digitalization offer new pathways for professional growth, they also erect significant **barriers to participation**—especially for individuals lacking the technological means, social support, or skillsets to adapt. Career Guidance 4.0, if it is to fulfill its inclusive mission, must adopt and promote proactive strategies to **overcome these digital and social barriers to employment**, ensuring that all individuals—regardless of their background—can access, navigate, and thrive in the modern labor market.

One of the most urgent barriers is the **lack of digital access and competence**. Overcoming this obstacle begins with promoting **digital inclusion**. This means providing underserved individuals with access to affordable internet, devices, and the digital literacy training necessary to use them confidently. Career guidance professionals must act as facilitators—not only of career development—but of digital empowerment. This involves assessing clients' digital readiness, introducing them to online platforms for job searching and skill-building, and guiding them through the creation of digital CVs, e-portfolios, and professional digital identities.

Furthermore, to effectively support vulnerable populations such as NEETs, long-term unemployed individuals, persons with disabilities, and migrants, guidance services must move beyond one-size-fits-all models. Tailored interventions are essential. These include offering **hybrid delivery methods**—such as combining face-to-face sessions with online counseling—and developing **low-tech or mobile-compatible tools** for clients with limited connectivity. Multilingual guidance resources, screen-reader-compatible platforms, and simplified user interfaces are also critical for reaching diverse users.

Addressing **social barriers** requires acknowledging and dismantling the structural inequalities that persist in access to education, training, and decent work. Career professionals must be equipped to recognize the effects of poverty, discrimination, gender inequality, trauma, disability, or cultural displacement on career trajectories. This means integrating **culturally sensitive** and **trauma-informed** approaches into counseling, building trust with clients who may have experienced exclusion or marginalization, and advocating on their behalf when necessary.

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Mentoring and **peer support networks** are particularly effective in reducing social isolation and enhancing career agency among marginalized groups. When individuals can see role models who have succeeded despite adversity, they are more likely to believe in their own capacity for transformation. Structured mentoring programs—particularly those that combine digital platforms with community-based interaction—can bridge the gap between aspiration and action.

To overcome the systemic barriers embedded in hiring practices, **career professionals must also engage employers as partners**. This includes promoting inclusive hiring policies, advocating for workplace accommodations, and co-designing recruitment pathways that consider the realities of disadvantaged jobseekers. For example, outreach to social enterprises, inclusive internships, supported employment programs, or collaborations with diversity-focused NGOs can expand opportunities for clients who might otherwise be overlooked in conventional recruitment systems.

A particularly promising strategy lies in the **integration of accessible and flexible upskilling opportunities** into career guidance pathways. Offering modular, personalized, and often free learning pathways—through microlearning platforms, MOOCs, and community-based workshops—can reduce entry barriers. Career services should play a central role in guiding clients through these learning ecosystems, helping them identify relevant courses, track their progress, and connect their newly acquired skills to employment pathways.

Equally important is **community engagement**. Local partnerships with libraries, municipalities, job centers, youth organizations, and NGOs create sustainable support networks for clients. These actors can work together to provide wraparound services—such as transportation, childcare, language support, or digital access—without which even the most innovative training initiative may fail to reach those who need it most.

In conclusion, overcoming digital and social barriers to employment in Industry 4.0 is a complex task that requires both systemic change and individualized support. Career Guidance 4.0 must position itself as a **bridge between innovation and equity**, leveraging technology not only to modernize guidance but to make it radically more inclusive. This demands a commitment to outreach, adaptability, advocacy, and ethical practice. Only then can career development become a truly empowering and accessible process for all.

Promoting Inclusive Training and Upskilling Opportunities in Industry 4.0

As technological advancements redefine work in the digital era, the ability to continuously learn, unlearn, and relearn becomes essential. Industry 4.0 demands not only digital and technical proficiency but also soft skills such as adaptability, creativity, and problem-solving. However, access to meaningful and relevant learning opportunities is **not evenly distributed** across all segments of society. If the benefits of technological progress are to be equitably shared, the promotion of **inclusive training and upskilling pathways** must become a core priority for career guidance professionals and public policy alike.

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Inclusive upskilling is not simply about increasing the number of training programs. It requires ensuring that these opportunities are **designed, delivered, and supported** in ways that accommodate the **diverse needs of all learners**—particularly those at risk of exclusion. NEETs, older adults, persons with disabilities, migrants, low-skilled workers, and individuals living in rural or remote areas often face multiple barriers to accessing reskilling initiatives. These include financial limitations, lack of childcare, digital illiteracy, limited access to transportation, stigma, and past negative experiences with education.

To address these challenges, career guidance within the framework of Career Guidance 4.0 must focus on **flexibility, accessibility, and personalization**. Flexible learning opportunities—such as **micro-credentials, online modules, blended learning, and mobile-compatible platforms**—allow learners to fit training into their lives. These approaches also support a more modular, competence-based view of skill development, enabling individuals to progressively build qualifications based on real needs and labor market trends.

Career professionals can play a transformative role by acting as **learning navigators**—helping clients assess their skills, identify training goals, and connect with accessible, recognized opportunities. This includes supporting individuals to develop personal learning plans, guiding them through digital platforms like LinkedIn Learning, Coursera, or national e-learning portals, and helping them monitor their progress. Such structured support is particularly vital for learners with low confidence, fragmented educational backgrounds, or unfamiliarity with online learning environments.

Accessibility must also be addressed at both **technical and pedagogical** levels. Training materials should be available in multiple formats (e.g., video, audio, subtitles, simplified text) and languages, and be compatible with assistive technologies. Additionally, inclusive training should reflect **real-life challenges** faced by learners—using scenarios, examples, and assessments that validate their lived experiences and empower their learning journey.

At the policy level, collaboration between guidance services, training providers, and labor market actors is essential. **Skills mapping and forecasting** can be used to inform the development of programs that are directly linked to employment needs. **Public-private partnerships**, vocational education and training institutions, and third-sector organizations can also work together to offer wraparound support services, including coaching, mentoring, equipment provision, or transportation subsidies.

Moreover, inclusive upskilling must not only focus on preparing people for existing jobs but also on **supporting transitions to new roles and sectors**, including those emerging from green and digital transformation. Guidance should encourage individuals to explore diverse learning paths—not just traditional academic tracks, but also community-based learning, experiential training, apprenticeships, and digital self-directed learning.

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In sum, promoting inclusive training and upskilling in the era of Industry 4.0 is both a practical necessity and a matter of social equity. Career guidance has a pivotal role in ensuring that lifelong learning is not a privilege for the few but a **right accessible to all**. By supporting learners through personalized guidance, removing structural barriers, and advocating for inclusive learning ecosystems, Career Guidance 4.0 can help build a labor market that is innovative, resilient, and just.

Promoting Inclusive Hiring Practices and Employer Collaboration

In the context of Industry 4.0, where technological advancements are reshaping employment structures and job requirements, it becomes increasingly vital to ensure that hiring practices evolve in parallel to reflect the values of **inclusivity, diversity, and equity**. While new technologies enable more efficient and data-driven recruitment processes, they can also reinforce existing biases or create new forms of exclusion if left unchecked. Career Guidance 4.0 must therefore engage not only with individual clients but also with employers—playing an active role in **shaping inclusive labor markets** and promoting hiring practices that open doors rather than close them.

Inclusive hiring is more than simply broadening the applicant pool. It involves **systemic transformation** in how candidates are sourced, evaluated, onboarded, and retained. Many job seekers—especially those from underrepresented groups such as people with disabilities, migrants, women in STEM fields, long-term unemployed individuals, and ethnic minorities—encounter invisible barriers long before they reach the interview stage. These may include opaque job descriptions, rigid selection criteria, algorithmic bias in screening tools, or a lack of accommodations in assessment methods.

Career guidance professionals are uniquely positioned to act as **bridges between individuals and employers**, helping to promote awareness of these challenges and advocating for more inclusive and equitable recruitment strategies. This includes advising employers on how to revise job descriptions to emphasize transferable skills rather than rigid qualifications, encouraging alternative assessment formats that recognize diverse competencies, and promoting the value of soft skills, lived experience, and non-formal learning.

One of the most effective approaches is the **co-design of inclusive pathways** into employment. This can include supported internships, job trials, pre-employment training tailored to specific employer needs, and dual mentorship models that support both candidates and hiring managers. For instance, programs that pair refugees with employer mentors not only prepare candidates for integration but also sensitize staff to the challenges of working with culturally diverse teams. Similarly, offering job coaching or workplace adjustments for persons with disabilities can lead to long-term job retention and mutual benefit.

Public-private partnerships are also critical. Career services can collaborate with employers, chambers of commerce, social enterprises, and local governments to create **inclusive employment ecosystems**. This includes the establishment of inclusive employer charters, diversity training programs, certification schemes for inclusive workplaces, and joint efforts to identify sectors with a high potential for integrating vulnerable groups.

