In collaboration with Capgemini

WORLD ECONOMIC FORUM

# Matching Talent to the Jobs of Tomorrow: A Guidebook for Public Employment Services

INSIGHT REPORT

FEBRUARY 2025

# Contents



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# Foreword

**Anne Lebel**
Chief Human Resources Officer, Capgemini

**Till Leopold**
Head, Work, Wages and Job Creation, World Economic Forum

By 2030, more than 20% of jobs globally are anticipated to undergo transformation due to disruptions in the labour market. This transformation will be driven by macrotrends such as the rapid adoption of frontier technologies, the green transition, demographic shifts and geoeconomic fragmentation. According to the World Economic Forum's *Future of Jobs Report 2025*, these shifts are expected to result in the creation of 170 million new jobs and, simultaneously, the displacement of 92 million others, underscoring the importance of efficient job matching for workers, employers and public employment services alike to navigate this upheaval.[1]

Improving the efficiency of job matching for job seekers and businesses will enable deeper labour market insights, stronger strategic workforce planning, more effective upskilling and reskilling programmes and, eventually, better employment outcomes. Public employment services have a crucial role to play in enabling this process. To address this issue, the World Economic Forum and Capgemini have partnered to research best practices, challenges and solutions, focusing on public employment services operating at the forefront of labour market disruptions. An extensive literature review, interviews with national employment services and a benchmark of technological solutions informed the design of this guidebook, which aims to be a practical resource for policy-makers.

While there are no one-size-fits-all solutions, the guidebook addresses common challenges such as heterogeneity of jobs and skills languages and multiple sources of data. It additionally assesses emerging innovative solutions, including technological enablers such as artificial intelligence (AI) agents and blockchain solutions for certifications, mapping these factors as part of the job matching journey. Whether policy-makers have already successfully embarked on this journey or are just beginning to prepare for it, the guidebook provides guidelines and illustrations on harnessing the best human capital and technological potential for matching talent to the jobs of tomorrow.

# Executive summary

## A guidebook on innovative technology solutions for better labour market outcomes.

The rapid advancement of technologies such as artificial intelligence (AI) and machine learning (ML) is transforming job matching, enabling real-time labour market analysis, automated resume screening, and skills-based matching beyond traditional keyword searches. Public employment services have long played a crucial role in connecting jobseekers with opportunities, driving workforce alignment, and advancing reskilling initiatives to improve employment outcomes.

However, public employment services face significant barriers to effective job matching. These include skills misalignment due to the absence of standardized frameworks, fragmented and inaccessible data sources that limit real-time labour market insights, and resistance to adopting emerging technologies. Technological innovations present an opportunity to overcome these obstacles. Yet, many public employment services worldwide have yet to fully adopt advanced technologies to enhance efficiency and effectiveness in job matching.

This guidebook offers a practical framework, actionable guidance and real-world case studies to support policy-makers in implementing and scaling technological solutions, ultimately driving better alignment between skills and opportunities.

### A tailored data-driven framework

The guidebook outlines a five-step framework for public employment services to enhance job matching using data: **(1)** data access and collection, **(2)** data structuring and standardization, **(3)** data validation, **(4)** upskilling and reskilling, and **(5)** effective matching.

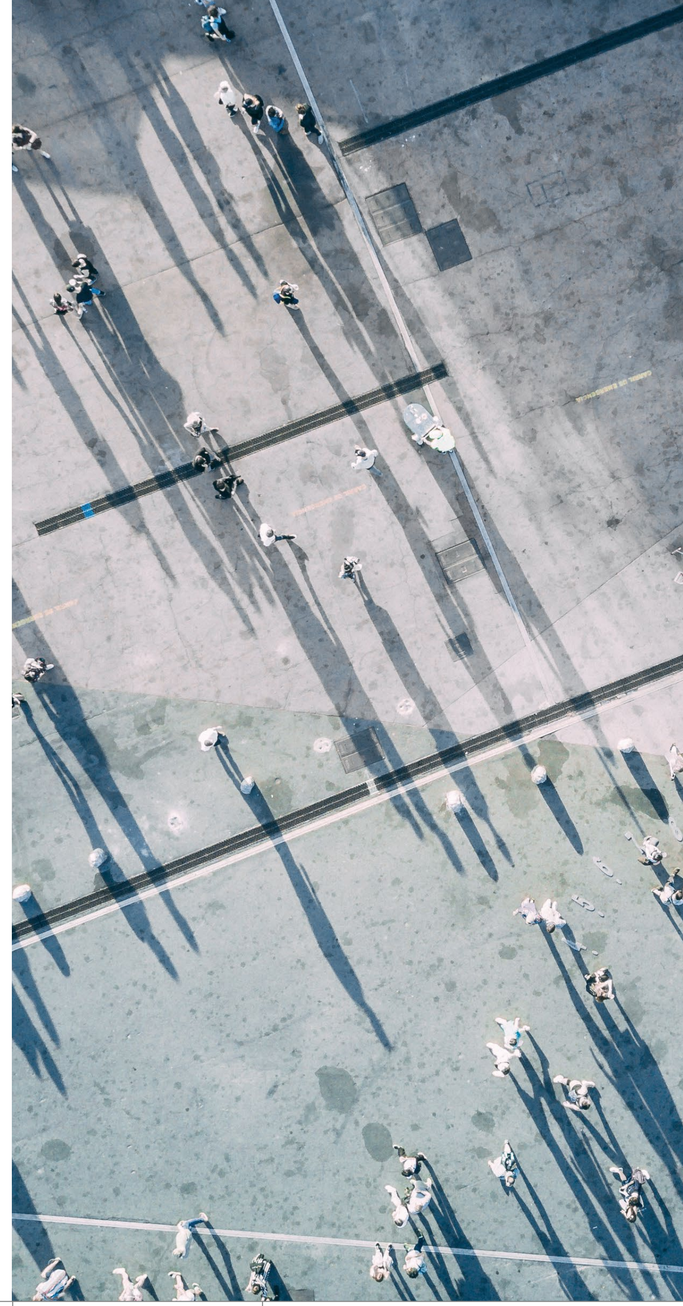
### Scalable solutions for better job matching

Data is at the core of the framework, empowering public employment services to harness technologies such as AI and ML for more efficient and effective job matching. While these solutions can be capital-intensive and require a highly skilled workforce, countries can begin with cost-effective, low-tech options such as SMS-based tools. These practical approaches enable public employment services to address immediate needs while building capacity to adopt more advanced technologies.

The guidebook highlights a range of advanced and cost-effective solutions for public employment services to improve the job matching process.

### Insights from real-world case studies

Implementing innovative job matching requires a flexible approach to address the diverse needs of public employment services across countries. Six country-level case studies illustrate how public employment services with varying levels of technological maturity harness technologies to address their unique job matching challenges. These case studies highlight the importance of balancing innovative technologies with a human-centred approach to foster meaningful connections, minimize biases and ensure cultural relevance. Strengthening public-private collaboration is essential to align workforce supply with demand, and drive sector-wide innovation. The adoption of standardized skills frameworks provides a foundation for inclusive labour market insights and supports dynamic workforce planning. Viewing job matching as an interconnected system allows for targeted improvements in one area to create ripple effects, ultimately boosting overall labour market efficiency. Through these strategies, public employment services can navigate the complexities of job matching and create a more agile and responsive labour market.

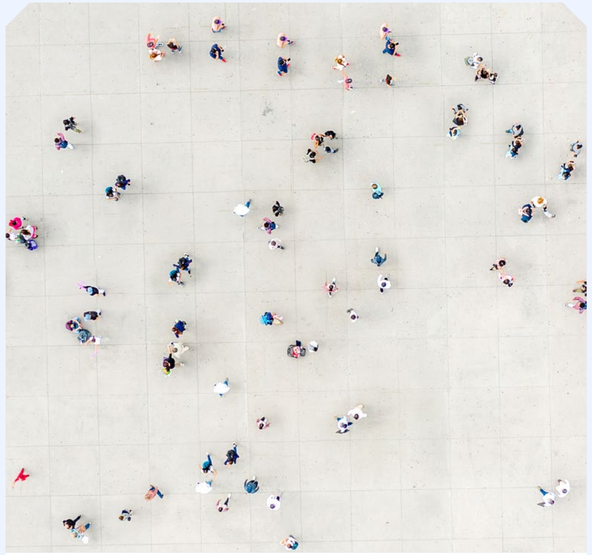


# Introduction

This guidebook is designed to support policy-makers in enhancing job matching efficiency using emerging technological solutions.

In particular, it targets public employment services seeking to support the matching of job seekers with opportunities at every level, including international organizations as well as national, regional and local authorities.

Effective job matching – the process of connecting individuals of working age with meaningful employment – faces mounting challenges. From misaligned skills frameworks and complex data workflows to concerns over data privacy and scepticism about emerging technologies, the obstacles are many.



## Chapter 1

of the guidebook presents a simple framework, outlining sequential steps and corresponding objectives that can be harnessed to enhance job-matching success and efficiency within public employment services.

## Chapter 2

shifts focus to technological innovations that can support job-matching activities today and in the future. A practical checklist is also provided, offering countries a step-by-step guide to advance through the various stages of job matching.

## Chapter 3

features six country case studies – France, Guatemala, Nigeria, the Philippines, Singapore and Sweden – showcasing best practices, challenges and solutions in real-world contexts.

**Additionally, a glossary of key technological terms offers accessible definitions to support understanding of the concepts explored in this guidebook.**

# 1 Framework for successful job matching

A five-step framework to enhance job matching for public employment services focused on data access, standardization, validation, upskilling and efficient matching.

