



Building the Digital Path to Responsible AI for Public Employment Services



13:00 CET / 06:00 CST / 20:00 MYT
Wednesday, 3 December 2025



Welcome & Opening remarks.

Moderators



Nicole Clobes

Consultant



Dovile Makutenaite

Employment Domain Specialist



Introduction.

Keynote Speakers



Dr. Willem Pieterse

Strategic researcher and
consultant



Dr. Alexander Hogenboom

Chief Technology Officer



**Ir. Ts. Mohamad
Fahrurrazi Bin Kamaludin**

Head of Labour Market Modelling
Section



Vanessa Gibson

Director, Investment Climate



Agenda.

- 01** Digitalization and use of AI in PES.
Poll questions
- 02** How PES can responsibly leverage data and AI in a transforming labor market.
Q&A
- 03** Digital Transformation of Public Employment Services in Malaysia.
Poll questions
- 04** Preparing the Workforce for the Future in Costa Rica.
Panel discussion & Final Q&A

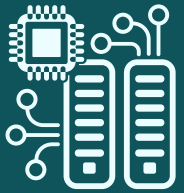
Digitalization and use of AI in PES

Webinar 03/12/2025

Dr. Willem Pieterse // willem@pieterse.com



Content

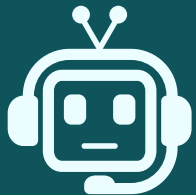


Background



Current status of digitalization in PES

Based on World of PES 2024 survey / 2026 World of PES (2nd edition) book



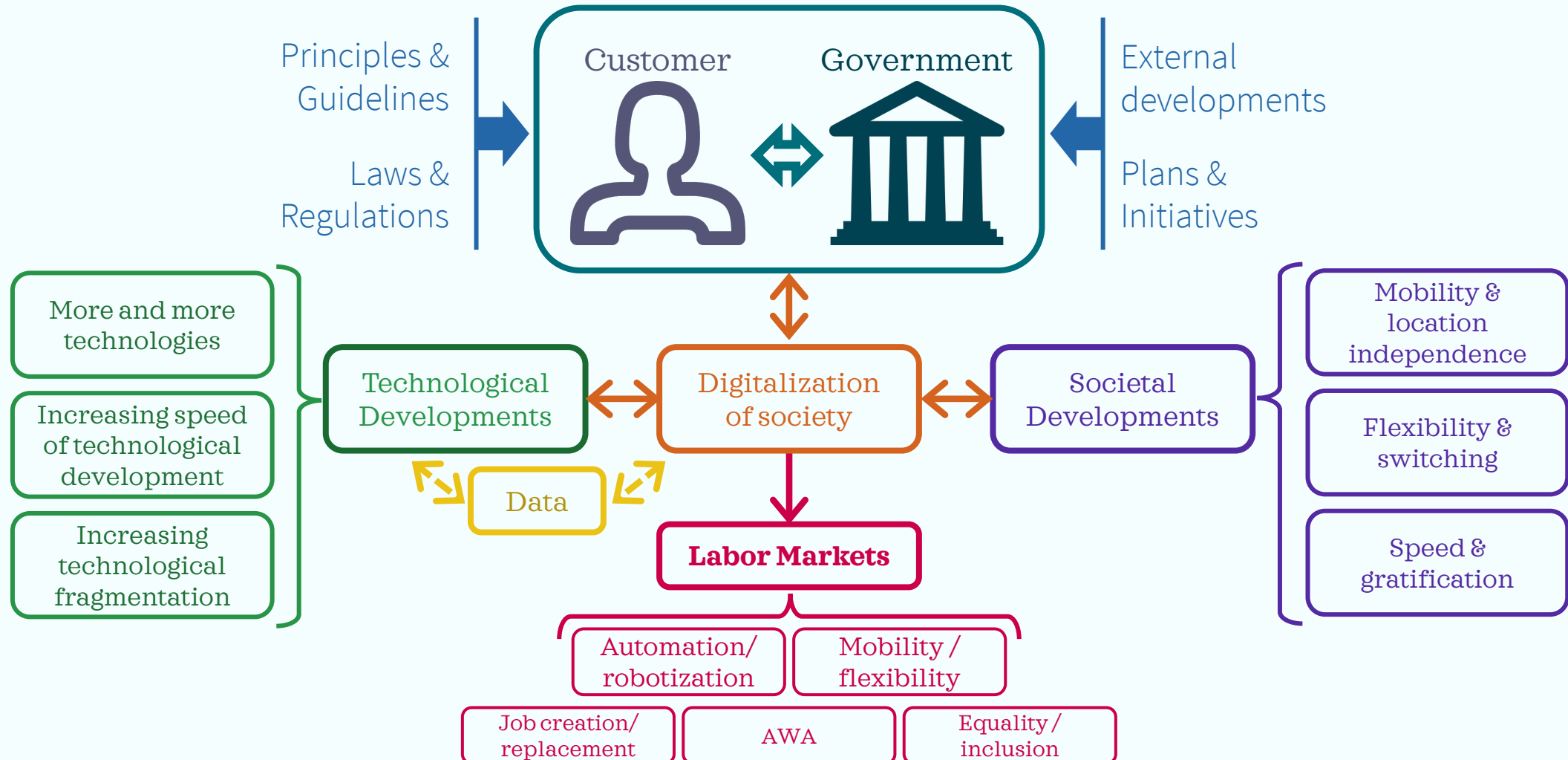
Current status of use of AI in PES

Based on PES Network / European Commission 2025 study



Implications & reflections

Background



Implications for PES



Digitalization as increasingly important and strategic topic for PES

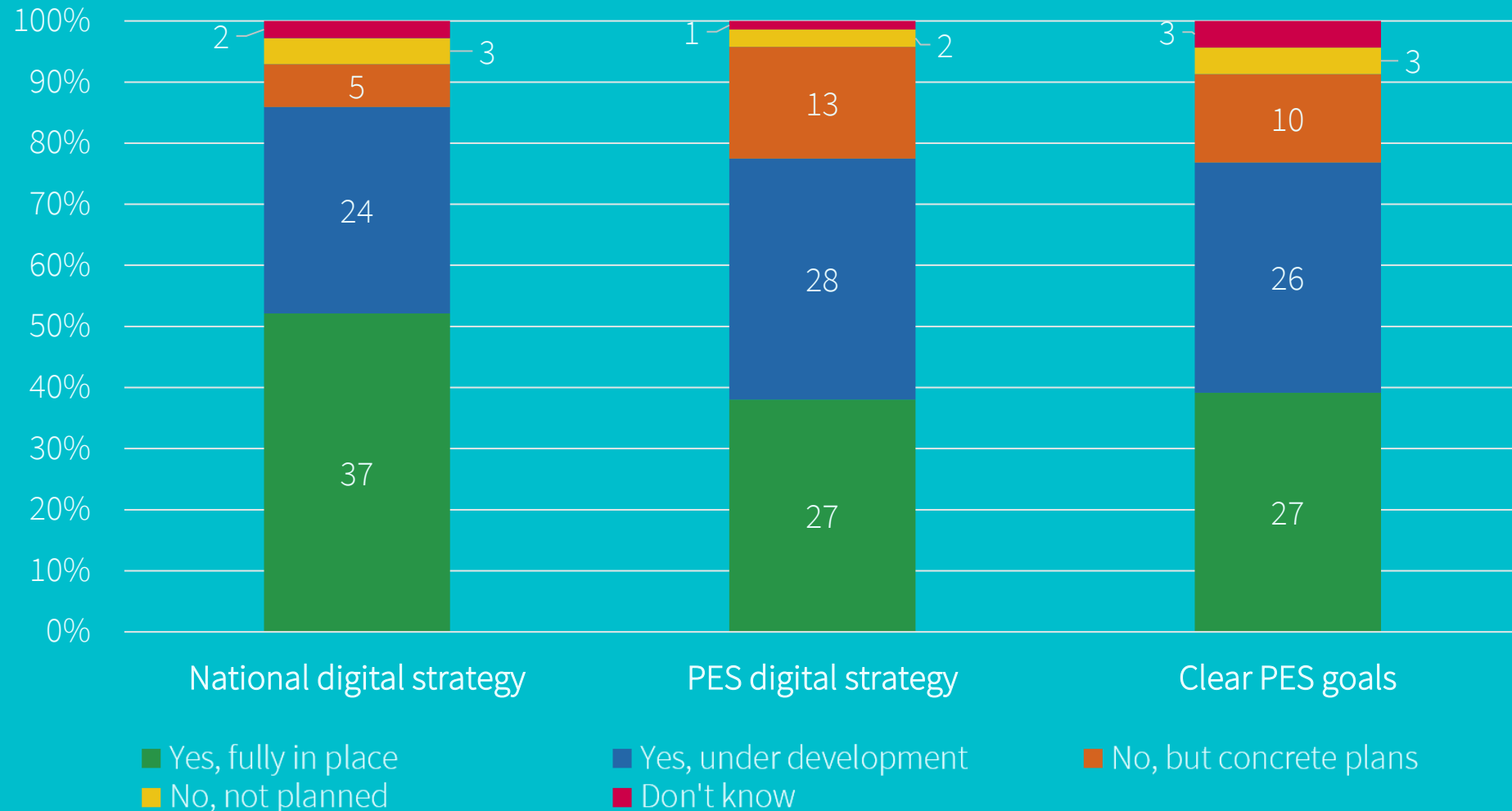
Need to develop strategies, capabilities & knowledge across affected areas within the PES.



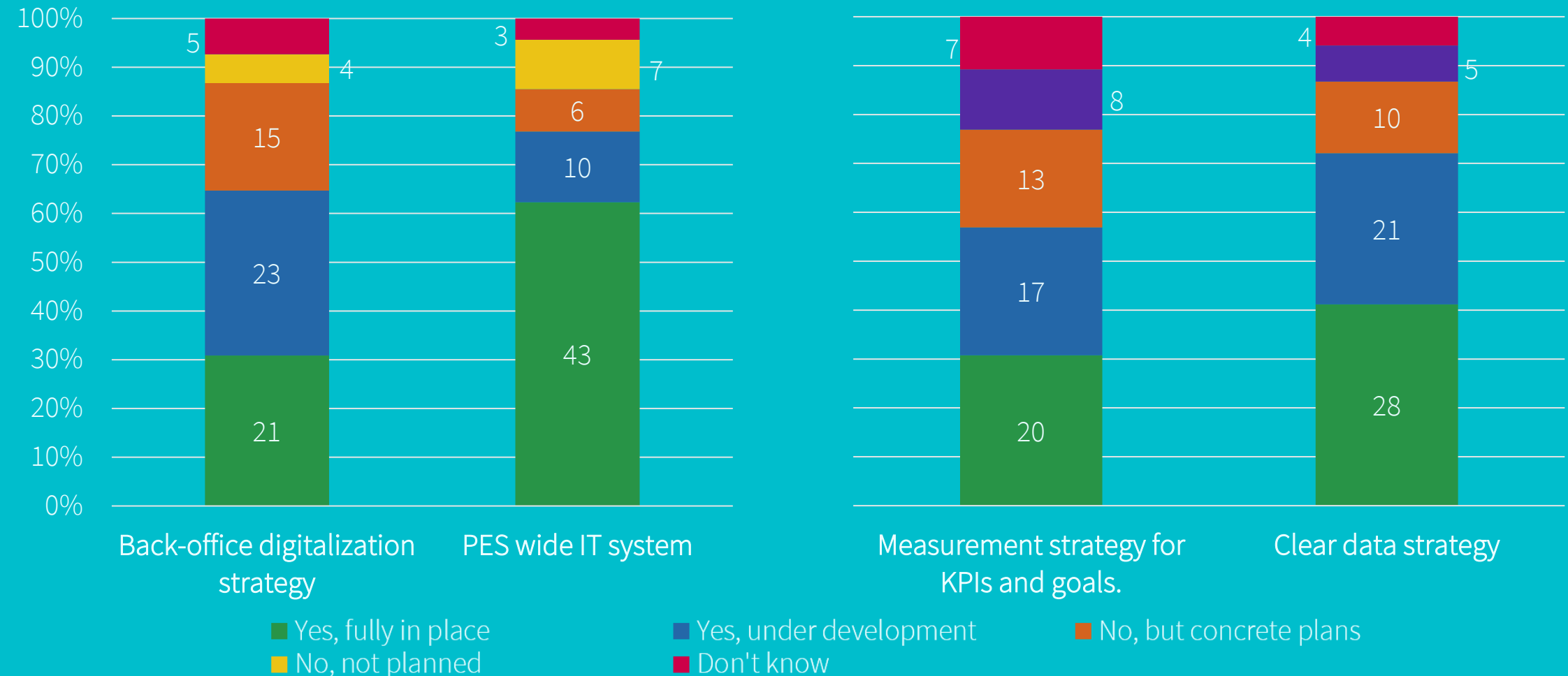
Digitalization as key facilitator of labor market changes

Need to develop capabilities to work with increasingly volatile markets and clients.