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Digital recruitment technologies—AI-powered job-matching, applicant tracking systems, and remote interviewing tools—must also be scrutinized for bias and accessibility. Career professionals can play an advocacy and advisory role here, ensuring that such systems are transparent, ethical, and aligned with universal design principles. For example, automated hiring tools should be tested for language simplicity, compatibility with screen readers, and flexibility in assessment time for neurodivergent applicants.

Moreover, promoting **employer commitment to inclusion** must be tied to ongoing workplace development. Guidance services can assist organizations in building inclusive cultures that go beyond tokenistic hiring. This includes supporting staff development, encouraging inclusive leadership, and advising on employee wellbeing practices that benefit everyone.

Ultimately, inclusive hiring is not a philanthropic gesture—it is a strategic imperative. Diverse teams are more innovative, resilient, and reflective of society. As the world of work becomes more complex and dynamic, organizations that embrace inclusive practices are better equipped to adapt and grow. Career Guidance 4.0 must therefore cultivate **employer engagement as a core strategy**, ensuring that all individuals have not just theoretical access to employment but **real and sustainable pathways** into decent work.

Tailoring Career Guidance Services to the Unique Needs of Diverse Populations

The guiding principle of modern career guidance—especially within the framework of Career Guidance 4.0—is that **one-size-fits-all approaches are no longer adequate**. As societies grow more diverse and labor markets more fragmented and digitalized, career professionals must be equipped to **adapt their services to the lived realities, identities, and aspirations of varied client groups**. Tailoring guidance services to diverse populations is not just a matter of ethics or inclusion—it is essential to the effectiveness and relevance of career support in an increasingly complex world of work.

Each client brings a unique set of experiences shaped by their cultural background, age, gender, abilities, socio-economic status, education level, and migration history. Career guidance must recognize and **honor these differences**, not view them as deviations from a norm. Rather than treating diversity as a challenge, inclusive guidance reframes it as an opportunity to co-construct meaningful, person-centered career pathways that align with individuals' strengths, values, and circumstances.

For example, **youth classified as NEETs (Not in Education, Employment, or Training)** may require not only career information but **motivational support, coaching, and trust-building** to re-engage with learning or the labor market. Their disengagement may stem from past academic failure, economic hardship, or lack of social capital. An effective intervention would focus not merely on employability skills but on **building confidence, setting achievable goals**, and developing digital skills in accessible formats.

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Similarly, **migrants and refugees** may face barriers related to credential recognition, language proficiency, unfamiliarity with local labor market systems, or trauma. Career guidance for these groups should incorporate **multilingual resources**, **intercultural sensitivity**, and where necessary, **trauma-informed approaches**. It should also involve collaboration with support services (housing, legal aid, psychosocial support) and community-based organizations that understand the nuances of each group's integration journey.

Persons with disabilities require services that go beyond standardized vocational assessments. Guidance professionals must be trained in **disability-inclusive practices**, including the use of assistive technologies, individualized planning, and awareness of workplace accommodations and anti-discrimination legislation. Accessibility must be both **physical and digital**, ensuring that online platforms, career games, and self-assessment tools can be navigated by individuals with visual, cognitive, or motor impairments.

Older adults returning to or transitioning within the labor market may face internalized ageism, low digital confidence, and health concerns. Effective guidance must acknowledge these realities while emphasizing the **value of life experience, mentoring capacity, and the possibility of portfolio careers** or flexible work. A strengths-based approach that highlights transferable skills and supports digital upskilling can enhance their sense of agency.

Likewise, **young women in male-dominated fields**, **LGBTQ+ individuals**, or **ethnic minorities** may need support in navigating not only career decisions but also the socio-cultural dynamics of discrimination, microaggressions, and marginalization in the workplace. In these cases, guidance must support **identity affirmation**, safety planning, and empowerment strategies, as well as advocate for inclusive work environments.

To deliver such differentiated services, career professionals must develop **intersectional awareness**—the understanding that multiple factors (e.g., disability, gender, class, ethnicity) intersect to shape individual opportunities and barriers. This requires ongoing **professional development**, use of **culturally responsive and person-centered tools**, and **collaborative partnerships** with community actors and civil society organizations.

Moreover, **co-constructive approaches**—where the client is viewed as an expert in their own life—are central to tailoring support. Narrative career counseling, life-design interviews, and digital storytelling allow individuals to voice their unique journeys and aspirations, while the counselor helps them identify options that resonate with their identity and context.

In conclusion, tailoring career guidance to diverse populations is not a matter of customizing services superficially—it is about **redefining the role of guidance itself**. Career Guidance 4.0 must become a responsive, empowering, and inclusive process that **validates diversity, addresses structural inequality, and helps individuals craft future pathways** that are both personally meaningful and socially sustainable.

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Using and Creating Accessible Career Guidance Materials and Tools for Vulnerable Groups

In the evolving landscape of Career Guidance 4.0, where technology and personalization define service delivery, the question of **accessibility** is not merely technical—it is deeply ethical and strategic. For career guidance to be inclusive and equitable, it must provide all individuals, particularly those from vulnerable or marginalized groups, with the **means to understand, engage with, and act upon career-related information and services**. This requires the development and use of **accessible career guidance materials and tools**, consciously designed to meet the diverse needs, abilities, and contexts of learners and jobseekers.

Vulnerable groups—such as persons with disabilities, low-literate adults, migrants and refugees, youth with limited formal education, older workers unfamiliar with digital systems, or individuals living in remote or under-resourced areas—frequently encounter structural and informational barriers in accessing guidance services. These barriers may include websites and applications that are incompatible with assistive technologies, materials written in overly technical or academic language, lack of translation, or reliance on formats (e.g., long text) that exclude those with different cognitive or sensory needs.

To address these challenges, career professionals must ensure that guidance materials and tools adhere to the **principles of universal design**, accessibility, and inclusiveness. This means creating and selecting resources that are **multimodal**—offering content in **visual, auditory, simplified textual, and interactive formats**. For example, a career self-assessment tool should be available in audio-narrated versions, accompanied by easy-to-read instructions, and compatible with screen readers. Career videos or online courses should include subtitles, sign language interpretation, and adjustable playback speeds. Printable resources should use clear fonts, high-contrast colors, and culturally inclusive imagery.

Moreover, **language accessibility** is critical. Migrants, refugees, and individuals from minority language backgrounds benefit greatly from materials provided in their native language or in simplified language versions. Involving community organizations in the co-creation and translation of these materials can enhance their cultural appropriateness and trustworthiness.

Digital tools must also reflect **user diversity**. Career games, virtual job exploration platforms, and digital guidance interfaces should be tested for usability by people with a range of abilities and digital skill levels. Tools should be mobile-responsive, usable on low-bandwidth devices, and designed with **clear, intuitive navigation** to minimize cognitive overload.

Beyond the content itself, the **process of accessing and interacting** with guidance materials must also be inclusive. Booking systems for career sessions, for instance, should offer alternatives for those who may not be comfortable with or capable of using online scheduling tools. Likewise, data privacy practices must be transparent and understandable, particularly when dealing with vulnerable groups who may have legitimate concerns about surveillance, discrimination, or exploitation.

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Importantly, creating accessible tools should not be a top-down process. Instead, it must involve **co-design with the target users**. Participatory design methods—where clients themselves are engaged in evaluating and improving tools—ensure that final products are aligned with real needs and preferences. This not only enhances effectiveness but also empowers individuals to feel ownership over the tools they use.

Career professionals must also be trained in **selecting, curating, and adapting existing tools** to fit the needs of their clients. This includes developing toolkits that map available platforms by accessibility features, learning how to modify activities for group or individual use, and using feedback mechanisms to continuously assess the relevance and inclusivity of the materials.

In summary, accessibility in career guidance is not a luxury or an afterthought—it is a **precondition for equity**. By investing in the creation and use of accessible materials and tools, Career Guidance 4.0 becomes more than technologically advanced: it becomes a genuinely **human-centered, socially responsible practice** that reaches those who have traditionally been excluded from career services.

Empowering Clients to Navigate the Changing Job Market Through Tailored Guidance, Mentorship, Coaching, and Community Career Development Services

In a world where technological advancement, economic uncertainty, and labor market volatility have become the norm, career development can no longer rely on static pathways or generic solutions. Clients today face a labor market shaped by automation, hybrid work models, gig and platform-based employment, shifting employer expectations, and an increasing emphasis on self-directed learning and adaptability. In this context, the role of career guidance is not simply to provide information—it is to **empower individuals to navigate complexity, uncertainty, and change with confidence, purpose, and resilience**.