# Job matching: definition and scope

## Definition

Job matching refers to **all activities that facilitate access to employment for individuals of working age, whether they are currently employed or actively seeking work**. This process involves identifying suitable employment opportunities for individuals and ensuring that their skills and qualifications meet the demands of the labour market.

## Country-specific needs

The scope of job matching services varies across countries due to a complex interplay of technology adoption, economic conditions, and cultural and market dynamics. Countries may encounter a range of unique challenges, such as limited infrastructure, budgetary and regulatory constraints, and diverse levels of technological literacy among the population, all of which can hinder the effective adoption of new technologies that could greatly enhance the efficiency of job matching services. While these structural differences highlight the lack of a one-size-fits-all solution, the guidebook identifies key points of convergence in the definition and scope of job matching.

## Scope

While the primary objective of job matching activities is to connect individuals with job opportunities within a national labour market or across borders, **three complementary activities are commonly pursued through job matching**:

### Labour market insights

Market insights derived from data analysis offer valuable information about labour market trends, employment patterns, skill demands and job locations. This data-driven approach enables policy-makers and employers to make informed decisions about workforce development and job matching strategies.

### Human capital planning

Human capital planning involves anticipating future labour market needs and preparing the workforce accordingly. This includes aggregating job offers and demand from diverse sources, and offering valuable insights into emerging employment trends and opportunities.

### Upskilling and reskilling

Upskilling and reskilling programmes are structured training initiatives aimed at equipping individuals with the skills needed to meet the evolving demands of the labour market. These programmes, which can include vocational training, professional development courses and other educational opportunities, play a crucial role in enhancing job matching services.

# Framework for successful job matching


This guidebook uses a simple framework, outlining five key steps for improving the success and efficiency of job matching for public employment services. Each step corresponds to a key **objective** of job matching, addressing common challenges.

## Step 1 – Data access and collection:

Gather comprehensive labour market data to analyse job demand and skill supply, to better **understand** current and future employment needs.

## Step 2 – Data structure and standardization:

Create a **common language** by linking skills to jobs, certifications and credentials to facilitate alignment between businesses and job seekers.

## Step 3 – Data validation:

Ensure data quality by verifying identities, credentials, skill proficiency levels and job descriptions, building **trust** in the journey.

## Step 4 – Upskilling and reskilling:

Regularly update profiles with the latest learning and training credentials, ensuring that job seekers' skills remain relevant, and increasing the accuracy and **value** of skills matching.

## Step 5 – Matching:

Use clean, validated data inputs to generate accurate outputs, ultimately driving job matching **efficiency**.

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# Innovative solutions and use cases

Exploring a diverse range of innovative and cost-effective approaches, providing comprehensive guidance across all stages of the job matching framework.

# Each of the following pages is structured as follows:

Outlines each step's **objective** from the public employment services perspective

## Innovative approaches for job matching processes

Highlights advanced technologies enhancing job matching processes to address diverse needs effectively.

## Cost-effective solutions for job matching processes

Emphasizes practical and cost-effective technologies to facilitate job matching processes, ensuring accessibility and efficiency for all stakeholders.

## Disruptive trends: tech provider perspectives

Shares insights from tech providers on disruptive trends and innovations shaping the future of job matching.

# Step 1: Data access and collection

Collect accurate and timely data from businesses and job seekers to understand labour market dynamics.

**Click on an icon below**
to find out more about each step
Access and collection

## Innovative approaches

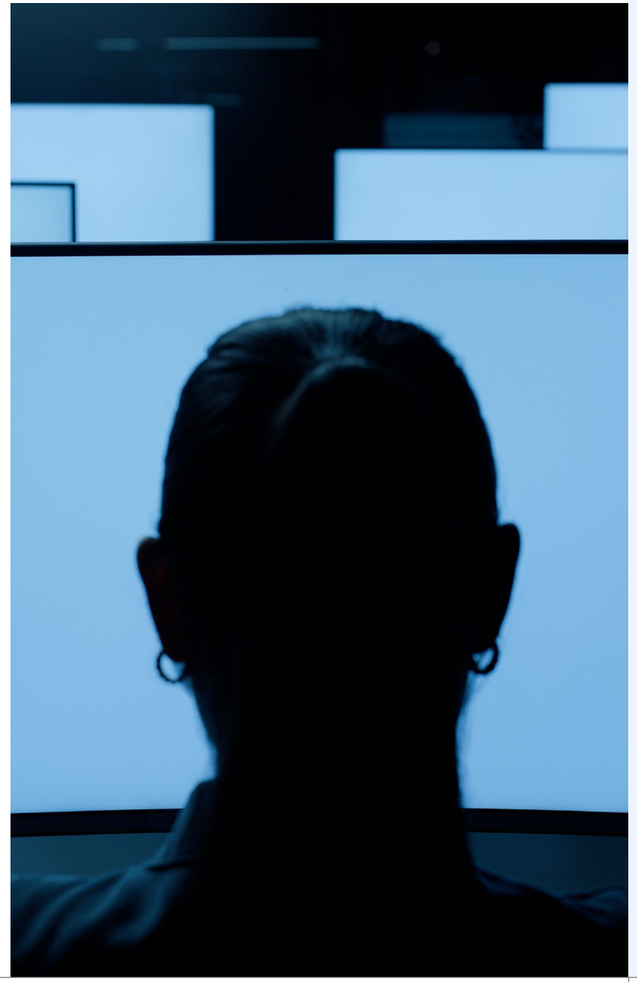
Data from businesses: **Application programming interface (API)** integrations with job boards can enable real-time vacancy updates and employer insights, while **artificial intelligence (AI)-driven** data analysis platforms can track labour market trends. Web scraping tools provide granular data from employer sites and job platforms.

Data from job seekers: **AI-driven profile analysers** can automatically parse resumes and extract structured data, such as skills and qualifications. Combined with **natural language processing (NLP)**, it processes unstructured data like resumes and cover letters to extract key details. **Chatbots** can also assist job seekers by helping with submissions, answering queries and ensuring a seamless data collection process.

## Cost-effective solutions

Data from businesses: **Market surveys** can be conducted to engage businesses and collect relevant information, along with **forms and spreadsheets**, which also provide a straightforward method for capturing data.

Data from job seekers: **SMS-based registration systems** offer a practical way for job seekers to provide their information. Additionally, **physical registration centres** such as kiosks or community offices can serve as data collection hubs.



## Disruptive trends: tech provider perspectives

The internet of things (IoT) will influence how data is collected. By harnessing interconnected devices, this technology will allow for real-time tracking of individuals' performance on the job or during recruitment processes. AI can then be used to analyse the data and provide insight into where training is needed and what skills are lacking.

# Step 2: Data structure and standardization

Organize and standardize all the collected data into unified frameworks to enable efficient analysis.

**Click on an icon below**
to find out more about each step
Structure and standardization

## Innovative approaches

Public employment services could adopt a unified framework for labour market data, using tools like **taxonomy management systems** – such as **taxonomy-as-a-service (TaaS)** – and **ontology editors** to align with global standards. **NLP** technologies can automate the structuring of unstructured data and address multilingual and domain-specific challenges, ensuring effective job and skills data standardization.

## Cost-effective solutions

**Predefined taxonomies** from global organizations – such as the World Economic Forum, International Labour Organization (ILO), O*NET, etc. – and simple categorization using **spreadsheets** can provide effective results. **Partnerships with language experts or educational institutions** are another way to support efforts to standardize data in local and regional contexts.

## Disruptive trends: tech provider perspectives

Pivot skill ontology technologies are key to the future of standardization, enabling a universal language that integrates diverse taxonomies. This allows public employment services to connect job seekers with opportunities globally by accurately interpreting profiles across markets.

# Step 3: Data validation

Ensure the authenticity of all the data through secure verification processes for candidates and job postings.

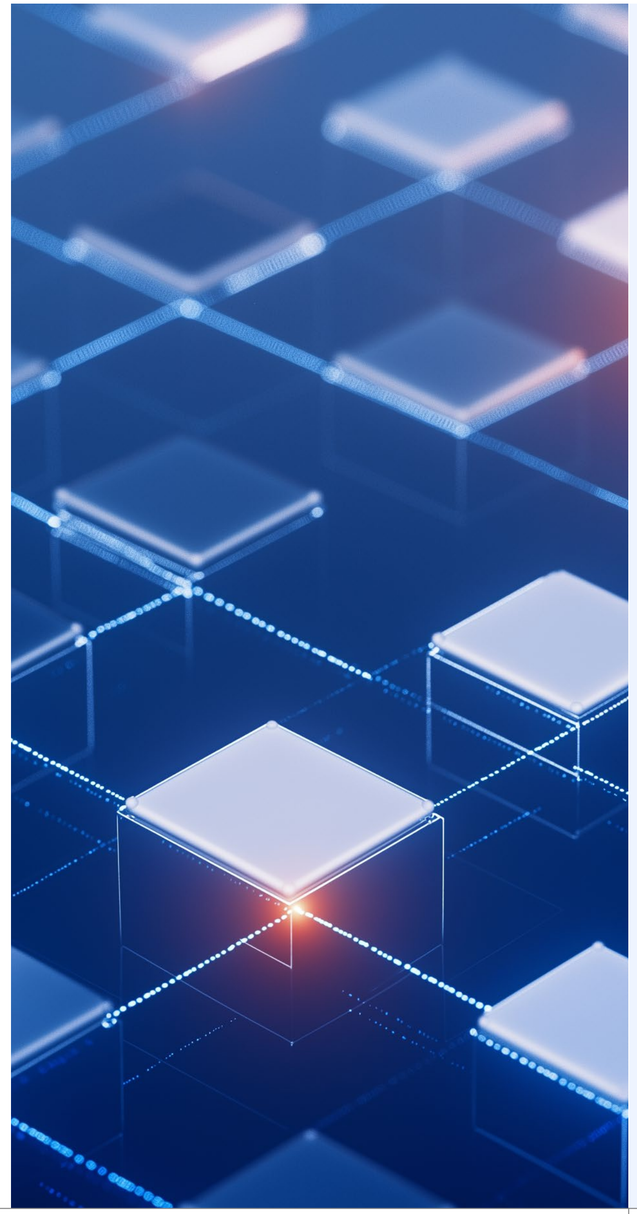
**Click on an icon below**
to find out more about each step
Validation

## Innovative approaches

**Blockchain** can create secure, tamper-proof records of certifications, boosting employer confidence. **Token-based** incentives on the blockchain can encourage accurate skills verification and credential sharing. Furthermore, **online skills assessment platforms** offer a practical solution by enabling direct digital testing of hard and soft skills.