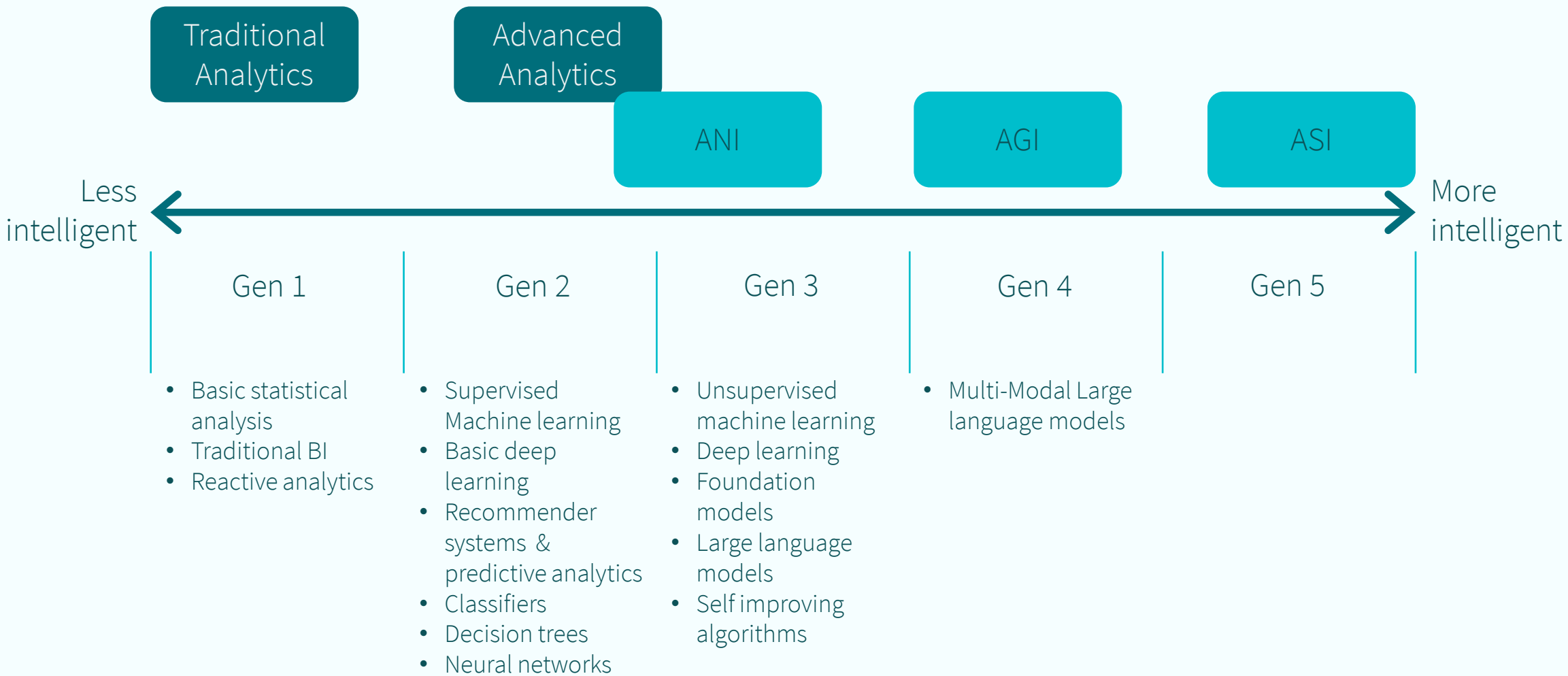
Global status of digital strategies



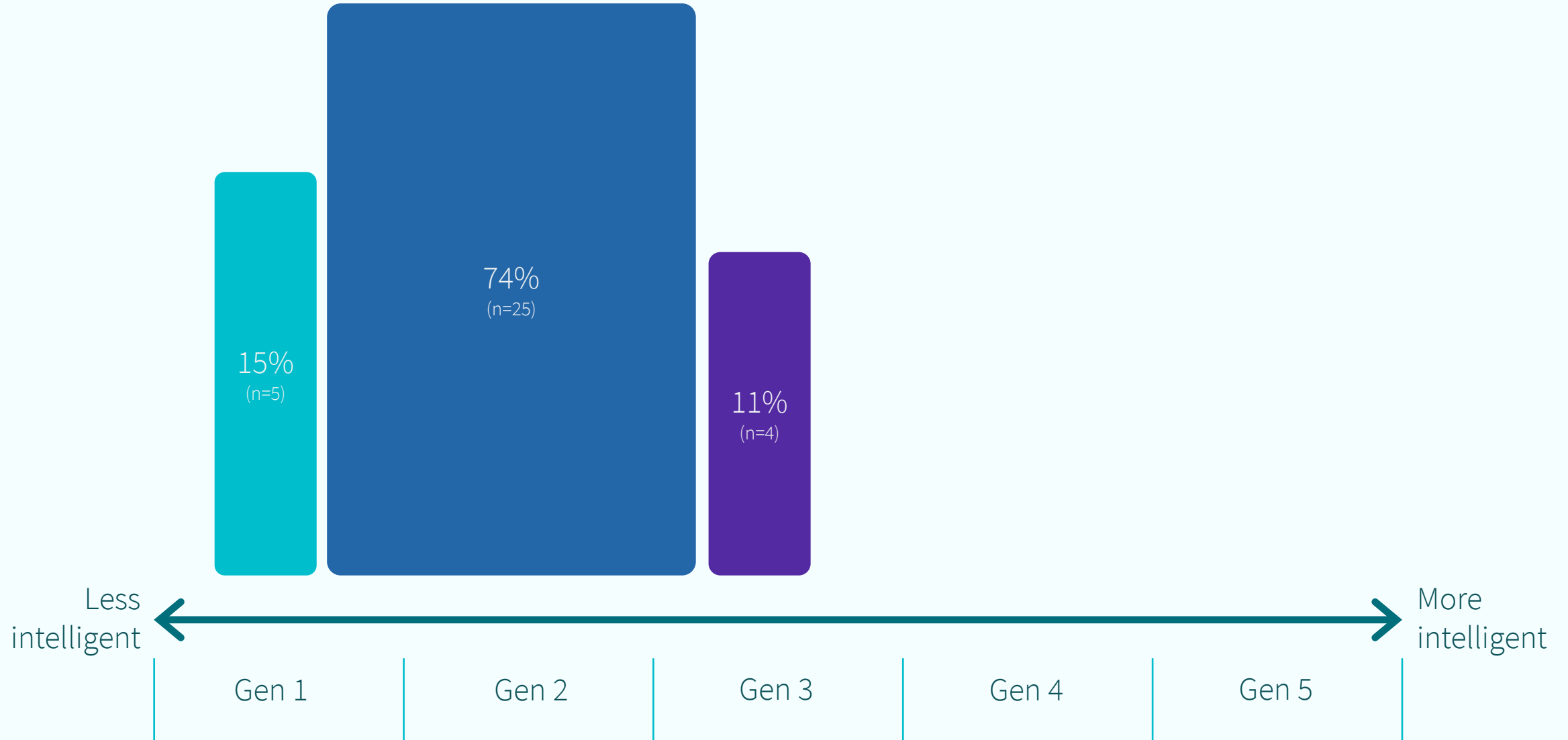
Global status of digital strategies



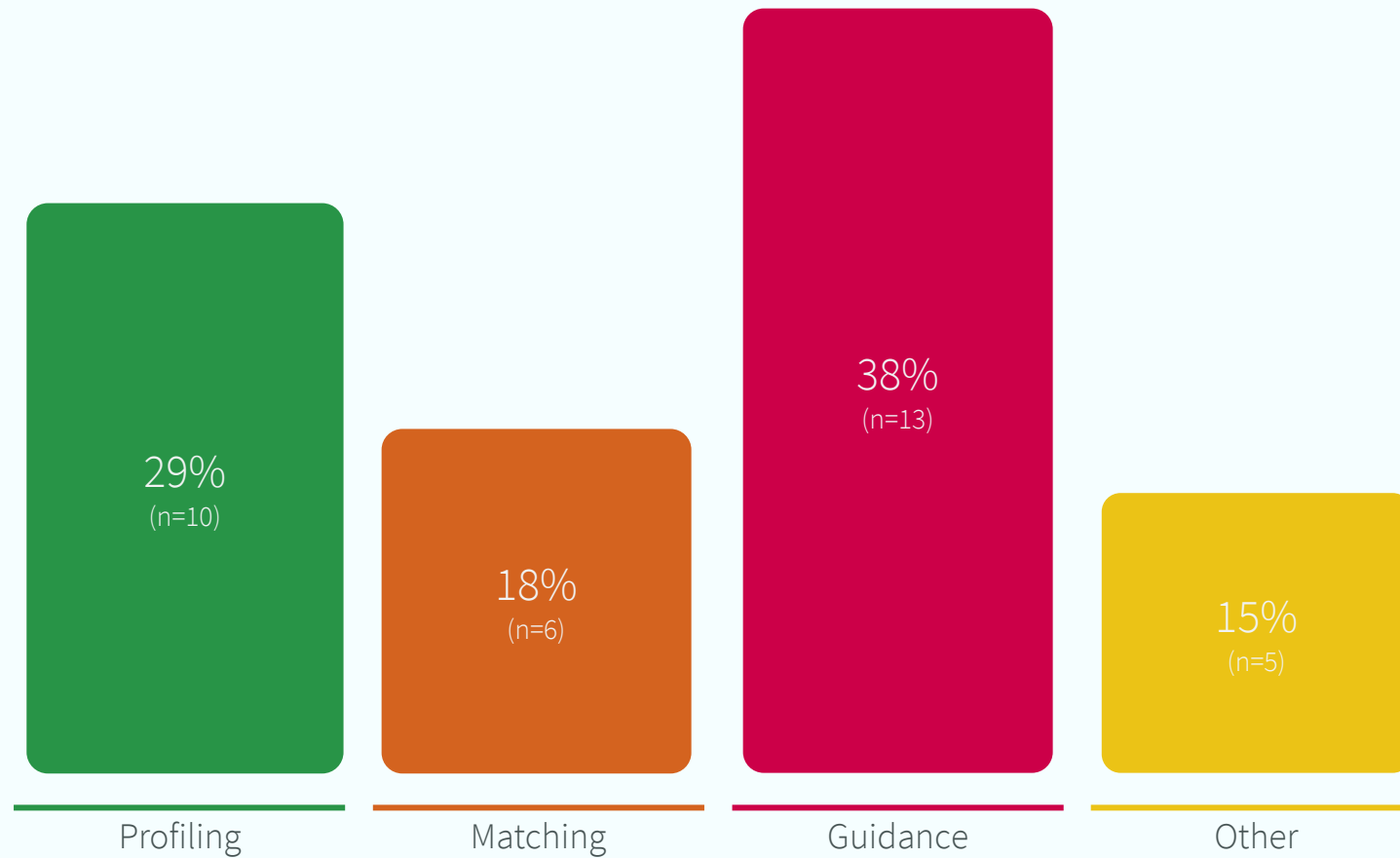
Approaches to Artificial Intelligence



Status of Artificial Intelligence in PES



Status of Artificial Intelligence in PES





Status of Artificial Intelligence in PES



AI emergent and focused on stand alone applications



PES focus on learning but black box is challenging



Positive (but 'soft') results, stakeholders critical for success



Exploring is easy, production is hard



Future looking bright, potential seen as great



General conclusions



PES at a crossroads

Try to integrate
digital/AI into existing
processes

Completely rethink
PES in a digital/AI
society

Digitalization and use of AI in PES

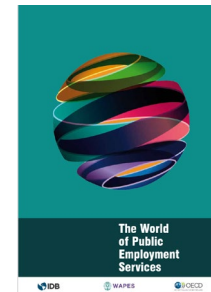
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PES AI study



World of PES (1st Ed)



2nd Ed coming 2026



In one word, how do you feel about the use of AI in Public Employment Services?