Empowerment begins with **tailored, client-centered guidance** that respects the individuality of each career journey. Generic advice often fails to resonate with people whose life stories include barriers such as discrimination, unemployment, migration, disability, or socioeconomic disadvantage. Instead, effective career guidance builds a **relationship of trust** and focuses on personalized strategies: assessing strengths and aspirations, identifying learning and labor market opportunities, and co-designing realistic and meaningful career plans. It emphasizes client agency and helps individuals take ownership of their own career decisions, especially in a fast-evolving digital environment.

Yet empowerment is not a solitary process. **Mentorship and coaching** play a critical role in sustaining motivation, building confidence, and expanding networks—especially for individuals navigating career transitions or entering unfamiliar sectors. Mentors offer lived insight, professional modeling, and social capital, while coaches provide structured support to develop skills, set goals, and manage change. Both relationships help clients move from uncertainty to action by reinforcing a sense of competence, connectedness, and future orientation.

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Career guidance professionals can act as facilitators in building these supportive relationships. This includes identifying potential mentors, linking clients to alumni or professional networks, organizing job shadowing or role-model encounters, and integrating coaching techniques—such as goal-setting, reflective questioning, and accountability tracking—into their practice. Such interventions are especially powerful for youth, newcomers, women in male-dominated fields, or older adults re-entering the workforce.

Moreover, empowering clients means supporting them **not just individually but as part of a community**. **Community-based career development services** are vital in extending the reach and cultural relevance of guidance. These services are often embedded in trusted local institutions such as libraries, community centers, migrant associations, or disability advocacy groups. They offer not only guidance but also wraparound support such as childcare, housing assistance, digital access, and psychosocial support. They also foster peer learning environments where clients can exchange knowledge, build solidarity, and combat isolation.

Digital tools can also reinforce empowerment—when they are designed to be inclusive and user-driven. Career planning platforms, goal-setting dashboards, interactive labor market visualizations, and AI-powered career simulations can help individuals explore opportunities, recognize their competencies, and visualize future scenarios. However, technology alone is not empowering unless clients are supported in understanding and applying it in ways that reflect their unique circumstances.

Finally, empowerment also requires a **structural perspective**. Career professionals must recognize that many clients face not only personal but also **systemic barriers**. They must be prepared to act as **advocates and connectors**, influencing policy and employer practices, and ensuring that the conditions for fair and sustainable employment are in place. This includes engaging in partnerships with employers, training providers, civil society, and policymakers to co-create ecosystems that support long-term, inclusive, and meaningful participation in the labor market.

In sum, empowering clients to navigate the changing job market is not about offering quick fixes—it is about equipping individuals with the insight, confidence, skills, and networks needed to **build resilient and adaptive career paths**. Career Guidance 4.0, when implemented through tailored support, mentorship, coaching, and community collaboration, becomes not just a service—but a transformative force for personal agency, social inclusion, and collective well-being.

Online Interactive Resources

ILO Skills for a Greener Future Database

A digital tool exploring green skill development and inclusive employment opportunities in the context of climate transition.

https://www.ilo.org/skills/greenjobs/WCMS_732214/lang--en/index.htm

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EPALE Platform (Electronic Platform for Adult Learning in Europe)
Features good practices, policy briefs, and inclusive career guidance methods aimed at vulnerable adults across the EU.
https://epale.ec.europa.eu

CareerHack: Inclusive Career Design Simulator
An interactive resource where users explore equity-centered guidance scenarios (gender, disability, refugee status, etc.).
https://www.careerhack.ca

LinkedIn Learning Path – Digital Skills for Everyone
A curated set of beginner-friendly, free courses on basic digital skills, inclusive for people with low digital literacy.
https://opportunity.linkedin.com

ILO Digital Skills for Youth Employment Tool
A toolkit designed for youth workers and career counselors working with NEETs to assess digital skill levels and offer tailored interventions.
https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_838941.pdf

UNHCR Connected Education Portal
Offers tools, case studies, and online learning resources for career development among displaced populations.
https://connectedlearning4refugees.org

Inclusive Design for Learning (Microsoft Accessibility Hub)
Provides guidelines and tools for creating accessible digital materials and career content for persons with disabilities.
https://www.microsoft.com/en-us/accessibility/

Career Skills Platform – EU-supported digital toolkit
A platform targeting vulnerable adults with interactive self-assessment, microlearning, and job readiness tools.
https://career-skills.eu

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Resources for further study

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Offers insights into inclusive training strategies for adults at risk of exclusion in Industry 4.0.
https://www.cedefop.europa.eu/en/publications/3081

European Commission (2022). "A European approach to micro-credentials for lifelong learning and employability."
Framework supporting access to flexible, short-term learning for disadvantaged groups.
https://education.ec.europa.eu/education-levels/higher-education/micro-credentials

UNESCO (2025). "Career without barriers: building inclusive and resilient education and training systems"
Provides case studies and conceptual approaches for inclusive, justice-oriented guidance services.
https://www.cedefop.europa.eu/en/news/career-without-barriers-building-inclusive-and-resilient-education-and-training-systems

ILO (2011). "Decent Work and Social Justice."
Explores the intersection of technology, labor rights, and inclusive employment practices.
https://webapps.ilo.org/public/libdoc/ilo/2011/111B09_376_engl.pdf

European Disability Forum (2023). "Employment Toolkit for Inclusive Workplaces"
Explores how guidance services and employers can jointly support persons with disabilities in Industry 4.0 labor markets.
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Self-evaluation Exercises

Which of the following best describes the digital divide in the context of career development?

A. The tendency for employers to prefer younger candidates with digital skills

B. The unequal access to digital tools, skills, and connectivity needed for full participation in career services and the labor market

C. A policy framework that ensures free internet access for all

D. The mismatch between traditional guidance tools and STEM-focused career paths

Correct Answer: B

What is one key strategy for promoting inclusive hiring practices in Industry 4.0?

A. Co-designing supported employment pathways with career professionals and employers

B. Emphasizing academic qualifications above all other criteria

C. Replacing all human recruiters with automated decision-making tools

D. Hiring primarily from elite educational institutions to reduce risk

Correct Answer: A

Why is it important to tailor career guidance to the unique needs of diverse populations?

A. Because it simplifies the guidance process for practitioners

B. Because individual differences should be eliminated to ensure fairness

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C. Because personalized support acknowledges diverse barriers and empowers individuals to act
D. Because all clients benefit equally from standardized tools and messages

Correct Answer: C

Which of the following is an example of making career guidance materials more accessible?
A. Using only text-based assessments for faster evaluation
B. Providing content only in the national language to promote integration
C. Offering career planning tools with screen-reader compatibility and simplified language options
D. Developing one high-level career guide and using it across all client groups

Correct Answer: C

How can mentorship and coaching contribute to career empowerment?
A. By replacing formal qualifications with informal advice
B. By reinforcing passivity in the client-professional relationship
C. By focusing only on performance reviews and employment outcomes
D. By helping individuals build confidence, clarify goals, and access networks

Correct Answer: D

What is a primary advantage of community-based career development services?
A. They eliminate the need for professional guidance qualifications
B. They offer peer and wraparound support in trusted local settings
C. They prioritize online delivery over human interaction
D. They are designed only for jobseekers with formal education

Correct Answer: B

Reflection Activities (Module 4: 5 activities)

The reflection activities / case studies enhance experiential learning, motivating trainees to answer specific questions by combining their personal, professional and social experience with the offered conceptual knowledge of each module

Activity 1: Case Study – The Digital Divide in Practice

Activity Type: Case Study with Structured Reflection

Learning Goals:

- Understand the impact of digital exclusion on career development

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- Analyze barriers and formulate inclusive interventions

Expected Outcome:

- Learners will identify challenges related to the digital divide and propose equitable guidance strategies

Specifications:

- *Individual or pair activity*
- *Duration:* 45–60 minutes

Description and Guidelines: Participants read the case of "Ahmed," a 38-year-old refugee with limited digital literacy, no home internet, and a disrupted employment history. Despite motivation, he struggles to access online job portals or digital training.

Instructions for participants:

- Identify three core digital and social barriers in Ahmed's case.
- Propose a personalized career guidance intervention plan using community-based support and digital inclusion strategies.
- Reflect in writing: *Have you worked with someone like Ahmed? How did your approach support or fail to support inclusion?*

Facilitator Tip: Encourage sharing in pairs or small groups to compare how different experiences shape responses.

Activity 2: Simulation – Designing an Accessible Career Tool

Activity Type: Simulation Exercise

Learning Goals:

- Explore principles of accessibility and universal design in practice
- Develop empathy and user-centered thinking

Expected Outcome:

- Participants will gain insights into creating tools that are usable by diverse client groups

Specifications:

- *Group activity (3–4 people)*
- *Duration:* 75–90 minutes

Description and Guidelines: Each group is assigned a user persona (e.g., low-literate NEET youth, blind jobseeker, migrant with limited local language skills). The task is to adapt a career planning worksheet or self-assessment tool for their assigned user.