## Cost-effective solutions

**QR codes** and **web links** are low-cost, user-friendly technologies that provide quick access to information and verification. They can embed key data, such as validated certifications, skills or work history, into a scannable or clickable format.



## Disruptive trends: tech provider perspectives

Audio and video analysis technologies will enhance job matching by assessing candidates' communication skills, language proficiency and behaviour through video resumes, interviews and recorded responses.

# Step 4: Upskilling and reskilling

Provide targeted training and resources to bridge skill gaps and align job seekers with labour market demands.

**Click on an icon below**
to find out more about each step
Upskilling and reskilling

## Innovative approaches

**AI** can generate hyper-personalized training content, including text, video, assessments and interactive tutorials. This content can then be easily embedded into a **learning experience platform (LXP)** that public employment services can harness to provide upskilling and reskilling pathways for job seekers and eventually create hyper-personalized learning content.

## Cost-effective solutions

**Tech-enabled community-based learning centres** can deliver in-person training effectively and at scale. Basic **printed materials** or **SMS-based training programmes** can reach job seekers in remote areas. More generally, **open educational resources (OER)** provide public employment services with an affordable way to offer training and skill development opportunities to job seekers. **Learning management systems (LMS)** now provide affordable platforms for delivering and managing basic training and upskilling programmes efficiently, allowing public employment services to easily share and create their own training.

## Disruptive trends: tech provider perspectives

Integrating co-pilot tools such as generative AI (genAI) agents into employment platforms will transform the value chain. Understanding job seekers' needs and creating tailored resources, agents will act as real-time learning coaches. A network of interconnected agents will enable public employment services to provide holistic learning solutions.

# Step 5: Matching

Accurately align job seekers with relevant opportunities to address labour market needs efficiently.

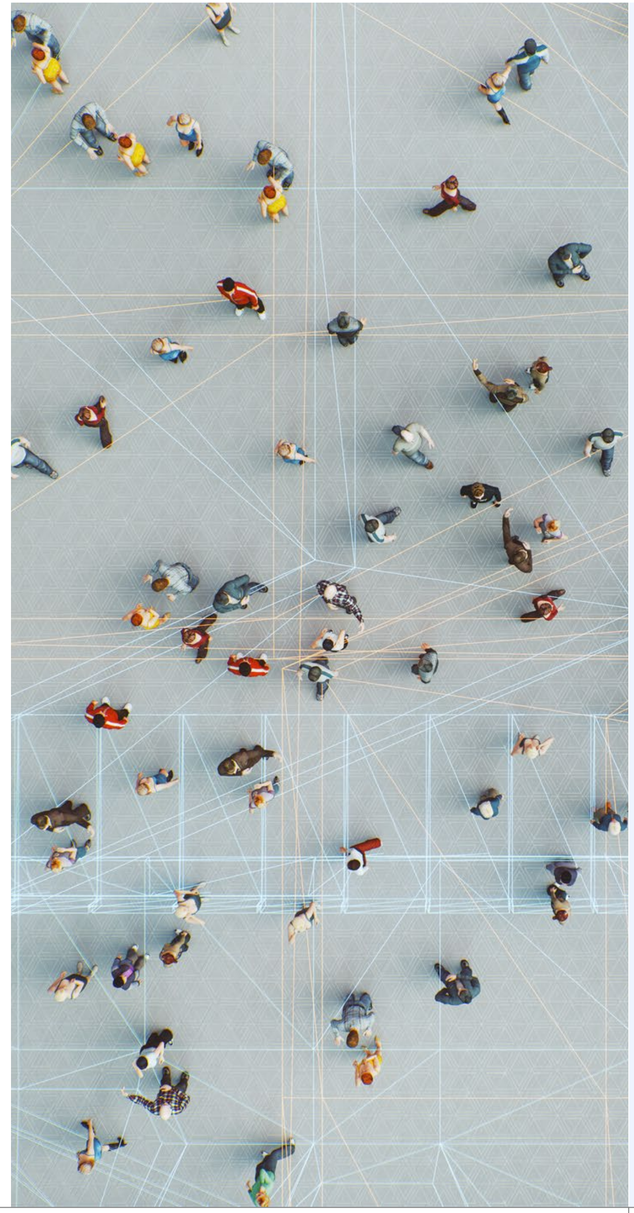
**Click on an icon below**
to find out more about each step
Matching

## Innovative approaches

**AI** technologies, including **machine learning (ML)** and **deep learning (DL)**, use historical data and data analysis to predict optimal job matches. **Big data** fuels these models by providing the necessary data for effective learning. **GenAI**, particularly **large language models (LLMs)**, enhances matching by offering clear, contextual explanations of how candidates align with roles, ensuring transparency. AI technologies can also enhance job matching on another level by analysing candidates' preferences, motivation and willingness, enabling more tailored and mutually beneficial placements.

## Cost-effective solutions

Public employment services can implement low-cost AI tools, such as **open-source ML models**, to support job matching by analysing skills and job requirements. Those models can then be based on any simple **tabular data management tools**, especially for smaller-scale applications or proof-of-concepts projects.



## Disruptive trends: tech provider perspectives

The future of job matching will prioritize personalization, considering factors like qualifications, skills, age, family situation and work-life balance. This approach ensures more meaningful, tailored matches that address the diverse needs of the modern workforce.

# How to get started – **data access and collection**

## Prerequisites

Data governance to manage data effectively

Knowledge of basic data analysis and visualization techniques

Knowledge of labour market trends and job market dynamics

Familiarity with sources of labour data

## Activities

Define the objective, the ambition and the programme statement

Establish who your partners are

Establish data-sharing agreements with your partners

Ensure compliance with national data privacy and security regulations

Develop standards for data accuracy, consistency and completeness

## Outcomes

Clear understanding of current labour market trends

Identification of skill surpluses and deficits

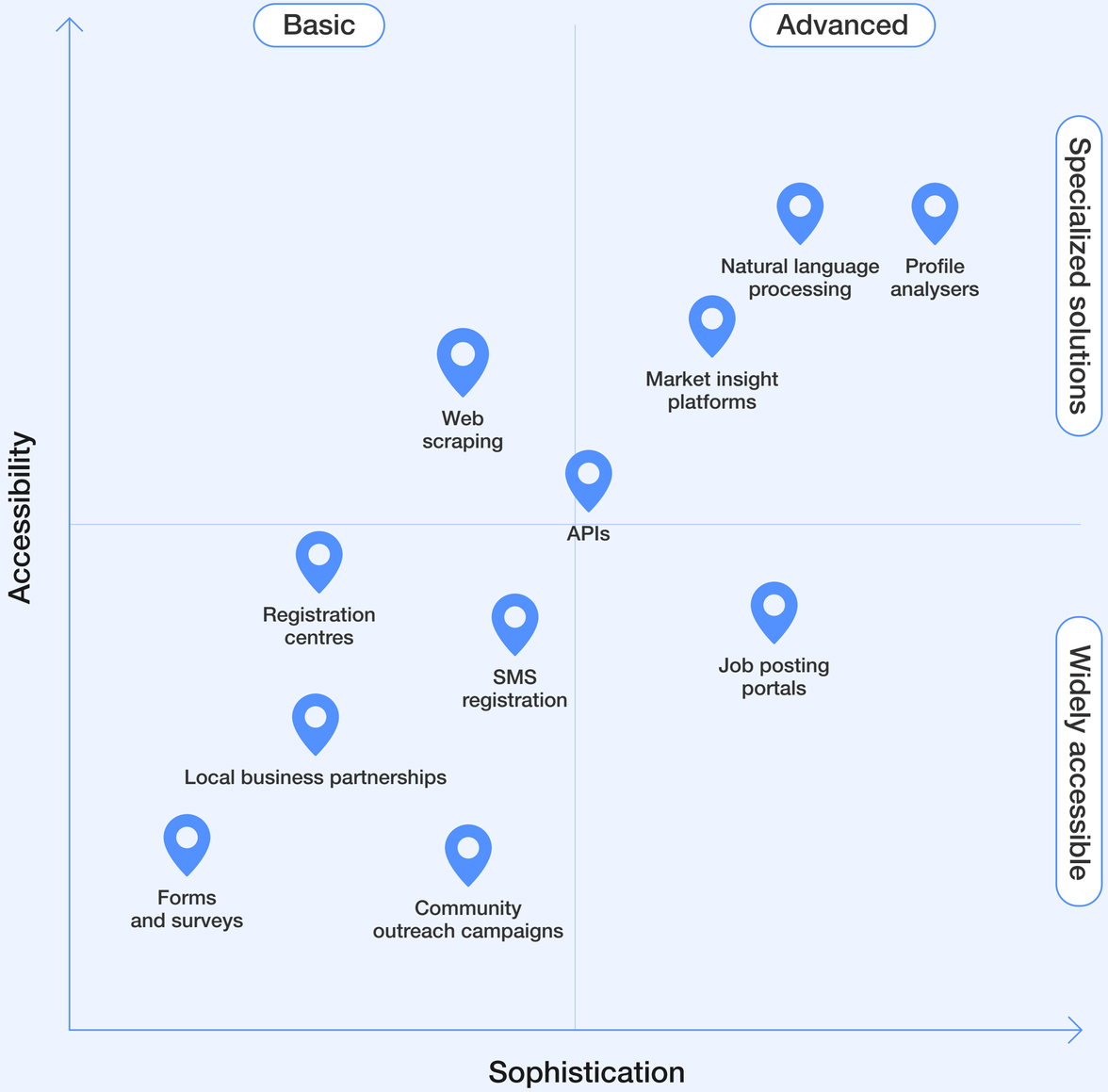
Stronger data partnerships across sectors