Where is your organization currently in the process of adopting AI solutions?

Preparing for the Future.

*How PES can responsibly leverage data and AI in
a transforming labor market*

Dr. Alexander Hogenboom

ahogenboom@wcc-group.com



03.12.2025

**Software
that matters**

01

Enabling Change.





Enabling **Change.**

Preparing for the Future

- Public Employment Services (PES) are challenged to support **sustainable employment** in the future economy.
- An increasing demand for green jobs and a shift towards digital and platform economies fuels the rise of **new occupations and skills**.
- PES must identify these trends and upskill their workforce in a timely and cost-effective manner.

Enabling **Change.**

Challenges for PES

- **Match** supply and demand on the labor market.
- Identify **development paths** for people to decrease their distance to the labor market.
- Track **trends** in an ever-changing labor market.
- Reduce inequality by promoting **equitable outcomes** through interventions tailored to the needs of specific labor market segments.

Enabling Change.

Technology as Catalyst

- Technology can serve as a crucial **enabler** for this labor market transformation
- The rapidly increasing potential of Artificial Intelligence (**AI**) can't be ignored, but with great power comes great responsibility.
- **Responsible AI** practices are essential, to ensure technology is used ethically, effectively, and in alignment with both PES values and emerging global regulations.

02

Artificial Intelligence.



Artificial Intelligence.

Definitions

- Artificial Intelligence (**AI**) is machines exhibiting human-like, mostly **cognitive intelligence**:
 - Following rules, applying logic, automated reasoning.
 - Learning and predicting.
 - Skill mastery and problem solving.
- **Algorithms**:
 - Are **models** that can perform tasks like prediction, classification, and the identification of trends, patterns, and outliers in order to support decision making.
 - Can be based on **logic** and/or **Machine Learning** through, e.g., clustering or Deep Learning.
 - Are nowadays available through (cloud) services and libraries like TensorFlow or ChatGPT.
- Domain knowledge – captured in business logic, **taxonomies**, or **ontologies** – can be used to improve algorithms and (the interpretation of) their outcomes.



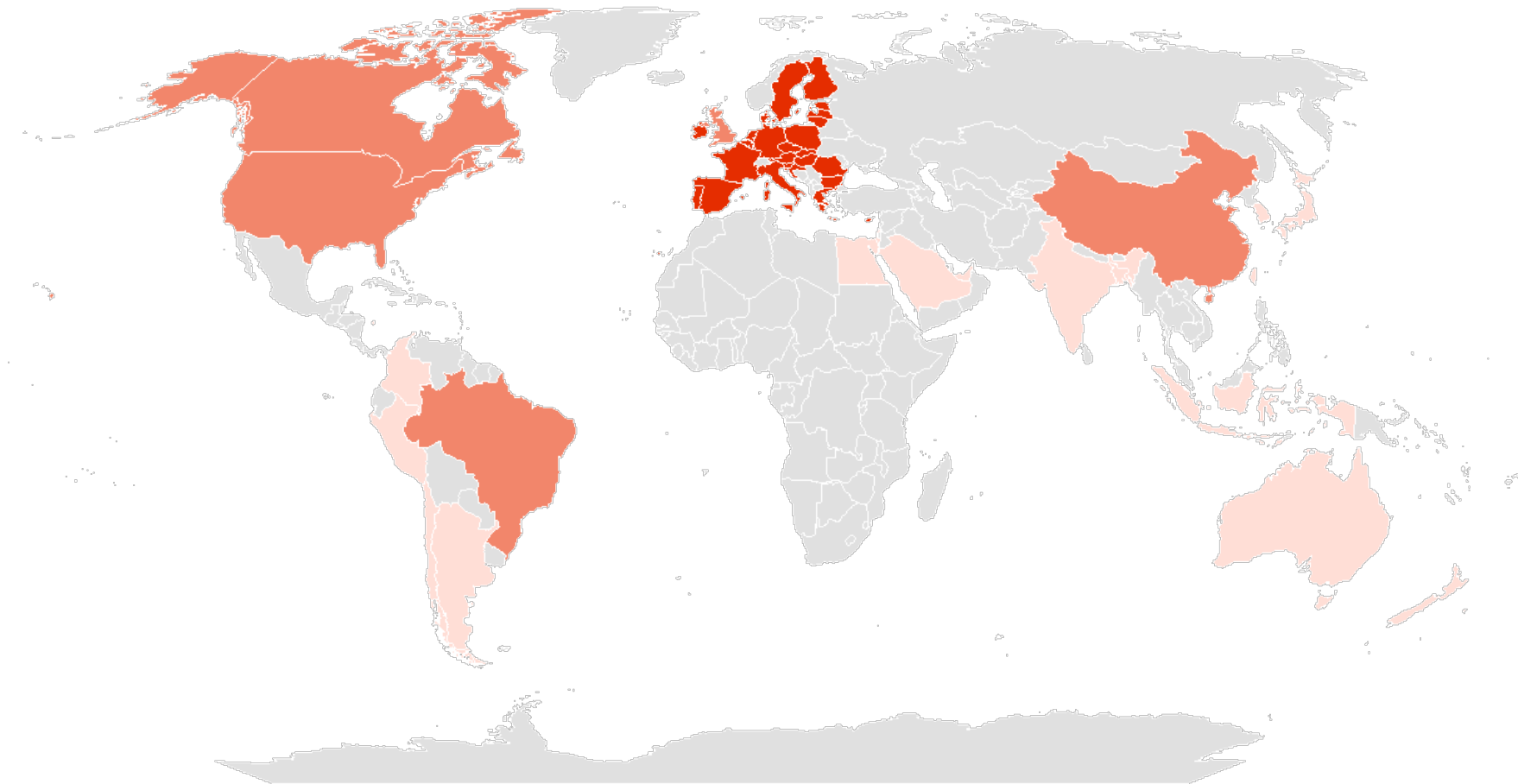
Artificial Intelligence.