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Instructions:

- Identify accessibility challenges in the original material.
- Redesign it using principles of plain language, multimodality, and cultural relevance.
- Present the redesigned tool and explain your choices.

Facilitator Tip: Have each group "test" another group's product from the user's perspective and give feedback.

Activity 3: Reflection Journal – Empowerment Through Mentorship

Activity Type: Guided Personal Reflection

Learning Goals:

- Reflect on the role of mentoring and coaching in fostering career agency
- Connect theory with personal mentoring/coaching experiences

Expected Outcome:

- Learners will articulate how supportive relationships can empower clients in vulnerable situations

Specifications:

- *Individual activity*
- *Duration:* 30–45 minutes

Description and Guidelines: Participants are asked to recall a time when they were either a mentor/coach or received mentoring/coaching support in their personal or professional life.

Guiding questions:

- What made the relationship effective or ineffective?
- What was the impact on your personal/professional growth?
- How might you apply these insights when supporting clients facing career uncertainty or marginalization?

Facilitator Tip: Offer the option to share insights in small groups or a secure online discussion board.

Activity 4: Case Study – Collaborating with Employers for Inclusive Hiring

Activity Type: Case Study Analysis and Action Planning

Learning Goals:

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- Understand strategies for engaging employers in inclusive hiring practices
- Apply guidance theory to real-world partnership building

Expected Outcome:

- Learners will develop a plan for employer engagement tailored to a specific client population

Specifications:

- *Group activity (4–5 participants)*
- *Duration:* 60–75 minutes

Description and Guidelines: Scenario: A local IT company wants to diversify its entry-level workforce but is unsure how to attract or support candidates with disabilities or from migrant backgrounds.

Instructions for trainees:

- Identify key inclusion principles to promote to the employer.
- Develop a mini "employer collaboration strategy" including outreach, training, and adapted recruitment practices.
- Link your approach to at least one theoretical model (e.g., Social Cognitive Career Theory or Psychology of Working).

Facilitator Tip: Facilitate a discussion comparing group strategies, highlighting creative and inclusive solutions.

Activity 5: Structured Dialogue – Tailoring Guidance Across Differences

Activity Type: Structured Roleplay and Reflection

Learning Goals:

- Practice adapting guidance approaches to clients with differing needs
- Increase cultural, emotional, and structural awareness in guidance scenarios

Expected Outcome:

- Learners will improve their ability to respond flexibly and ethically to diverse clients

Specifications:

- *Pairs or triads (rotating roles)*
- *Duration:* 60 minutes

Description and Guidelines: Participants roleplay three scenarios:

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6. A young migrant mother seeking part-time work

7. An older worker made redundant by automation

8. A low-literate adult seeking vocational training

Each round includes a “client,” a “counselor,” and an “observer” who gives feedback on inclusion, empathy, and practical strategy.

Reflection Questions (post-activity):

- What assumptions did you have about your “client”?
- How did you adapt your communication or suggestions?
- What would you do differently next time?

Facilitator Tip: Conclude with a plenary debrief linking practice to module theory (e.g., empowerment, tailored guidance, systemic barriers).

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Module 5: Professional development and Ethical Professional Practice in Career Guidance 4.0

Learning scheme

Module 5, "Professional development and Ethical Professional Practice in Career Guidance 4.0" will provide career, VET and social inclusion practitioners with the knowledge and skills necessary to foster continuous professional development, ensuring that practitioners remain competent and up-to-date with the latest industry trends, technological advancements, and best practices.n addition, the module will address the ethical dimensions of career guidance practice, emphasizing the importance of maintaining professional integrity, adhering to ethical guidelines, and ensuring that career counseling services are inclusive, fair, and equitable, while maintaining a high standard of service delivery within the Industry 4.0 challenges.

Learning Objectives:

This module will support trainees to:

- Develop high-level cognitive and social-emotional skills, essential for addressing the evolving challenges in career guidance in the context of Industry 4.0.
- Develop a strong readiness for change and an ability to engage with and lead innovation in career guidance practices, ensuring they are equipped to adapt to the rapid shifts in technology and the labour market driven by Industry 4.0.
- Gain a comprehensive understanding of the ethical and quality assurance issues related to the use of ICT-based tools in career counseling, including challenges related to cybersecurity, personal data protection, and maintaining client confidentiality in digital interventions.
- Enhance their ability to collaborate effectively across sectors (e.g., education, industry, and public policy) to integrate diverse insights and best practices into career guidance, ensuring that services are informed by the latest developments and trends in education, labour markets, and public policy.
- Develop strategies to continuously grow professionally, engaging in lifelong learning to maintain up-to-date knowledge and skills, ensuring they can provide high-quality career guidance services throughout their careers.

Expected Learning Outcomes:

By the end of this module, trainees will be able to:

- Apply ethical standards and data protection regulations in Digital Career Guidance provision (e.g., GDPR).
- Ensure client confidentiality while using digital tools, adapting career guidance services to meet individual client needs and ensuring that all digital interventions are respectful of privacy and personal circumstances
- Provide unbiased, transparent and client-centered career advice, prioritizing the welfare of clients, enabling them to make informed career decisions, and boosting their employability within the evolving Industry 4.0 landscape.

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- Develop and maintain a network of stakeholders (including employers, educational institutions, policy makers, and community organizations) that can assist clients in navigating career transitions and accessing opportunities within the Industry 4.0 labour market.
- Support clients to adapt to complex and rapid labour market changes in the labour market due to technological advancements, helping them adapt to Industry 4.0 by providing personalized advice, career development resources, and strategies to overcome barriers to employment.

Key words:
Professional development, Cybersecurity in guidance services, Cross-sector cooperation, Inclusive digital practices, Data protection (GDPR), Digital ethics

Motivation Questions

- How should traditional ethical standards for career guidance evolve to align with the context of Career Guidance 4.0, particularly with the integration of digital tools and technologies?
- In what ways can career guidance professionals maintain ethical standards while adapting to the increasing demand for digital services and tools in the career development process?

Suggested Learning Content

- Understanding the benefits and limitations of digital career services and blended/ multi-channel service delivery approach in comparison to face-to-face counseling.
- Ethical Standards in Digital Career Guidance - Adapting traditional ethical standards for the digital age, including handling data protection and privacy (e.g., GDPR compliance).
- Principles of cybersecurity and personal data protection in digital career guidance. Safeguarding client information when using remote counseling platforms and digital tools.
- Addressing challenges in maintaining ethical practices while using digital tools like AI-driven assessments, chatbots, and career apps. Maintaining confidentiality in the digital context. Tailoring digital services to accommodate various client needs and access challenges (e.g., digital divide, accessibility)
- Strategies for working collaboratively with other sectors (e.g., education, industry, government) to enhance career guidance services. Building networks of employers, educational institutions, and policy makers to create effective career pathways
- Continuous learning and adaptation for career guidance professionals.Developing critical skills such as digital literacy, ethical decision-making, and innovation in career guidance practices
- Quality standards in Career Guidance 4.0 provision.

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Theoretical background

Understanding the Benefits and Limitations of Digital Career Services and Blended/Multi-Channel Service Delivery in Comparison to Face-to-Face Counseling

The rise of digital technologies and the accelerating transformation of the labor market have led to significant changes in the delivery of career guidance services. In Career Guidance 4.0, digital tools and multi-channel approaches are not just add-ons to traditional counseling—they are integral to how guidance is accessed, designed, and experienced. However, these new modes of delivery come with both advantages and limitations, especially when compared to conventional face-to-face counseling. Understanding these is essential for professionals who aim to offer flexible, effective, and ethically sound services.

Digital and blended career services refer to the use of various technological platforms and tools—such as video conferencing, online career platforms, chatbots, mobile apps, and social media—in delivering career information, assessments, and counseling. A blended or multi-channel approach integrates both digital and in-person elements, offering clients multiple pathways to engage with career services.