## Key success factors

Strong partnerships with public and private stakeholders

Comprehensive and reliable data collection

Accurate analysis of skills demand and supply



# How to get started – **data structure and standardization**

## Prerequisites

- Access to basic classification systems
- Clear understanding of national and sector-specific requirements
- Knowledge in taxonomy and ontology management
- Skills classification methods
- Linguistic understanding for multilingual adaptation

## Activities

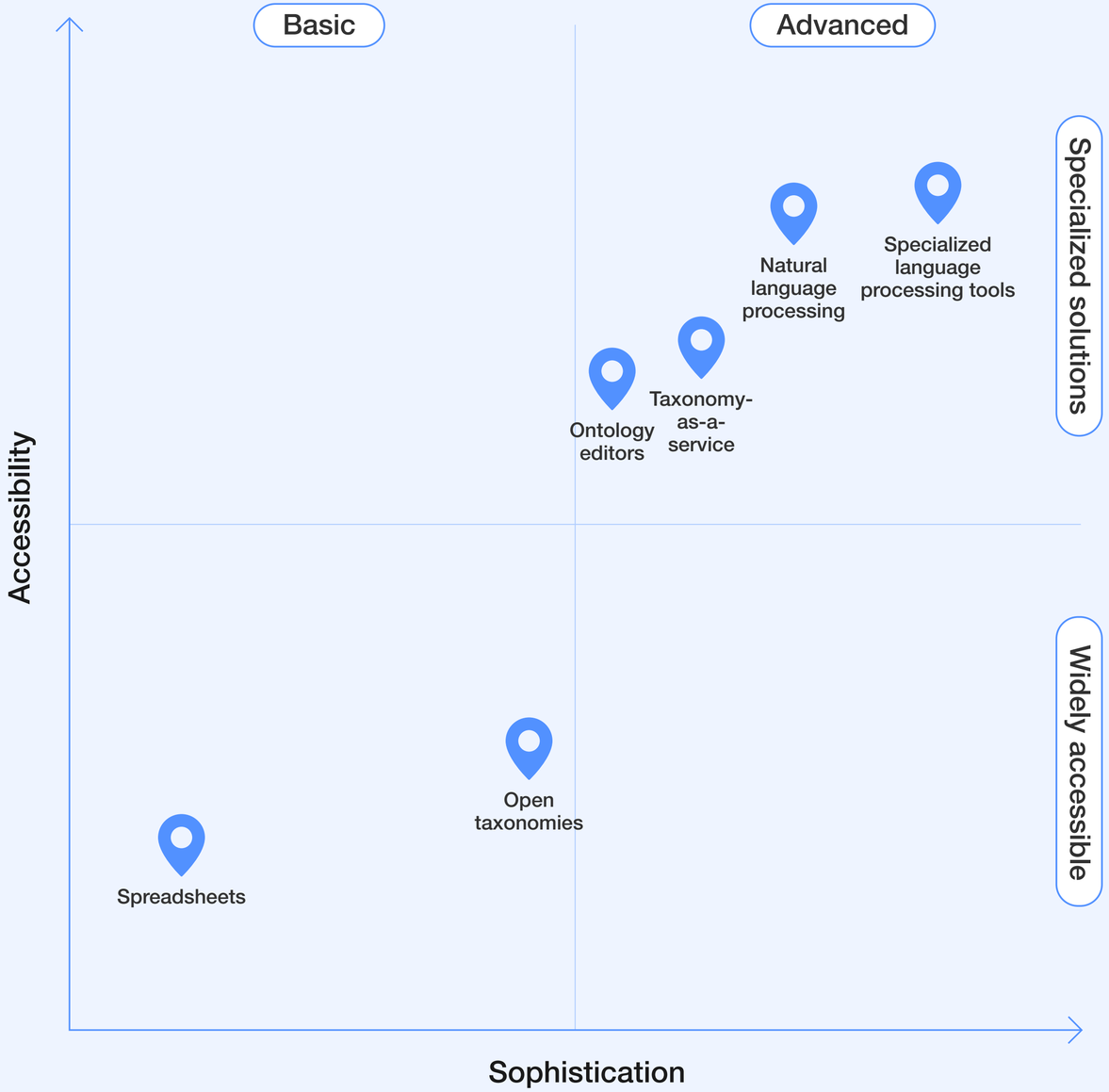
- Develop or adopt taxonomies and ontologies
- Train staff on how to map and align diverse data formats to the framework
- Map and align collected data to your standardized framework
- Regularly update your framework to reflect changing market trends
- Pilot the process with a small dataset to identify gaps before scaling

## Outcomes

- A unified language for skills and job roles
- Better data compatibility across systems
- Reduced complexity in matching across industries and regions

## Key success factors

- Consistent updates to taxonomies
- Collaboration with industry experts to ensure relevance
- Seamless integration with existing systems



# How to get started – **data validation**

## Prerequisites

- Existing credential frameworks
- Basic digital infrastructure for data verification
- Understanding of skill assessment techniques
- Knowledge of secure data handling practices
- Basic familiarity with credential standards

## Activities

- Establish partnerships with credentialing institutions
- Develop a process for verifying skills and qualifications
- Educate job seekers and employers on how to participate in the validation process
- Provide training to employers on using verification tools or assessing the authenticity of credentials
- Ensure secure storage and handling of validated credentials

## Outcomes

- Verified and trusted candidate credentials
- Reduced risk of skill misrepresentation
- Improved stakeholder confidence in the matching process

## Key success factors

- Clear validation protocols
- Transparency and trust-building among stakeholders
- Scalable solutions for large-scale implementation

# How to get started – **upskilling and reskilling**

## Prerequisites

A baseline understanding of skills in demand

Partnerships with training providers

Curriculum development and training methodologies

Understanding of labour market needs

Knowledge of learning platforms for skill-building

## Activities

Identify key gaps and focus on high demand skills

Develop or adopt learning platforms, e.g. LXPs, or open educational resources (OER)

Create personalized training pathways aligned with your job market requirements

Promote awareness campaigns to encourage upskilling initiatives

Monitor and evaluate the effectiveness of training programmes

## Outcomes

A more skilled and adaptable workforce

Enhanced employability for job seekers

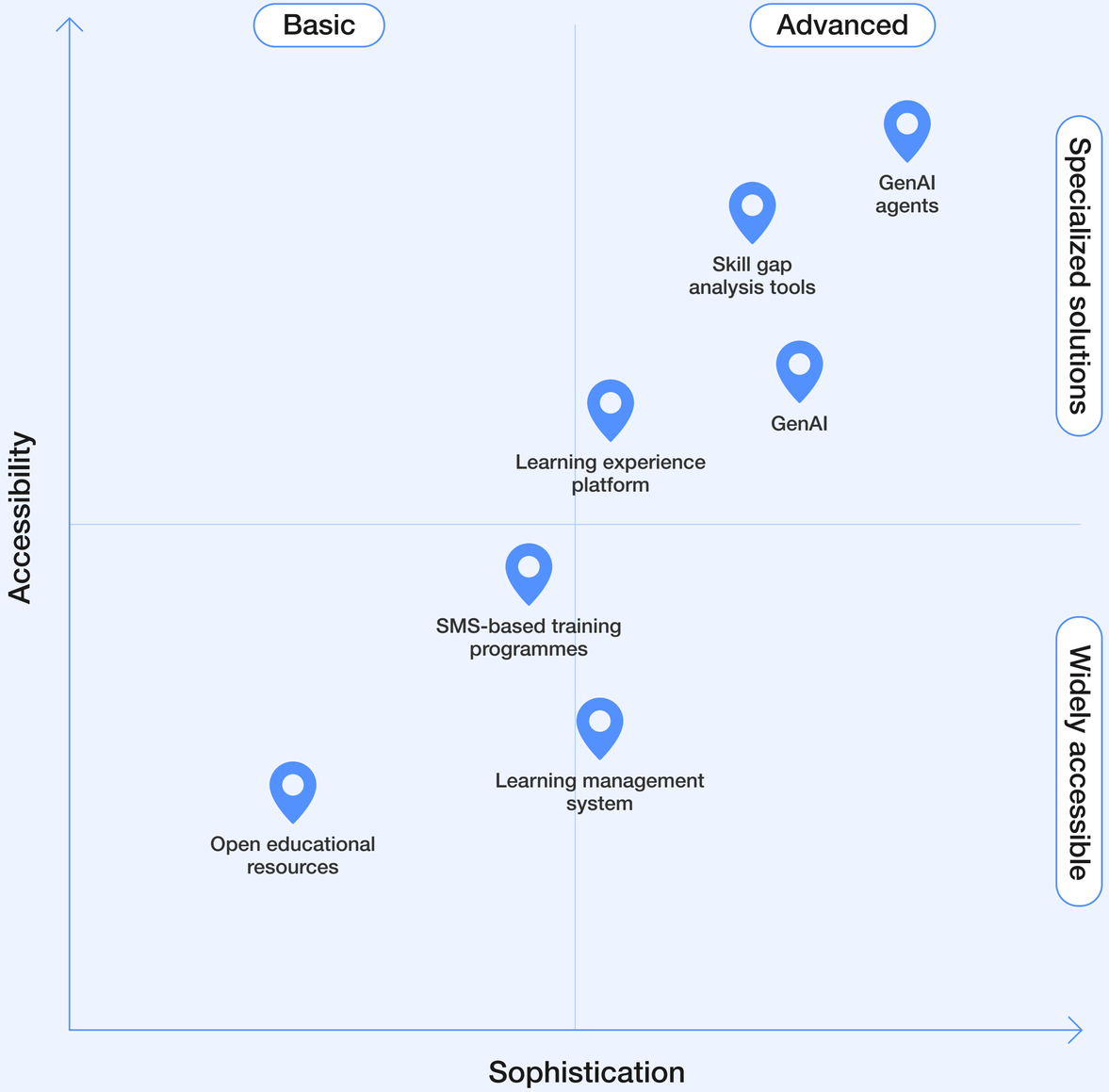
Improved alignment of workforce skills with market needs