Challenges

- AI has become a **commodity**; the key is knowing **how** and **when** to apply **what**.
- Challenges in an AI-based application:
 - **Data** selection and processing.
 - **Model** selection and fine-tuning.
 - Evaluation and presentation of results.
 - Dealing with change.
 - Preventing biased models.
- With increasingly complex, powerful, and **impactful** real-world applications, responsible AI has become essential.

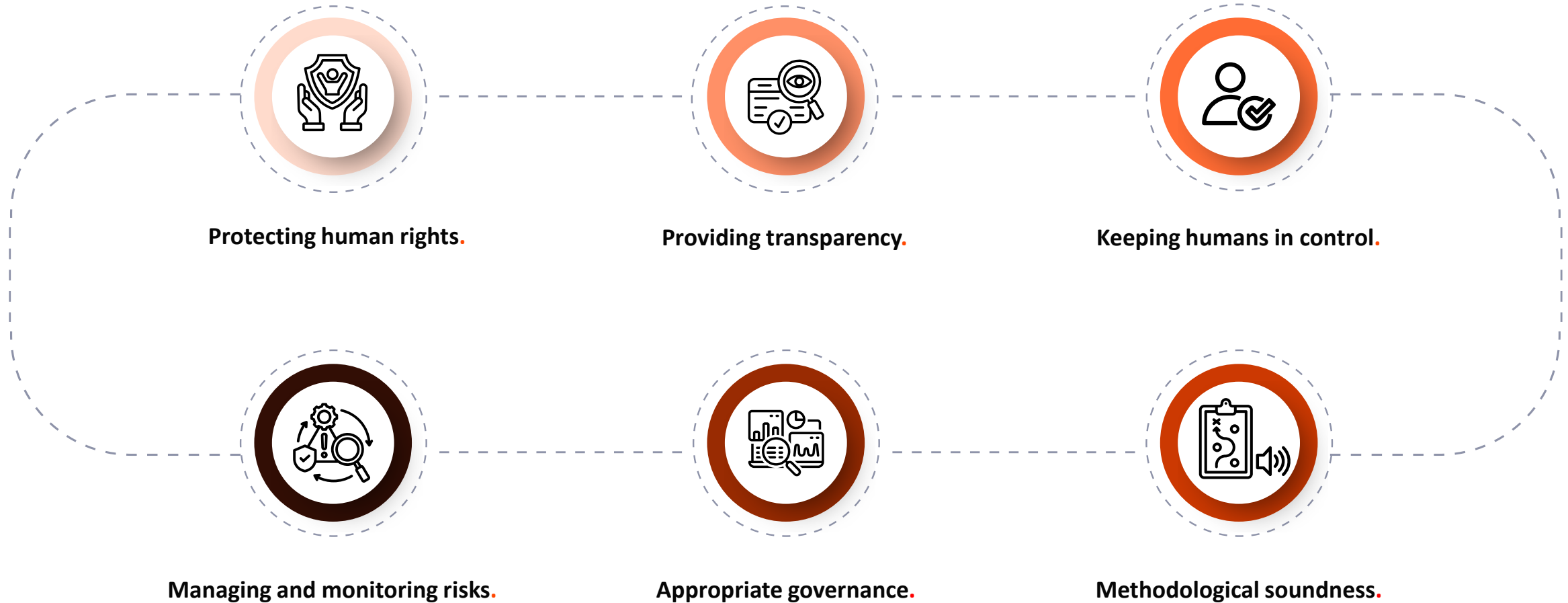
Artificial Intelligence.

Guidelines, Legislation, and Standards for Responsible AI



Artificial Intelligence.

Key Elements of Responsible AI



03

Responsible AI for PES.



Responsible AI for PES.

General Guidelines

- Ensure that the **core** of your solution (e.g., matching people with jobs and providing recommendations for professional development) is a type of AI that allows for transparency and keeps a **human in the loop** to ensure **compliance** with the strictest AI regulations:
 - **Rule-based** and knowledge-driven.
 - Controllable, explainable, automated application of logic and reasoning.
- Use **data-driven** self-learning capabilities in a **supporting** role, for instance to improve data quality (e.g., input completion or data enrichment), yet still in a **controllable** manner.
- In both rule-based and data-driven innovations, strive for a **responsible** use of AI through:
 - Prioritization of explainability of algorithms and/or their outcomes.
 - Methodological rigor in the development and delivery of your algorithms.
 - Diversity of backgrounds of professionals working on/with your AI solutions.



Responsible AI for PES.

Compliance by Design

- When using AI in a high-impact domain like the employment market, responsible AI practices are not only a nice-to-have; **compliance with emerging AI regulations** is of critical importance.
- We have identified a few **key corner stones** for AI solutions for PES to comply with such regulations by design.

Responsible AI for PES.

Transparency

- Aim for **transparency** of the AI solution.
- Create solutions that can provide full transparency on the reasoning behind their outputs.



Responsible AI for PES.

Domain Knowledge

- Design the AI solution in a way that allows for **incorporation of domain knowledge**.
- Feed domain expertise into your solution through taxonomies, ontologies, and business logic.

A close-up photograph of a dark bowl filled with bright red cherries. Some cherries have spilled out onto a light-colored, weathered wooden surface. The cherries are glossy and have green stems.

Responsible AI for PES.

Control of Data

- Allow for full **controllability of data usage**.
- Provide the ability to control exactly:
 - Which data is used:
 - Source selection.
 - Cleaning.
 - Transformation.
 - Enrichment.
 - Under which circumstances this data is used.



Responsible AI for PES.

Control of Models

- Allow for full **controllability of model usage**.
- Provide the ability to control exactly:
 - Which models are used
 - How these models are used
 - For whom these models are used
 - Under which circumstances these models are used



Responsible AI for PES.

Monitoring

- Perform appropriate **monitoring** of your AI solution.
- Use analytics and system logs to monitor your solutions' performance and to spot trends and patterns that can be used to further optimize matching strategies.

Responsible AI for PES.

User Engagement

- Aim for **user acceptance through engagement**.
- End users tend to more easily accept systems where they feel like they understand and are in control of the underlying AI.
- You can achieve this by engaging the user in the process, from guiding their data entry to explaining the results they see on their screens.



**We have committed
to the AI Pact
voluntary pledges.**



Responsible AI for PES.