This evolution in career service delivery has been shaped by a combination of interconnected factors. First, technological innovation and the digitalization of labor markets have transformed both the nature of work and the ways individuals engage with career information and support. At the same time, clients increasingly expect services that are flexible, immediate, and responsive to their individual schedules and needs. Additionally, there is a growing recognition of the importance of reaching geographically dispersed or underserved populations, who may otherwise face barriers to accessing traditional, location-based services. Finally, the COVID-19 pandemic served as a major turning point, rapidly accelerating the adoption of remote counseling and solidifying its acceptance as a legitimate and necessary form of career guidance*Benefits of Digital and Blended Career Services*

1. Increased Accessibility and Flexibility: Clients can access services at their own pace, from any location, and at convenient times—especially important for individuals with disabilities, work/family responsibilities, or rural locations.
2. Scalability and Efficiency: Digital tools enable counselors to reach larger audiences through webinars, chat-based support, AI-driven assessments, or automated follow-ups, optimizing time and resources.
3. Innovative Tools and Engagement: Platforms may offer engaging features such as interactive career games, real-time labor market data, digital CV builders, and adaptive learning paths.
4. Continuity of Support: Clients can receive ongoing assistance across different channels (e.g., email, app notifications, video sessions), enhancing engagement and tracking progress over time.
5. Data-Informed Personalization: Digital systems can collect user behavior data to provide customized content, improving the relevance of information and interventions.

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6. Hybrid Learning and Support" Blended models allow professionals to combine the depth of in-person counseling with the reach and convenience of digital tools, tailoring the approach to each client.

Limitations and Challenges

1. Human Connection: Digital interfaces may limit the depth of the counseling relationship, emotional nuances, and non-verbal communication—all crucial elements of trust and empathy in guidance.
2. Digital Divide and Inequity: Not all clients have reliable access to the internet, devices, or digital skills. This can exacerbate exclusion for vulnerable populations if not addressed.
3. Privacy and Security Risks: Use of online platforms introduces concerns related to data protection, confidentiality, and informed consent, requiring strong ethical and technical safeguards.
4. Over-Reliance on Technology: Automated tools, while helpful, cannot fully replace the reflective and dialogical nature of counseling, particularly for complex or emotionally charged decisions.
5. Fragmentation of Services: When multiple platforms and channels are used without coordination, clients may experience disjointed or confusing service delivery.
6. Professional Adaptation Needs: Career practitioners need ongoing training to develop digital competencies, evaluate the appropriateness of tools, and maintain ethical standards across delivery formats.

Digital and blended career services have opened new possibilities for innovation, accessibility, and responsiveness in career guidance. However, they are not a universal solution. Their effectiveness depends on context, client needs, professional competence, and ethical vigilance. Rather than replacing face-to-face counseling, digital approaches should be seen as complementary—part of a toolkit that enables career practitioners to deliver personalized, inclusive, and adaptive services in the era of Career Guidance 4.0.

Ethical Standards in Digital Career Guidance – Adapting Traditional Ethics for the Digital Age

As career guidance enters the digital era, the foundational ethical principles that have long governed the profession—such as confidentiality, informed consent, professional integrity, and respect for client autonomy—remain just as relevant. However, **the digitalization of services presents new ethical challenges and responsibilities** that demand thoughtful adaptation of these standards. Career professionals must not only understand traditional ethical frameworks but also critically assess how these principles apply—and sometimes shift—when counseling moves into online spaces.

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The core ethical values of career counseling, often informed by codes of practice such as those by the **International Association for Educational and Vocational Guidance (IAEVG)** or national professional bodies, were developed primarily in the context of in-person interactions. These principles include:

- Maintaining **confidentiality** of client information
- Securing **informed consent**
- Practicing **non-maleficence and beneficence** (avoiding harm, promoting well-being)
- Acting with **professional competence** and **accountability**

In the digital realm, these principles still guide practice—but their application is more complex. For example, obtaining informed consent online may require additional steps to ensure the client understands how their data will be used, stored, or shared. Confidentiality must be maintained not only in the presence of the counselor, but across potentially insecure digital channels and platforms.

New Ethical Challenges in Digital Practice

While the foundational ethical principles remain unchanged, the digitalization of career guidance has introduced new challenges that require careful consideration and adaptation.

One of the most pressing concerns is data protection, particularly compliance with the General Data Protection Regulation (GDPR). Career practitioners who operate within the European Union—or serve clients who reside in the EU—must navigate stringent requirements regarding the collection, use, and storage of personal data. This includes providing clients with clear and comprehensive information about what personal information is being collected, for what purposes, who will have access to it, and how long it will be retained. Moreover, clients must be informed of their rights to access their data, request corrections, or even demand its deletion. Ensuring GDPR compliance is not merely a technical task—it is a matter of ethical transparency, client trust, and legal accountability.

A second area of ethical concern involves the selection and use of digital platforms for service delivery. Not all online counseling tools are designed with the same level of data security or user protection. Practitioners are responsible for ensuring that the platforms they use offer robust encryption, respect user privacy, and do not collect or sell user data without explicit consent. Choosing a digital platform is no longer a neutral logistical decision—it has direct ethical implications for the confidentiality and safety of client information. Furthermore, practitioners must remain vigilant about software updates, third-party integrations, and data storage policies, as these can all impact client security.

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Maintaining confidentiality in remote settings presents another challenge, especially when neither the counselor nor the client is operating from a controlled environment. In traditional face-to-face counseling, privacy can be ensured by managing the physical space. In digital interactions, however, confidentiality depends on the integrity of networks, devices, and surroundings. Counselors must consider the risks of unsecured Wi-Fi, shared devices, or background noise during sessions. They must also help clients understand how to participate safely—for example, by recommending the use of headphones or ensuring sessions take place in private, interruption-free spaces whenever possible.

The integration of artificial intelligence (AI), chatbots, and automated assessments in career services raises further ethical questions. While these tools can enhance efficiency and personalization, they also carry the risk of embedded bias, lack of transparency, and dehumanization of the guidance process. For instance, if a chatbot offers career suggestions based on data patterns, how can a practitioner be sure that these recommendations are free from gender, ethnic, or socioeconomic bias? And if an AI system produces results that seem inappropriate or limiting, who is accountable? Ethical practice requires that such tools are used with caution, that their functioning is understood, and that human oversight remains central, particularly in emotionally sensitive or complex cases.

Finally, the shift to digital communication has blurred the lines of professional boundaries. With clients able to reach out via email, messaging apps, or even social media, the traditional boundaries of time, space, and role are often tested. Career practitioners must navigate how and when to respond to digital communications, set clear expectations for availability, and maintain a consistent tone of professionalism across platforms. The immediacy of digital contact should not undermine the integrity of the counseling relationship, and practitioners must resist the temptation to engage in informal or reactive exchanges that may compromise ethical standards.

To respond to these challenges, ethical professionalism in Career Guidance 4.0 requires **new competencies**. These include:

- Digital literacy not only in using tools, but also in **evaluating their ethical implications**
- Awareness of **cybersecurity and privacy principles**
- Ability to **critically assess digital interventions** for inclusivity, equity, and client empowerment
- Ongoing professional development to remain current with technological and legal changes

Ethical practice in the digital age is not simply about avoiding harm—it is about **actively shaping a digital guidance landscape that is just, transparent, and client-centered**.

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Principles of Cybersecurity and Personal Data Protection in Digital Career Guidance

As career guidance services increasingly rely on digital platforms and cloud-based systems to deliver support, manage information, and communicate with clients, the responsibility of career professionals to protect sensitive data becomes more significant than ever. In this context, **cybersecurity and personal data protection are not simply technical concerns—they are central to ethical and professional practice** in Career Guidance 4.0.

The nature of the data exchanged in career counseling—such as psychometric assessment results, personal goals, employment histories, identity information, and even sensitive issues related to mental health or personal crisis—makes it essential that every interaction is conducted within a secure digital environment. A breach of confidentiality in this context could have serious consequences for a client's well-being, reputation, or employment prospects. Therefore, practitioners must be well-informed about the **principles of cybersecurity** and be able to implement **practical safeguards** in their day-to-day work.

Cybersecurity in the context of career guidance refers to the **protection of digital systems, devices, and data from unauthorized access, misuse, or damage**. This begins with an awareness of potential vulnerabilities: unsecured Wi-Fi connections, outdated software, weak passwords, unencrypted communication tools, or cloud storage systems lacking proper access controls. Professionals must take active steps to minimize these risks. This includes using secure and encrypted video conferencing platforms, enabling two-factor authentication for logins, regularly updating software and antivirus protections, and storing sensitive data only on platforms that comply with recognized data security standards.

Closely connected to cybersecurity is the **principle of personal data protection**. In the European context, this is legally framed by the **General Data Protection Regulation (GDPR)**, which defines how personal data must be collected, processed, stored, and disposed of. Career professionals must ensure that clients are fully informed about how their data will be used, for what purposes, and for how long it will be retained. Clients must also be able to exercise their rights—to access their own records, to correct inaccurate information, or to request the deletion of data if it is no longer needed.

Good practice in digital career guidance involves integrating these principles into all stages of service delivery. Before a remote session begins, for example, counselors should inform clients of the digital tools to be used and confirm that they consent to the session being held online. They should also confirm whether the client is in a private and secure location. During the session, screen-sharing or the exchange of files should only occur over secure channels. After the session, records should be stored in password-protected systems, and care must be taken to ensure that only authorized personnel have access.