## Key success factors

Alignment between training programmes and market needs

Access to scalable and tailored learning resources

Effective communication between public employment services and educational partners



# How to get started – **matching**

## Prerequisites

- Access to robust datasets for matching
- Initial implementation of structuring and validation stages
- Algorithm design and implementation
- Knowledge of market dynamics and demand-supply alignment

## Activities

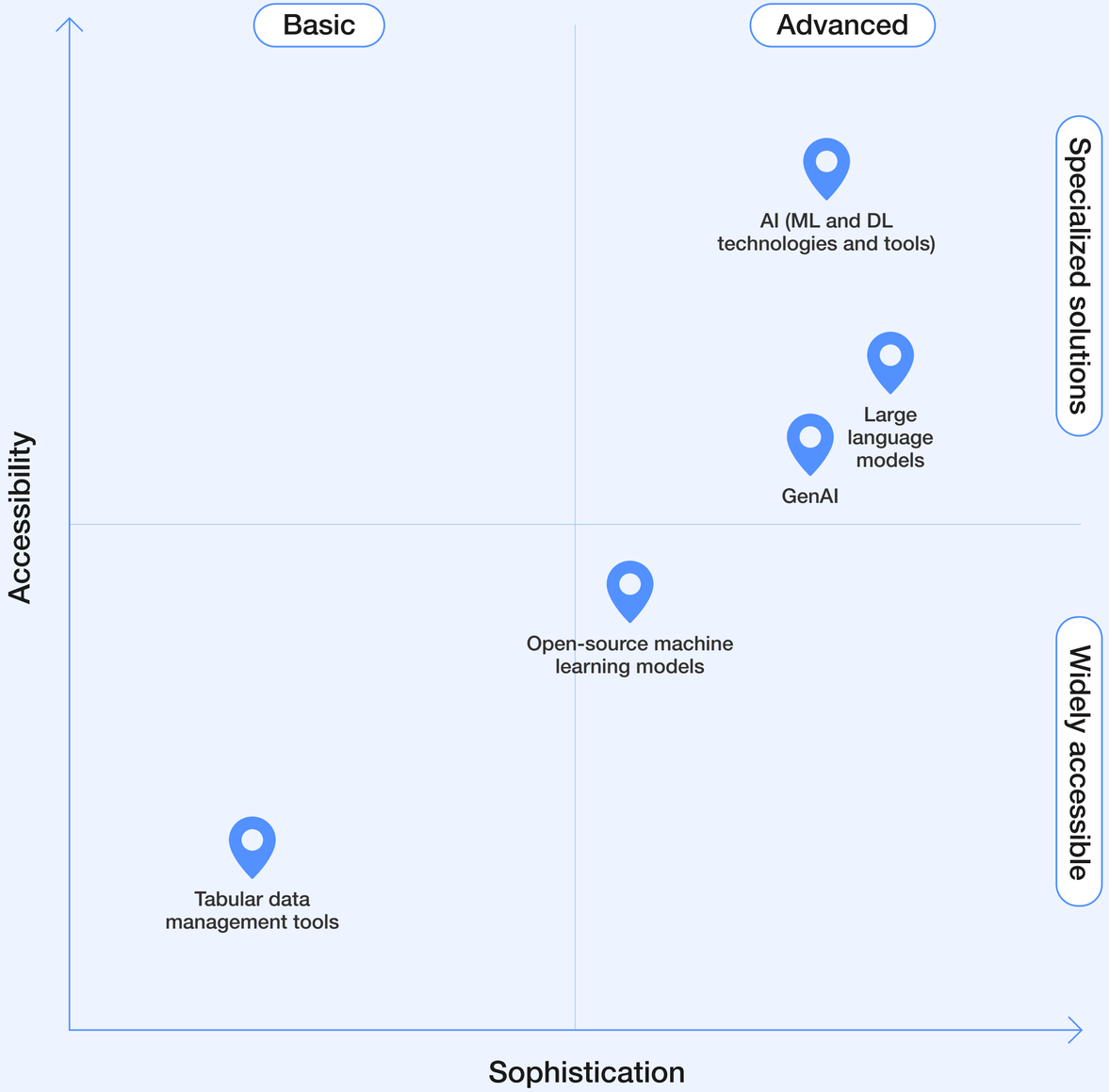
- Build or adopt a system to match job seekers to vacancies
- Gather job seeker and employer feedback to refine matching criteria
- Integrate AI tools, when possible, to improve match quality
- Update matching systems with real-time labour market trends
- Promote successful matches to build trust in the system

## Outcomes

- Faster and more accurate job matching
- Actionable data intelligence for further labour market insights
- Enhanced cross-border matching capabilities

## Key success factors

- Transparent and explainable matching processes
- Regular updates to algorithms based on feedback
- Responsiveness to evolving labour market trends

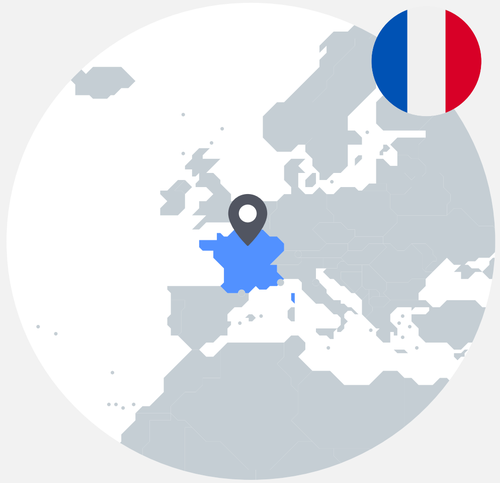


# 3 Case studies

Case studies from six countries – France, Guatemala, Nigeria, the Philippines, Singapore and Sweden – illustrate how technology is reshaping job matching practices.

CASE STUDY 1

# France



## About France Travail

France Travail is a French public employment service. Its mission is to support job seekers in their search for work and to assist companies in their recruitment efforts. Its close to 54,500 employees carry out this mission – they are mobilized to anticipate trends, innovate and convene key stakeholders involved.

## Job matching scope

France Travail offers tailored job matching services for job seekers and employers across sectors. It supports career transitions, beneficiaries of the Revenu de Solidarité Active (RSA)*, and recruitment alignment through advanced AI tools that standardize job descriptions and identify needed skills. By considering factors like location, working conditions and transferable skills, it enhances job matches. Since 1989, its national jobs and skills repository, ROME, which was strongly reviewed in 2024, has provided an updated framework for understanding the labour market and improving recruitment efficiency.

## Technology use cases

France Travail combines advanced digital tools and human expertise to improve job matching. Using AI, semantic analysis and generative AI, it identifies skill similarities, generates detailed job descriptions and enhances job recommendations. Recent additions, like conversational agents in mobile channels, provide personalized guidance for job seekers. By integrating data from state services, professional partners and private job boards, France Travail ensures centralized, clean and structured information. Public-private partnerships (PPPs) and scalable infrastructure process large datasets, delivering responsive, data-driven solutions for the evolving labour market. Despite its technological advancements, France Travail emphasizes the critical role of human insight in building trust and ensuring successful job placements.

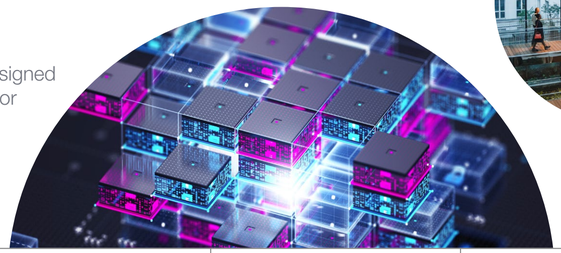
## Challenges

France Travail faces a range of challenges in adopting and implementing advanced technological solutions. A critical concern is ensuring that technologies align effectively with the practical realities of the job market. Translating the complexity of job market dynamics into IT frameworks, including AI, requires close collaboration between job market experts and technical developers. Ensuring transparency and fairness is equally critical, requiring AI systems to be explainable and free from bias. For instance, if past hiring practices favoured specific demographics, AI systems might unintentionally perpetuate these biases in its recommendations. Moreover, the organization must ensure that technology complements (rather than replaces) human expertise, which remains essential to cultivating trust and maintaining the quality and integrity of job matching services.