AI Pact

- It is of critical importance to start thinking about **responsible AI** practices **now**.
- Under the European Union's **AI Act**, AI in the employment domain is seen as **high-risk** and will be **strictly regulated** by **August 2026**.
- WCC was one of the first providers of AI solutions to join the **AI Pact**, to remain a **frontrunner** in responsible AI and comply with the AI Act as soon as possible.

04

Getting Started with AI.



Getting Started with AI.

No One-Size-Fits-All Approach for AI to Support PES



Getting Started with AI.

Do the Right Thing ...



Getting Started with AI.

... And Do it Right



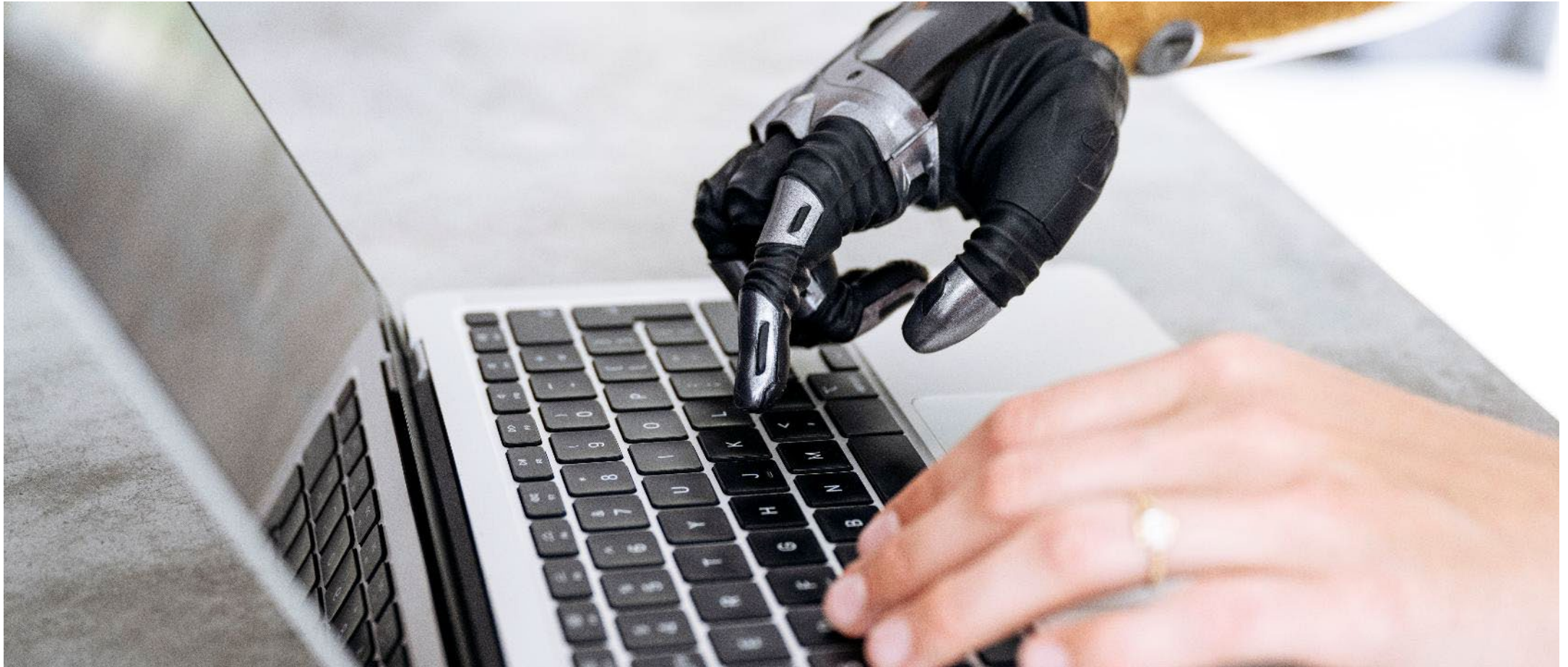
Getting Started with AI.

Ensure a Solid Foundation of High-Quality Data First



Getting Started with AI.

Technology Must Be Embedded in Processes to Thrive



Getting Started with AI.

The Human Factor Remains Crucial





Thank you!

Dr. Alexander Hogenboom

Chief Technology Officer

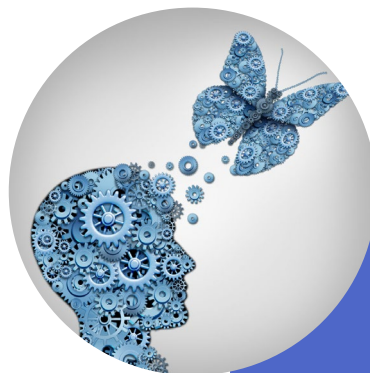
ahogenboom@wcc-group.com

Q&A.



PERKESO Labour Market Digitalization Journey

From Data Extraction to AI-Powered
Intelligence.



PERKESO's labour market transformation evolved from manual data extraction to an intelligent, AI-enabled ecosystem that empowers decision-makers, employers, and jobseekers.



This presentation traces that journey — highlighting how technology, policy, and people converged to make data work for Malaysia's workforce.

In 2019, PERKESO launched the EIS Centre Portal to share labour market data drawn from two main sources:

1. MyFutureJobs (WCC)

2. Employment Information Services (IBM)

The portal covered Loss of Employment, Job Vacancies, Job Seekers, and Job Placements

Data extraction was **fully manual**, using Power BI and DB2 queries

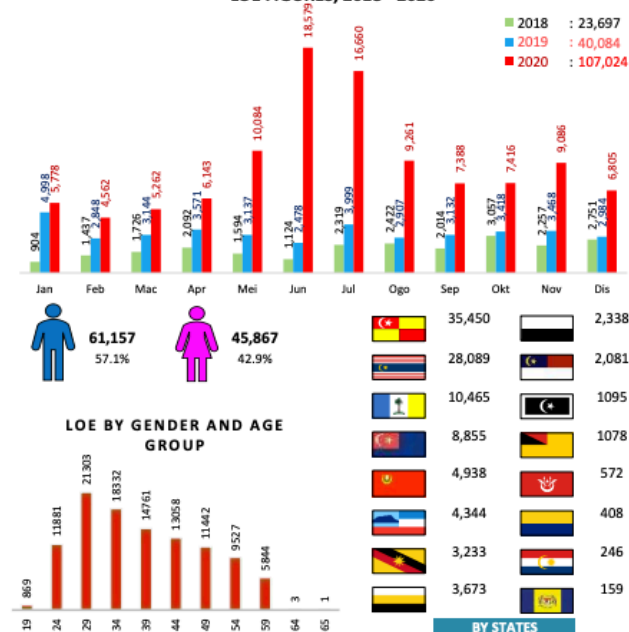
Despite the limitations, it laid the foundation for a unified, **data-driven approach** to labour market reporting