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Moreover, career professionals should be cautious about the use of third-party applications, especially free or commercially driven platforms that may monetize user data or track behavior. When integrating new technologies into their practice—such as career assessment tools, scheduling apps, or feedback forms—practitioners must review the privacy policies and data handling protocols of these tools. They should avoid using platforms that are vague about how client data is used or that do not comply with relevant data protection legislation.

It is also essential that professionals stay informed through **continuous learning**, as cybersecurity threats evolve rapidly. Training in digital ethics, data protection laws, and secure communication methods should be an ongoing component of professional development. Additionally, organizations providing career services should establish internal protocols for data breaches, reporting procedures, and regular audits of cybersecurity practices.

In summary, the move to digital career services expands both the reach and the responsibility of career professionals. Protecting client data is a fundamental expression of respect and ethical commitment. In Career Guidance 4.0, **cybersecurity and personal data protection are not optional enhancements but essential components of quality, safety, and trust**.

Addressing Challenges in Maintaining Ethical Practices While Using Digital Tools Like AI-Driven Assessments, Chatbots, and Career Apps

The integration of digital technologies—particularly artificial intelligence (AI), chatbots, and mobile applications—has brought innovation and efficiency to career guidance services. These tools have the potential to personalize support, expand access, and automate routine processes such as appointment scheduling, CV generation, or initial career interest screening. However, as the use of these technologies increases, so too do the **ethical complexities** associated with their application. Maintaining ethical standards while using digital tools requires both **technical awareness** and **professional judgment**, ensuring that such tools serve the interests of clients rather than compromising their autonomy, privacy, or well-being.

One of the primary ethical concerns surrounding AI-driven assessments is the **lack of transparency in how algorithms function**. Many digital tools use proprietary models to evaluate user responses and generate career suggestions. These models are often opaque—even to the professionals using them—making it difficult to explain how decisions are made or to identify potential biases embedded in the system. For example, an AI tool might suggest different career paths for two clients with similar qualifications based on subtle, unexplainable variables, such as prior click behavior or incomplete data. In such cases, the career professional may unknowingly reinforce inequities or provide misleading guidance. Ethical practice demands that counselors critically evaluate the reliability, fairness, and relevance of AI outputs and **never rely on them in isolation** when supporting clients.

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Chatbots present another set of challenges. While they offer convenience, scalability, and around-the-clock availability, they often operate without emotional intelligence or contextual sensitivity. A chatbot may, for instance, respond to a client in distress with standardized, inappropriate, or even harmful messaging. Furthermore, clients may be unaware that they are interacting with an automated system rather than a human professional—leading to **misunderstandings about confidentiality, responsibility, and support expectations**. Ethical guidance requires that users are clearly informed when interacting with automated systems, and that **boundaries between digital support and human counseling are well defined**.

Career apps—ranging from mobile platforms that offer interview training to gamified career exploration tools—introduce additional risks related to **data security, commercial influence, and overgeneralization**. Some apps collect detailed user data and may share it with third parties for marketing or profiling purposes. Others use simplified career matching algorithms that may be engaging but lack scientific validity. Career professionals must **carefully vet these tools** before recommending them and ensure that their use aligns with professional standards for informed consent, data protection, and cultural relevance.

Another ethical challenge lies in the **over-reliance on technology** to address complex human needs. While digital tools can support self-assessment and labor market exploration, they cannot replicate the empathy, reflective dialogue, and nuanced understanding that human counselors bring to difficult career decisions. For example, a young adult facing uncertainty about their future may receive a list of occupations from an app—but what they may truly need is to be heard, validated, and guided through a process of identity exploration. Ethical practice in Career Guidance 4.0 requires maintaining the **centrality of the human relationship**, with technology serving as a supplement—not a replacement—for professional care.

To navigate these challenges, practitioners must adopt a **critical and reflective stance** toward the tools they use. This includes:

- Understanding how a tool works and what assumptions it relies on
- Evaluating whether the tool is accessible and inclusive
- Identifying when a tool may reinforce stereotypes or exclude marginalized clients
- Ensuring that clients understand the role of digital tools in the guidance process and are empowered to question or reject outputs they do not find meaningful

Additionally, professionals should advocate for **greater transparency and accountability** in the development of digital guidance tools. Where possible, practitioners can collaborate with developers, researchers, and policymakers to shape the ethical design of AI systems and promote open standards that center user dignity and fairness.

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In summary, the rise of AI, chatbots, and digital apps in career services introduces both promise and peril. To uphold ethical practice in this context, career professionals must exercise **technological discernment**, **critical engagement**, and a deep commitment to **human-centered guidance**. Ethics in Career Guidance 4.0 is not just about using new tools responsibly—it is about ensuring that innovation always serves the best interests of those we are called to support.

Tailoring Digital Services to Accommodate Various Client Needs and Access Challenges (e.g., Digital Divide, Accessibility)

In the expanding ecosystem of Career Guidance 4.0, digital tools and platforms are increasingly central to how individuals access information, assessments, counseling, and opportunities. However, while technology can offer unprecedented flexibility and reach, it can also unintentionally exclude those who lack the infrastructure, skills, or personal circumstances to engage with digital services. Therefore, the ethical and professional responsibility of career guidance practitioners includes not only adopting technology but **tailoring it to fit the diverse realities of their clients**—especially those facing barriers related to the **digital divide**, **disability**, or other **access-related challenges**.

The digital divide is not a singular phenomenon. It encompasses **inequalities in access to devices and internet**, **differences in digital literacy**, and **variations in motivation or confidence** when using technology. For example, an unemployed older adult in a rural area may lack reliable internet or the skills to complete an online application, while a young person from a low-income household might only have access to a shared smartphone with limited data. Despite being equally in need of guidance, these individuals face very different digital realities. A standardized digital service would risk **reinforcing exclusion**, rather than resolving it.

Career professionals must begin by **assessing each client's digital readiness**. This includes understanding what technologies clients can access, how comfortable they are in using them, and what forms of support they may need. Rather than assuming all clients are equally prepared for online sessions or self-guided learning, practitioners should adapt their delivery formats. For some, this might involve offering career counseling over the phone or via SMS. For others, it may mean helping them navigate basic platforms before progressing to more complex online tools.

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Accessibility for persons with disabilities is another critical dimension. Many digital career tools are not designed with inclusivity in mind. Websites may lack screen reader compatibility, career games may rely on mouse use without alternatives, or text-heavy content may not be suitable for clients with cognitive or learning disabilities. To ensure full participation, digital platforms must adhere to **universal design principles**—offering content in multiple formats (audio, text, video, easy-to-read versions), being navigable through assistive technologies, and providing language and format options that accommodate diverse needs. Career professionals must also **advocate for accessible tools** and guide their clients in identifying and using platforms that support their unique requirements.

Moreover, clients from **culturally and linguistically diverse backgrounds** may face access issues even if they are digitally fluent. If digital tools are only available in the dominant language, use unfamiliar metaphors or references, or assume a certain educational background, they may alienate users or result in poor engagement. Tailoring services here means **providing multilingual resources**, integrating culturally relevant examples, and involving community mediators or support workers when appropriate.

Emotional readiness and trust are also part of accessibility. Some clients—particularly those who have experienced marginalization, trauma, or institutional distrust—may feel uncomfortable using unfamiliar technologies or platforms where they are unsure how their data will be used. Building trust through transparent communication, clear boundaries, and offering alternatives to fully digital interactions is essential.

Importantly, career professionals do not need to address these challenges alone. Collaboration with local organizations, libraries, adult education providers, or NGOs can help create wraparound support systems. These partners may offer digital literacy workshops, access to devices, or quiet spaces for remote guidance sessions. By integrating digital services into community infrastructure, the gap between availability and accessibility can be bridged more effectively.

In conclusion, Career Guidance 4.0 must not assume that digitalization is synonymous with inclusion. On the contrary, **inclusive digital guidance demands intentional design, adaptive practice, and persistent advocacy**. Tailoring services to individual needs is not only a matter of quality—it is a matter of equity. Only when digital guidance meets people where they are, can it truly help them move forward.

Strategies for Working Collaboratively with Other Sectors (e.g., Education, Industry, Government)

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In the era of Career Guidance 4.0, effective career support no longer exists in isolation. The rapidly changing nature of work, education, and skill demands requires career professionals to engage beyond the boundaries of their immediate practice. This means building strong **cross-sectoral partnerships** with education providers, employers, government agencies, and community organizations. Such collaboration is essential not only for offering relevant and dynamic services to clients, but also for contributing to more **cohesive and inclusive career ecosystems**.