*RSA is a social welfare benefit in France designed to ensure a minimum income for individuals or households with insufficient resources. The amount provided varies depending on the household composition.

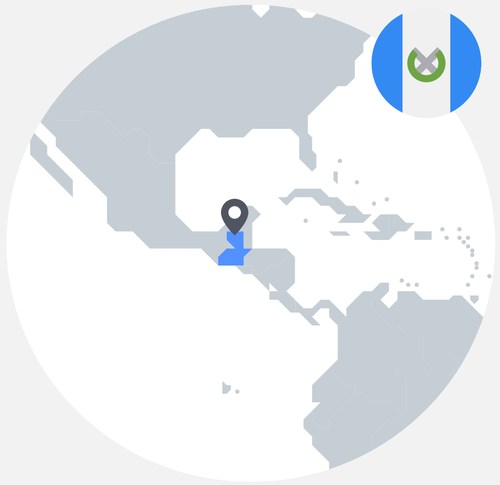
## Key success factors

- **Collaborative approach:** France Travail actively partners with other public service entities, local employment networks and business associations to develop widely recognized and validated job descriptions, skills frameworks and shared tools, ensuring alignment and credibility across stakeholders.
- **Data integration:** The organization adopts the “Tell Us Once” principle to reduce data redundancy by efficiently using existing structured and unstructured data from other public services, streamlining processes and reducing administrative burdens.
- **Technological innovations and continuous improvement:** France Travail’s emphasis on experimentation has improved job matching services, achieving faster job description generation and higher response rates from job seekers. Innovations like conversational agents enhance efficiency, engagement and inclusivity.



CASE STUDY 2

# Guatemala



## About Guatemala Moving Forward

Guatemala Moving Forward (Guatemala No Se Detiene)[2] is a PPP aimed at attracting foreign investment, boosting the economy and creating jobs to improve living conditions. Running through 2032, the initiative focuses on human capital development, enhancing skills aligned with future workforce needs to help Guatemalans access opportunities in high-growth industries.[3]

## Job matching scope

In Guatemala, job matching services are delivered through a PPP. The Ministry of Labour manages the Tu Empleo platform, which connects job seekers with opportunities. Meanwhile, Guatemala Moving Forward focuses on providing training in English, programming and management skills to meet the demand of emerging job opportunities. The public sector ensures broad access and regulatory compliance, while the private sector provides technology and market insights, streamlining job matching and improving the employment market's effectiveness.

## Technology use cases

Guatemala is gradually adopting technological solutions for job matching, with the primary public platform, Tu Empleo, currently using a web interface and web-based forms for data collection and job postings. However, there is a clear shift towards incorporating more advanced technologies, such as AI and data analytics, to improve efficiency and accuracy. The Ministry of Labour looks to benchmarks such as the Future Up platform in Costa Rica, currently being developed by the Inter-American Development Bank (IDB), which aims to integrate AI to analyse data more effectively, assess job seekers' skills and provide personalized recommendations for training programmes.

## Challenges

Guatemala faces significant challenges in job matching, including reliance on manual operations, lack of integrated systems and legal complexities related to licensing agreements and procurement laws. Budget constraints and low technological literacy further hinder progress, especially in rural areas with limited internet access. Only 4% of workers extensively use digital tools, while low educational attainment and high dropout rates create the potential of a young underutilized population.[4] These issues contribute to mismatches between job market demands and workforce skills, emphasizing the need for user-friendly technologies accessible to both employers and employees.

## Key success factors

– **PPPs:** Guatemala is prioritizing PPPs to improve understanding of labour market needs and drive technological change and improve job matching services.

CASE STUDY 3

# Nigeria

## About National Talent Export Programme

The National Talent Export Programme (NATEP) was established in 2023 to capitalize on Nigeria's talent pool and drive economic growth through outsourcing and physical talent export. Its mission is to build a sustainable talent pipeline, harness the country's human capital and position Nigeria as a global talent hub. NATEP aims to create 1 million jobs and increase foreign exchange earnings through strategic partnerships and advanced technology.[5]

## Job matching scope

In Nigeria, public job matching services target technology-driven sectors like insurance, healthcare, banking, artisanship, the creative industry and tech to drive economic transformation and global competitiveness. The process involves outsourcing local and international remote work and physical talent exports for global opportunities. The goal is to align skilled labour supply with sector demands, both internationally and domestically, driving economic growth, innovation and workforce adaptability in a rapidly evolving global economy.

## Technology use cases

Technological solutions are central to Nigeria's efforts to streamline job matching, aiming to create or facilitate employment for 1 million individuals over five years. AI tools enhance efficiency by screening candidates, assessing skills and verifying identities through national databases, optimizing and scaling the job matching process. Supported by PPPs and third-party contracting, Nigeria plans to expand its systems with personalized training and mobile-friendly technologies, taking advantage of widespread mobile phone use. The adoption of a skills taxonomy will further improve job matching by providing a structured framework to monitor and assess workforce capabilities.

## Challenges

Nigeria faces significant challenges in implementing efficient job matching processes, including limited budgets, unreliable internet connectivity, unstable power supply and low digital literacy. To address these issues, Nigeria is focusing on strengthening infrastructure and promoting digital upskilling initiatives. User resistance and limited in-house capacity further hinder the adoption and management of technology-enabled systems, highlighting the need for lightweight, mobile-friendly solutions.

## Key success factors

- **Public policies and PPPs:** Government mandates and public-private collaborations encourage the adoption of innovative solutions for employment services.
- **Upskilling programmes:** Comprehensive training programmes are essential for equipping job seekers with the skills required for evolving labour market demands.
- **Technological innovation:** Advanced AI-driven tools are critical to streamlining candidate screening, skill assessment and identity verification, ensuring precise and efficient job matching.

CASE STUDY 4

# Philippines

## About the Department of Trade and Industry

The Department of Trade and Industry (DTI) in the Philippines is a government agency dedicated to driving trade and industry development. It plays a pivotal role in supporting businesses, attracting investments and ensuring consumer protection. DTI's mission is to drive a competitive and innovative industrial sector, facilitate inclusive economic growth and generate employment through effective policies and programmes.[6]

## Job matching scope

The Philippines' job-matching services integrate government-led efforts with private sector initiatives to create a comprehensive employment ecosystem. The national government is currently developing a digital portal designed to streamline job matching across diverse sectors, including opportunities abroad. This platform enhances connectivity between job seekers and employers through features like user registration, profile verification and detailed job preference settings. Assessing this information, the system will efficiently identify and match candidates with the most suitable employment opportunities.

## Technology use cases

The national government in the Philippines uses online portals and mobile applications to deliver job matching services, offering job alerts and virtual skill-building resources. The current system employs non-AI filtering to connect job seekers with opportunities, developed and managed through in-house efforts, local ICT collaborations and third-party consultants. Future plans include integrating AI-driven features to enhance job matching precision by considering factors like personality traits and cultural alignment for a more comprehensive employment service.

## Challenges

The effective deployment of solutions for job matching in the Philippines encounters several challenges. A critical gap in comprehensive and up-to-date data on skills demand results from fragmented and outdated data collection systems, limited coverage of rural and informal sectors, and infrequent labour market studies that do not keep pace with evolving needs. These issues hinder accurate matching between job seekers and opportunities. Inadequate technological infrastructure and limited internet access, particularly in rural areas, also restrict the reach and effectiveness of digital platforms. Budget constraints impede the development, deployment and scaling of advanced technologies. Existing systems often have complex user interfaces that discourage engagement from job seekers and employers. Moreover, inefficiencies in profile verification and authenticity checks lead to delays and obstacles in hiring processes.

## Key success factors

- **Government support for digital transformation:** Initiatives such as the establishment of the Centre for AI Research and the inclusion of innovation as a pillar in the competitiveness index for cities and municipalities drive progress in digital employment solutions.
- **PPPs:** Collaborative efforts between government and private entities ensure the relevance and effective implementation of tailored solutions across various sectors.

CASE STUDY 5

# Singapore

## About SkillsFuture Singapore

SkillsFuture Singapore (SSG) is a government agency that drives and coordinates the implementation of the national SkillsFuture movement, promotes a culture of lifelong learning and strengthens the ecosystem of training and adult education in Singapore. Through a holistic suite of national SkillsFuture initiatives, SSG enables Singaporeans to take charge of their learning journeys pursuit of skills mastery. SSG also works with key stakeholders to ensure that students and adults have access to high-quality and industry-relevant training that meets the demands of different sectors of the economy for an innovative and productive workforce.[7]

## Job matching scope

SkillsFuture Singapore focuses on skills as the core of its job matching services, aligning workers with opportunities based on employer demand and promoting informed education and training decisions. Businesses benefit from strategic workforce planning and investment in skills development. SSG adopts an ecosystem approach by ensuring adequate, high-quality training programmes are available, providing online and in-person career-skills advisory services, reducing barriers to participating in training through modular and flexible learning, upskilling adult educators and investing in research and evaluation. A robust skills taxonomy ensures seamless alignment across the ecosystem, enhancing job matching, sustaining low unemployment and maintaining economic competitiveness.

## Technology use cases

SkillsFuture Singapore employs advanced technological solutions, such as cloud computing and ML, to enhance job matching and workforce planning. SSG also deploys chatbots to provide a conversational interface to users. The integration of these technologies is critical for efficiently managing large datasets and delivering user-friendly interfaces for both individuals and employers. Other innovations include a **career skills passport**, which serves as a career-and-skills registry for individuals, and specialized tools designed to help small- and medium-sized enterprises (SMEs) profile their workforce's capabilities.

## Challenges

Besides the well-established national skills taxonomy, institutional users are also free to adopt other taxonomies embedded within human resources technology (HRTech) platforms. However, while large companies often maintain their own taxonomies, they align them with the national framework when hiring locally to minimize inconsistencies and support data integration. Additionally, SSG encourages the private sector to innovate and design tools to meet the diverse needs and interaction preferences of individuals and employers. Ensuring transparency in underlying methodologies and incorporating iterative refinements based on user feedback have been critical for continuously enhancing user interfaces.

## Key success factors

- **Government support and PPPs:** Strong governmental backing ensures the effective rollout of technological solutions, while collaboration with sector agencies, trade associations and professional bodies enhances their adoption and integration across industries.
- **Standardization:** The adoption of a standardized skills language enhances the efficiency of job matching services and workforce planning.
- **Data integration:** Various data sources, including job postings and employment data, are integrated to offer a comprehensive view of job demand and workforce skills.
- **Accessibility:** The deployment of intuitive and accessible tools has significantly improved user engagement and outcomes.
- **Monitoring and continuous improvement:** Success is measured both quantitatively (e.g. the number of users and participating companies) and qualitatively (e.g. user satisfaction and the alignment of skills with job market demands). Continuous monitoring and adaptation ensure tools remain relevant to the evolving job market.

CASE STUDY 6

# Sweden

## About Arbetsförmedlingen

Arbetsförmedlingen is Sweden's national public employment service. Its mission is to contribute to a well-functioning labour market by supporting businesses in recruitment efforts and providing individuals – particularly those facing challenges in entering the labour market – with the tools and programmes needed to enhance their employability and secure suitable job opportunities. Through collaboration with municipalities and other stakeholders, the agency aims to improve the efficiency and effectiveness of its services.[8]

## Job matching scope

Arbetsförmedlingen supports job seekers, especially those facing barriers such as low skills, asylum status or immigration challenges, in finding suitable opportunities. The agency offers programmes like internships and targeted training to aid workforce integration. A robust job and skills taxonomy ensures precise alignment between job seeker skills and employer needs, enhancing job matching efficiency and cultivating an inclusive employment ecosystem.

## Technology use cases

Arbetsförmedlingen uses advanced technological solutions, including NLP and LLMs, to enhance job matching. These technologies extract relevant information from job advertisements to match it with job seekers' profiles. The agency has developed in-house models tailored specifically to the Swedish language and local requirements. This approach addresses the lack of suitable external solutions, ensuring high-quality and context-specific models. Additionally, Arbetsförmedlingen collaborates with public innovation agencies to further develop these technologies.

## Challenges

Arbetsförmedlingen has faced several challenges that impact job matching efficiency. One major issue is that job advertisements often lack detailed and accurate data, particularly around skill requirements, making precise matching difficult. The absence of follow-up data on job seekers' post-service outcomes further complicates the evaluation of long-term effectiveness. Finally, the rapid pace of technological advancements necessitates ongoing adaptation and investment in new tools and methods. Addressing these challenges is essential to improve the efficacy of Arbetsförmedlingen's employment services.

## Key success factors

- **Government support and PPPs:** Strong collaboration with other public agencies enhances resource sharing and strategic alignment. PPPs bring additional expertise and technological capabilities to enhance job matching services.
- **Technological innovations and continuous improvement:** The integration of AI and NLP significantly enhances the accuracy and efficiency of job matching by providing a deeper understanding of both job ads and job seekers' profiles. Continuous innovation is vital to maintaining and improving the effectiveness of job matching.
- **Monitoring and continuous improvement:** While quantitative data tracking remains a challenge, qualitative feedback from job seekers suggests increased satisfaction and better alignment of skills with job opportunities. Continuous refinement of the system based on feedback is key to ensuring its success.

# Conclusion

## This guidebook offers four key recommendations for the success of job matching journeys:

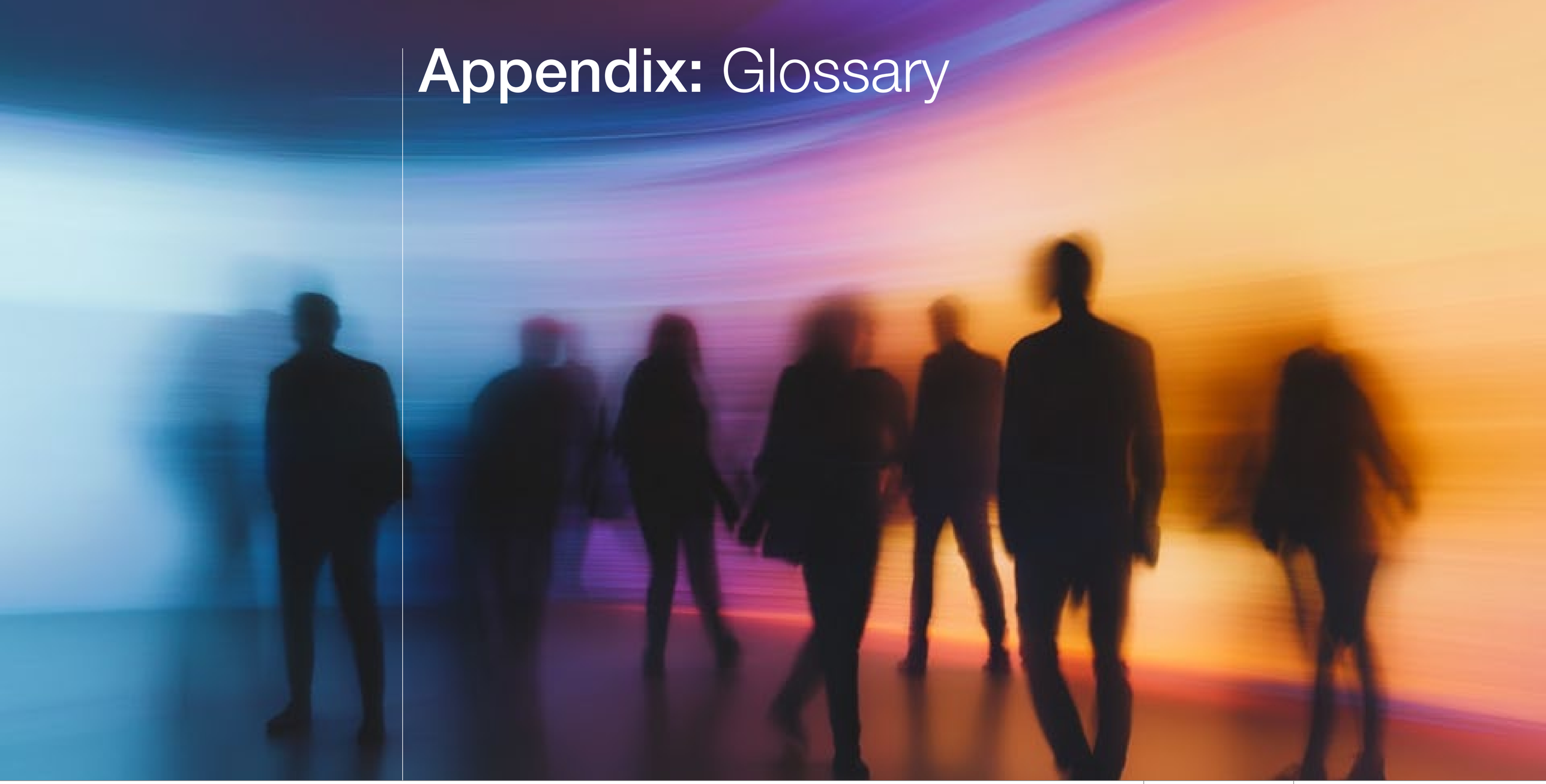
– Creating a more dynamic and responsive job market requires a foundational focus on **public-private collaboration**. Partnerships between public employment services, private sector companies and the education sector are essential to align workforce supply and demand effectively. Moreover, as the job matching landscape evolves, collaboration across sectors ensures that technological innovation **supports**, rather than replaces, **human potential**. By aligning strategies, co-designing job matching and learning technologies, cultivating trust and embracing flexibility, stakeholders can create systems that meet the demands of a **complex and ever-changing workforce**.

– The development of **shared standardized skills frameworks** and strategies drives improved integration of **labour market insights**, enabling solutions that are both inclusive and adaptable to changing needs.

– The job matching efficiency journey should not be seen as a rigid or isolated process but rather as an **interconnected system** where each stage supports and enhances the rest. The use of one technology in one step often creates a ripple effect, improving the overall efficiency and outcomes of the entire framework. This interconnection highlights the importance of viewing progress as **cumulative**, with even small improvements in one stage potentially leading to broader systemic benefits across the wider job matching process.

– Innovative job matching systems must balance advanced technologies with a **human-first approach**. While AI and data-driven tools enhance precision and scalability, empathy and human judgment remain central to cultivating meaningful connections, avoiding bias and respecting individual aspirations. Equally important is recognizing that **one size does not fit all**; tailored solutions that address the unique needs of different labour markets, including cultural and technological considerations, are crucial for ensuring relevance and effectiveness. This is where **cognitive diversity** becomes a key enabler. By assembling teams with varied expertise and problem-solving approaches, policy-makers can design tailored frameworks that address the unique needs of their labour markets. This approach ensures solutions are both culturally relevant and effective, using diverse perspectives to create innovative and adaptable strategies for improving workforce alignment.