The rationale for intersectoral collaboration is clear: no single actor can adequately address the complexity of transitions in the modern labor market. Career guidance professionals, while experts in individual development and support, **depend on timely information, accessible learning pathways, and labor market entry points**—resources that are largely shaped and controlled by institutions in other sectors. Without ongoing dialogue and coordination, guidance services risk becoming disconnected from reality and less responsive to client needs.

One of the most strategic partnerships is with the **education sector**. Schools, vocational education providers, adult learning centers, and universities are natural allies in promoting lifelong career development. Collaborative initiatives may include the integration of career education into curricula, coordinated guidance programs across educational transitions, or referral systems between institutional guidance services and public career centers. When career professionals work alongside educators, they can **identify early disengagement**, help align student pathways with emerging labor market trends, and ensure that students receive **developmentally appropriate, future-oriented guidance**.

Equally critical is collaboration with the **business and industry sector**. Employers hold key insights into evolving skill requirements, sector-specific trends, and hiring practices. Career professionals can leverage these relationships to **inform their guidance**, develop up-to-date career information, and co-create opportunities such as job shadowing, internships, mentoring schemes, or employer visits. Such partnerships not only enrich guidance content but also foster trust and smoother transitions between education, training, and employment—especially for young people, migrants, and reskilled adults.

At a broader level, **collaboration with government agencies and policymakers** ensures that career guidance is aligned with national employment strategies, social inclusion goals, and skills development plans. Public authorities often hold responsibility for funding, infrastructure, and data that are critical to guidance provision. When career practitioners engage in policy discussions, working groups, or multi-agency networks, they can **influence the design of inclusive and effective systems**, advocate for underserved populations, and help shape lifelong guidance policies that respond to real-world conditions.

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Community and third-sector organizations—such as NGOs, youth services, disability advocates, and migrant associations—also play a vital role in outreach and support. These actors often **have deeper access to hard-to-reach groups** and can help guidance services tailor their approach in culturally sensitive and contextually appropriate ways. Collaborative models here may involve co-location of services, joint delivery of training or counseling, and sharing of case management responsibilities.

To make cross-sectoral collaboration successful, several strategies are essential:

- Establishing **mutual understanding** of roles, languages, and goals across sectors
- Creating **shared platforms** for communication, information exchange, and coordination
- Engaging in **regular joint planning and evaluation** of guidance initiatives
- Building **trust-based relationships** through transparency, consistency, and reciprocity
- Promoting **inclusive leadership** and co-ownership of career development efforts

Ultimately, collaboration is not just an operational tactic—it is a **mindset and practice of interdependence**. In the complex and dynamic landscape of Career Guidance 4.0, working across sectors is not optional. It is the only way to build resilient systems that truly support people in navigating lifelong learning, decent work, and meaningful careers in a fast-changing world.

Continuous Learning and Adaptation for Career Guidance Professionals

The evolving nature of work, technology, and client needs in the context of Career Guidance 4.0 demands that professionals themselves engage in **ongoing learning and adaptability**. The role of the career counselor is no longer static or solely reactive—it is dynamic, future-facing, and deeply intertwined with developments in digitalization, labor market transformation, social inclusion policy, and ethical practice. To remain effective and relevant, career guidance professionals must **continuously update their knowledge, strengthen their skills, and embrace a mindset of lifelong professional development**.

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The shift from traditional to digitally enhanced or hybrid guidance models has introduced **new competencies** that extend beyond classical counseling skills. Today's practitioners must be comfortable with **digital platforms**, understand the **ethical implications of data use**, engage with **AI-based tools critically**, and communicate across multiple media formats. At the same time, they are still expected to uphold the **relational depth, empathy, and reflexivity** that have always underpinned meaningful guidance work. This dual expectation underscores the importance of **adaptive professionalism**—the ability to integrate new knowledge while remaining grounded in core values.

Continuous learning involves more than acquiring technical skills. It encompasses **critical thinking**, **innovation**, and the ability to reflect on one's practice in the face of uncertainty. For example, when encountering a new digital tool or platform, a career professional must not only learn how to use it functionally but also assess whether it is inclusive, accessible, ethically sound, and contextually appropriate for their clients. This reflective practice—questioning not only how to use tools, but whether, when, and for whom they are suitable—is a key marker of professional maturity in the 4.0 landscape.

Moreover, adaptation is essential in how professionals respond to broader societal shifts: economic disruption, climate change, automation, migration, and social inequality. These forces shape the career opportunities, barriers, and motivations of clients—and guidance must adjust accordingly. For instance, a professional supporting clients in a community affected by job loss due to automation must not only understand local labor trends but also be able to support psychological resilience, promote upskilling pathways, and navigate digital guidance platforms.

To support this development, institutions and professional associations must play a proactive role in offering **accessible, high-quality professional learning opportunities**. These might include:

- Short online modules on digital literacy, cybersecurity, or emerging technologies
- Training on inclusive guidance methods and working with specific client groups
- Webinars or communities of practice focused on real-world problem solving
- Reflective supervision or peer mentoring to share dilemmas and insights

Equally important is the promotion of a **learning culture** within guidance organizations—one where experimentation is encouraged, failure is seen as part of growth, and staff are supported to try new methods and technologies without fear of judgment.

Continuous learning is not only a professional necessity but also an **ethical imperative**. Clients place their trust in guidance practitioners to support informed and empowering decisions. To honor that trust in a changing world, professionals must commit to **evolving alongside their field**—not once, but throughout their careers.

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In summary, Career Guidance 4.0 does not only require that services become more agile and innovative—it demands the same from the professionals who deliver them. Through continuous learning, career counselors are better equipped to guide others through change precisely because they model that **adaptability and commitment to growth themselves**.

Quality Standards in Career Guidance 4.0 Provision

In an era of rapid transformation across the labor market, education, and technology, ensuring the **quality of career guidance services** has never been more important—or more complex. As Career Guidance 4.0 integrates digital tools, hybrid delivery models, and cross-sectoral collaboration, professionals and institutions must reaffirm their commitment to **quality assurance** through robust frameworks that respond to both traditional expectations and new realities. Quality standards in this context are not only about maintaining consistency—they are about **ensuring effectiveness, fairness, and relevance** in a changing world.

At its core, quality in career guidance refers to the **extent to which services are client-centered, ethically sound, evidence-informed, and inclusive**. Traditional quality indicators have often focused on counselor qualifications, adherence to professional codes of ethics, clear procedures, and user satisfaction. These remain important. However, Career Guidance 4.0 expands the scope of what quality means, introducing new dimensions such as **digital accessibility, cybersecurity, data protection, responsiveness to labor market trends, and adaptability to diverse delivery channels**.

A key feature of quality in the digital age is **transparency and accountability**—not only in service delivery, but in the tools and technologies used. For instance, if a career platform recommends occupations based on AI algorithms, practitioners and users alike have the right to know how those results are generated and whether the tool meets professional and ethical standards. Tools must be **validated**, updated regularly, and assessed for **bias, inclusivity, and accessibility**. Quality assurance frameworks must include procedures for **evaluating digital tools**, not simply accepting them as neutral or effective because they are widely used.

Another pillar of quality is **equity**. Services must be designed and delivered in ways that do not reinforce existing inequalities. This includes ensuring that clients with lower digital skills, disabilities, or limited access to technology can still benefit fully from career support. Quality guidance does not exclude—it adapts. In Career Guidance 4.0, **inclusivity becomes a quality criterion**, not just a value.

Moreover, quality must be viewed not only from the perspective of processes and standards, but also in terms of **outcomes**. Are services actually helping clients navigate transitions, develop agency, and pursue meaningful careers? Are they connected to real labor market opportunities and responsive to economic and social change? Quality in this context means linking services with **evidence of impact**, using both qualitative and quantitative data to improve practice.

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To support quality assurance in Career Guidance 4.0, various frameworks exist. At the European level, for example, the **ELGPN (European Lifelong Guidance Policy Network)** and the **CEDEFOP guidelines** emphasize principles such as accessibility, impartiality, transparency, and coordination. National quality standards may also include certification systems, supervision mechanisms, or professional registers that promote competence and accountability.

Organizations must also foster a **culture of continuous improvement**, where practitioners are encouraged to reflect on their practice, seek feedback, engage in professional learning, and contribute to innovation. Quality is not a fixed achievement—it is a **process of ongoing development**. This includes:

- Regular review of service policies and procedures
- Active inclusion of client voices in service design
- Monitoring of ethical and legal compliance (e.g., GDPR, accessibility laws)
- Investment in staff training and digital capacity-building

In conclusion, quality standards in Career Guidance 4.0 are not only about maintaining what has worked in the past—they are about **reimagining quality in light of new tools, expectations, and challenges**. To be effective and equitable, guidance services must be flexible, inclusive, ethical, and future-oriented. Quality is the foundation upon which trust, innovation, and impact are built.

Online Interactive Resources

1. **EPALE (Electronic Platform for Adult Learning in Europe)**
   A multilingual platform offering articles, toolkits, webinars, and community forums related to inclusive adult learning and guidance.
   https://epale.ec.europa.eu
2. **DigComp Hub (EU Digital Competence Framework)**
   Self-assessment tools and learning resources for digital skills applicable to career professionals and their clients.
   https://www.digcomphub.eu/
3. **Microsoft Accessibility Design Guidelines**
   An interactive design toolkit for developing inclusive and accessible digital content and services.
   https://www.microsoft.com/en-us/accessibility

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4. **Data Detox Kit (Tactical Tech)**
   Interactive guide to privacy, data protection, and responsible digital tool use—adapted for professionals and the public.
   https://datadetoxkit.org
5. **LinkedIn Learning: Digital Literacy for Career Professionals**
   Free digital upskilling modules suitable for guidance practitioners and clients.
   https://opportunity.linkedin.com

Resources for further study

1. Cedefop (2021). " Digital transitions in lifelong guidance: rethinking careers."
   In-depth analysis of digital guidance practices across Europe, with a focus on quality, ethics, and inclusivity.
   https://www.cedefop.europa.eu/files/6202_en_1.pdf
2. ELGPN (European Lifelong Guidance Policy Network) ELGPN Guidelines for Policies and Systems Development for Lifelong Guidance

   Practical guidance for implementing quality assurance and intersectoral collaboration in lifelong career guidance.

   https://www.cedefop.europa.eu/en/tools/vet-toolkit-tackling-early-leaving/resources/elgpn-guidelines-policies-and-systems-development-lifelong-guidance
3. UNESCO (2021). " Digital technology and the futures of education – towards 'non-stupid' optimism."
   Includes frameworks for ethical decision-making in the use of AI in education and guidance contexts.
   https://unesdoc.unesco.org/ark:/48223/pf0000377071
4. OECD (2024). " Digital technologies in career guidance for youth"
   Explores strategies for effective cross-sector collaboration and digital preparedness.
   https://www.oecd.org/en/publications/digital-technologies-in-career-guidance-for-youth_c9ab23da-en.html
5. ENISA (European Union Agency for Cybersecurity)
   Offers guidelines and toolkits for cybersecurity best practices, data protection, and ethical digital behavior.
   https://www.enisa.europa.eu
6. **International Association for Educational and Vocational Guidance (IAEVG) Ethical Guidelines**: These guidelines support members in enhancing the worth, dignity, potential, and uniqueness of those they serve. They provide a reference for decision-making, planning agency policies, informing the public, and ensuring quality standards in service provision. iaevg.com

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7. **National Career Development Association (NCDA) 2024 Code of Ethics**: This code serves as an ethical guide designed to assist members in constructing a professional course of action that best serves those utilizing career services and promotes the values of the career profession. It addresses areas such as the professional relationship, confidentiality, professional responsibility, and the use of technology in providing career services. NCDA
8. **Career Development Institute (CDI) Code of Ethics (2024)**: This code covers the professional behavior and practice required of all CDI members and informs the public of the ethical principles to which all CDI members adhere. It emphasizes principles like equity, diversity, inclusion, accountability, autonomy, and confidentiality. acdis.org+2thecdi.net+2cheshirewestandchester.gov.uk+2

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Sampson, J.P., Kettunen, J. & Vuorinen, R. The role of practitioners in helping persons make effective use of information and communication technology in career interventions. *Int J Educ Vocat Guidance* 20, 191–208 (2020). https://doi.org/10.1007/s10775-019-09399-y

Self-evaluation Exercises

1. Which of the following is a key benefit of using blended or multi-channel career guidance services?

A. It eliminates the need for professional training in guidance delivery
B. It guarantees higher job placement rates for all clients

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C. It combines flexibility and accessibility with the depth of face-to-face interaction
D. It replaces the need for face-to-face sessions completely

Correct Answer: C

2. When providing digital career guidance, what is the primary reason GDPR compliance is essential?

A. It improves the visual design of online tools
B. It ensures that personal data is collected and used legally and transparently
C. It accelerates session scheduling across platforms
D. It provides free software for digital guidance services

Correct Answer: B

3. What is an ethical risk associated with the use of AI-based career assessment tools?

A. AI eliminates the need for career professionals
B. AI can recommend more career options than traditional methods
C. AI decisions may lack transparency and reinforce bias
D. AI makes career choices easier for everyone

Correct Answer: C

4. What is an example of tailoring digital guidance to address accessibility needs?

A. Offering only video-based sessions to simplify scheduling
B. Using complex assessment tools to filter out low-skilled users
C. Requiring all users to complete guidance activities independently online
D. Providing guidance content in multiple formats, including screen-reader-compatible text and audio

Correct Answer: D

5. Why is cross-sector collaboration important in Career Guidance 4.0?

A. It helps career professionals outsource their responsibilities
B. It limits the influence of education and industry on guidance content
C. It enables guidance services to align with labor market trends and improve client outcomes
D. It avoids the need for career professionals to update their methods

Correct Answer: C

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6. Which of the following best describes the purpose of quality standards in Career Guidance 4.0?

A. To maintain ethical, inclusive, and effective service delivery in a rapidly changing context
B. To assess job satisfaction levels of guidance professionals
C. To ensure all clients receive automated digital guidance

D. To standardize all tools used across different platforms

Correct Answer: A

Reflection Activities (Module 5: 3 activities)

Activity 1: Case Study – Navigating Ethical Dilemmas in Digital Career Guidance

Activity Type: Case Study Analysis

Learning Goals:

- To apply ethical frameworks to digital guidance scenarios
- To critically evaluate risk, responsibility, and client-centered decision-making in online environments

Expected Outcome:

- Trainees will demonstrate ethical reasoning and identify practical solutions to common digital practice challenges

Specifications:

- *Individual or small group activity (2–3 participants)*
- *Duration:* 60 minutes

Description and Implementation Guidelines: Participants are presented with a fictional scenario: *A guidance professional uses an AI-driven career assessment app recommended by their institution. The tool is popular, but a client expresses confusion and concern about how the results were generated. The counselor is also unsure of the tool's data collection practices or underlying algorithm.*

Instructions:

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- Analyze the ethical issues raised in the scenario (e.g., transparency, informed consent, data protection).
- Propose how the counselor should respond in the moment and what long-term action should be taken.
- Reflect: *Have you encountered ethical tensions in your work with digital tools? What guided your decision-making?*

Facilitator Tip: Use a decision-making framework (e.g., the 7-step ethical decision model) to structure responses and facilitate whole-group discussion afterward.

Activity 2: Simulation – Designing Inclusive Digital Career Support

Activity Type: Simulation / Design Thinking Challenge

Learning Goals:

- To explore digital inclusion from the client's perspective
- To identify and apply principles of accessibility and universal design

Expected Outcome:

- Trainees will create a user-centered plan to improve access to digital guidance tools for a vulnerable client group

Specifications:

- *Group activity (3–4 participants)*
- *Duration:* 75–90 minutes

Description and Implementation Guidelines:
Each group is given a client persona, such as:

- A long-term unemployed adult with limited digital literacy
- A migrant youth with high motivation but poor connectivity and language barriers
- A person with a visual impairment seeking career re-entry

Instructions:

- Identify key barriers the persona might face in accessing digital career services.
- Co-design a digital guidance strategy or toolset adapted to the client's needs (e.g., alternative formats, low-tech options, partnerships).
- Present your solution to the wider group.

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Facilitator Tip: Encourage participants to use empathy mapping and to consider both digital and human supports (e.g., community organizations, phone-based coaching).

Activity 3: Structured Reflection – My Professional Development Journey in the Digital Age

Activity Type: Guided Reflection Exercise

Learning Goals:

- To enhance self-awareness around digital competence and ethical readiness
- To promote goal-setting for professional learning and adaptation

Expected Outcome:

- Trainees will create a reflective narrative of their development and identify future learning needs in Career Guidance 4.0

Specifications:

- *Individual activity with optional peer sharing*
- *Duration:* 45 minutes writing, 30 minutes discussion (optional)

Description and Implementation Guidelines:
Trainees write a short personal reflection (500–700 words) responding to the following prompts:

- How has your professional practice changed in response to digitalization?
- What ethical dilemmas or uncertainties have you encountered recently?
- In which areas (e.g., digital tools, data protection, inclusive design) do you feel strong, and where would you like to grow?
- Set one concrete professional development goal for the next six months.

Facilitator Tip: Optionally, pair up trainees to share reflections in a peer-coaching format or create a collective “learning wall” where key themes can be displayed anonymously.

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