# **Appendix:** Glossary



# Glossary (1/4)

| Term | Generic definition | Applied to job matching |
|---|---|---|
| **Agent** | An agent is an autonomous AI unit that communicates with other agents, makes decisions, and plans and performs tasks. It is customizable for integration with language models, humans, tools or their combinations. | An agent can automate tasks in job matching such as analysing job descriptions and candidate profiles and generating personalized resources. It can streamline onboarding as an intermediary. |
| **Application programming interface (API)** | An API is a set of rules and protocols that allows different software applications to communicate and share data with one another, enabling seamless integration and functionality across platforms. | An API can facilitate the integration of public employment services systems with external platforms, such as job boards, educational platforms or employer databases, allowing for real-time data exchange on job vacancies, skills and qualifications. |
| **Artificial intelligence (AI)** | AI is a broad field of computer science focused on creating systems that can perform tasks that would typically require human intelligence. This includes a wide range of capabilities such as learning, problem-solving, perception, language understanding, etc.[9] | AI is an overall concept encompassing a wide variety of AI subsets that analyse large sets of candidate and job data to automate the process of matching the right talent to the right opportunities. This makes recruitment faster and more precise than manual filtering. |
| **Big data** | This is an all-encompassing term for large, complex digital data sets that require equally complex technological means to be stored, analysed, managed and processed with substantial computing power.[10] | Big data is an overarching concept that fuels predictive algorithms by analysing vast candidate pools and job data, enabling faster and more accurate matches compared to smaller datasets. |
| **Blockchain** | A blockchain is a distributed ledger which maintains all transactions and assets and is updated by a number of counterparties.[11] Blockchain cannot be easily tampered with, mostly because it is decentralized and uses a secure and linked data structure. | Blockchain can be used to maintain transparent and immutable records of candidates' credentials, work histories and skills, enhancing trust and eliminating the risk of data manipulation. |
| **Chatbot** | A chatbot is a computer program designed to simulate conversation with a human user (usually over the internet) – especially one used to provide information or assistance to the user as part of an automated service.[12] | Chatbots can guide candidates through job applications, answer queries or even assess basic skills. Unlike static web forms, they create a more interactive experience while reducing recruiter workload. |

# Glossary (2/4)

| Term | Generic definition | Applied to job matching |
|---|---|---|
| **Deep learning (DL)** | DL is a type of machine learning (ML) that enables machines to mimic human behaviour by learning from data and identifying patterns.[13] | DL can analyse video resumes, interpret nuanced resume language and match candidates by identifying deeper skill-job connections. It can also handle advanced tasks like image and speech recognition, though it is more computationally intensive than standard ML. |
| **Generative AI (GenAI)** | GenAI is a category of AI that can create new content such as text, images, videos and music.[14] | GenAI can create personalized job recommendations, interview questions and learning content based on specific skills and gaps. Unlike ML or DL, it focuses on content creation, adding creativity and adaptability to job matching. |
| **Inference model** | This is a statistical model used to predict or infer the properties of a population based on sample data, especially useful in scenarios where direct measurement of all data points is impractical. | These models can predict the likelihood of a candidate's success in a role based on historical data, helping recruiters make data-driven hiring decisions. |
| **Internet of things (IoT)** | The inter-networking of physical devices and objects whose state can be altered via the internet.[15] | IoT facilitates the use of interconnected devices to collect real-time data on labour market trends, workplace environments and industry demands. By using IoT data, public employment services can gain precise insights into emerging job opportunities, workforce needs and skills requirements. |
| **Interoperability** | Interoperability refers to the ability of software or hardware systems or components to operate together successfully with minimal effort by an end user.[16] | Interoperability can ensure that tools like job boards, applicant tracking systems, and learning platforms share data effortlessly, enabling comprehensive talent management. |
| **Large language model (LLM)** | LLMs are a class of language models that use DL algorithms and are trained on extremely large textual datasets that can be multiple terabytes in size.[17] | LLMs can process resumes, answer candidate queries and enhance chatbots for real-time career guidance. Specializing in language comprehension and generation, they excel in tasks involving communication or text-heavy data in job matching. |

# Glossary (3/4)

| Term | Generic definition | Applied to job matching |
|---|---|---|
| **Learning experience platforms (LXP)** | Platforms that deliver personalized learning experiences to users by using AI to recommend learning resources based on their needs, preferences and past behaviour. | LXPs can help workers and job seekers upskill by recommending training aligned with their career goals and available job openings, unlike traditional systems that follow a one-size-fits-all approach. |
| **Learning management systems (LMS)** | An LMS is a software platform used to create, deliver and manage educational content and training programmes. | LMSs can bridge skill gaps by offering training courses to align candidate skills with job requirements. They focus more on structured learning than LXPs, which prioritize personalization. |
| **Machine learning (ML)** | ML is a branch of AI and computer science that focuses on the development of systems that can learn and adapt without following explicit instructions. ML imitates the way humans learn, gradually improving its accuracy by using algorithms and statistical models to analyse and draw inferences from patterns in data.[18] | ML algorithms can analyse past hiring data to predict which candidates might be a good fit based on skills, experience and job descriptions. They focus on identifying patterns and making predictions from structured or unstructured data. |
| **Natural language processing (NLP)** | NLP refers to the ability of a machine to process, analyse and mimic human language, either spoken or written.[19] | NLP can extract key information from resumes and job descriptions, speeding up and improving accuracy compared to manual keyword searches. |
| **Ontology** | Ontology refers to defining the properties of subject areas and how they are related by defining a set of concepts, terminologies and categories that represent the subject. | It maps out skills, roles and qualifications to standardize how candidates are assessed. Unlike taxonomy, ontology encompasses relationships between concepts. |
| **Open educational resources (OER)** | OERs are learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, permitting no-cost access, re-use, re-purpose, adaptation and redistribution by others.[20] | OERs can provide job seekers with accessible learning resources to upgrade skills based on market demands. Public employment services can use OERs for cost-effective training, improving employability and reducing barriers to skill development. |

# Glossary (4/4)

| Term | Generic definition | Applied to job matching |
|---|---|---|
| **Parsing** | The process of analysing a string of symbols. | Parsing is the ability to extract skills, experiences and contact details from textual data like resumes. |
| **Pivot ontology** | A pivot ontology is a centralized framework used to align and integrate multiple, diverse ontologies. It acts as an intermediary that standardizes how different datasets or systems interpret and communicate concepts, ensuring interoperability and consistency. | A pivot ontology can standardize diverse taxonomies from different countries by mapping them to a unified framework. |
| **Semantic analysis** | Semantic analysis is the process of understanding the meaning and interpretation of words, phrases and sentences in the context of the languages they are used in. | Semantic analysis ensures better job candidate alignment by illuminating the intent and context of job descriptions and resumes, unlike keyword-based matching. |
| **Skills taxonomy** | This is a structured classification of skills, used to standardize and organize skills data across platforms and industries. | It standardizes how skills are categorized and matched, ensuring consistency. Unlike ontologies, it does not capture relationships or contexts. |
| **Token** | A token is a digital asset created and managed on a blockchain platform. Tokens can represent a wide range of assets or utilities, such as currency, ownership rights or access to specific services, and they are secured by the blockchain's decentralized and tamper-proof system. | Tokens can serve as a digital incentive or credential. For example, tokens may be awarded to individuals for verifying their skills or contributing accurate data. |
| **Unstructured data** | This refers to information that does not have a predefined format or organization, making it difficult to process and analyse using traditional methods. | Processing unstructured data requires advanced technologies (like NLP, ML, DL, etc.) to extract key insights, such as identifying hidden skills in resumes or understanding nuanced job requirements. |

# Contributors

## World Economic Forum

**Ximena Játiva**
Insight Lead, Education, Skills and Learning

**Till Leopold**
Head, Work, Wages and Job Creation

**Shuvasish Sharma**
Insights Specialist, Work, Wages and Job Creation

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## Capgemini

**Stéphanie Bertrand**
Director, Workforce and Organization

**Claudia Crummenerl**
Global Head, Advisory for Strategic Partnerships

**Dawn Dalton**
Consultant, Workforce and Organization, Capgemini Invent

**Robin Hartmann**
Consultant, frog

**Amy Kowalska**
Senior Manager, Workforce and Organization

**Antoine Schenesse**
Consultant, Workforce and Organization

**Neil Shastri**
Senior Director, Workforce and Organization

**Johann Zillmann**
Vice-President, Enterprise Transformation

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Project Director, Skills 4.0, JOP and Behavioral Science Development, France Travail

**Ligia Chinchilla**
Executive Director, Mesa Capital Humano

**Anders Danell**
Head, AI Center Department, Arbetsförmedlingen

**Jo-Dann N. Darong**
Director III, Competitiveness and Innovation Group, Department of Trade and Industry, The Philippines

**Eghosa Ero**
National Talent Export Programme (NATEP)

**Soon-Joo Gog**
Chief Skills Officer, SkillsFuture

**Karolina Jedrzejewska**
Product Manager, Applied AI, Arbetsförmedlingen

**Hélène Rohaut-Marchal**
Data & AI Programme Manager, France Travail

## Production

**Louis Chaplin**
Editor, Studio Miko

**Laurence Denmark**
Creative Director, Studio Miko

**Will Liley**
Editor, Studio Miko

**Cat Slaymaker**
Designer, Studio Miko

**Oliver Turner**
Designer, Studio Miko

# Endnotes


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