B. LOSS OF EMPLOYMENT

1 Jan - 31 December 2020

- Loss of Employment (LOE) refers to any reasons by insured person who had lost his employment but does not include compulsory retirement, voluntary resignation, expiry of a fixed-term contract, and retrenchment due to misconduct.
- The 5 EIS benefits are the Job Search Allowance, the Early Re-Employment Allowance, the Reduced Income allowance, the Training Allowance, and the Training Fee.
- Applicants are eligible for benefits if they have paid a minimum number of contributions and are actively seeking work. All applicants must register on MYFutureJobs.

LOE FIGURES, 2018 - 2020

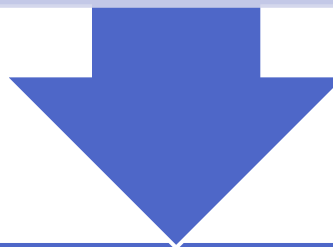


The foundation for PERKESO's Labour Market Framework was built upon **three key policy papers:**

Harnessing Administrative
Records for Labour Market
Information System

Bridging Occupations and
Qualifications

MSOC Handbook



These established Malaysia's national structure linking skills, occupations, and qualifications — providing the taxonomy that **made labour data interoperable and policy-relevant**

Towards Automation: The 2021 Turning Point



In 2021, PERKESO proposed a new Labour Market Information System (LMIS) built on its **data warehouse architecture**



The LMIS automated ETL data flows, consolidating information from **multiple sources**



Importantly, Social Security data — including employers, employees, and gig workers — was **integrated** for the first time



This automation turned static records into **dynamic, AI-ready** datasets



Later that year,
the **Labour
Market
Command
Centre** was
launched in SIP
Putrajaya



It provided **up-
to-date labour
statistics** and
**demographic
insights** by
gender, age,
occupation, and
industry across
states, districts
and political
constituencies



The Command
Centre marked
PERKESO's shift
from static to
live analytics —
making data
accessible,
visual, and
actionable for
national
employment
strategies.



The Birth of LMX: 2022–2025



Development of the **Labour Market Exchange (LMX)** began in early 2022 and took **three years** to complete



The system unified all labour market data into **one intelligent platform**

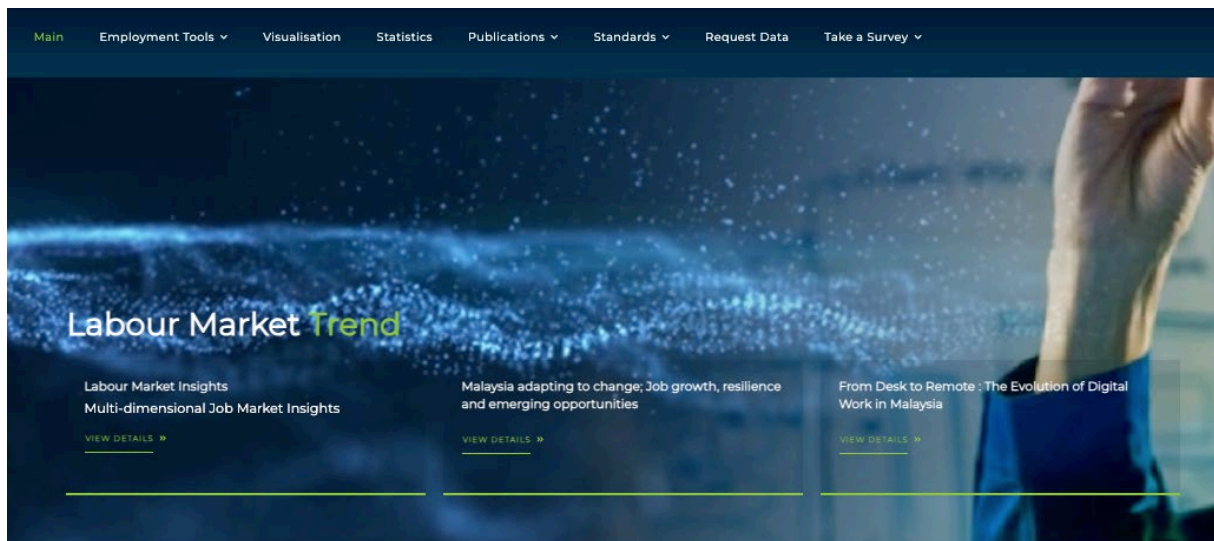


Alongside LMX, PERKESO in-house developed the **Wage Guide** — a machine-learning salary benchmarking tool — and the **Career Bridge** — an NLP-based solution linking qualifications to jobs



These innovations positioned PERKESO as a **pioneer in AI-based labour analytics.**

The LMX Portal: Key Features



The LMX Portal provides comprehensive functionality:

Employment Tools (AI-based): Wage Guide, Career Bridge, Job Galaxy

Interactive Visualisation: Dashboards and maps depicting the Malaysian labour landscape

Statistics Module: Create, analyse, and export structured datasets

Publications Repository: Reports, analyses, and articles for policymakers

Standards & Taxonomies: Incorporation of MSIC, MASCO, and NEC for consistent classification

The **Malaysia Career Exploration Centre (MYCEC)** is a state-of-the-art career discovery hub located at NU Sentral Kuala Lumpur. It combines digital analytics with gamified personality assessments to help **individuals explore their career pathways**.

At MYCEC, career readiness becomes **an interactive experience**, bridging the gap between data, discovery, and development.

MYCEC supports four main pillars:

Labour Market Insights: Provides real-time labour market data and trends from PERKESO's Labour Market Exchange (LMX).

Career Exploration: Helps visitors explore different industries, aligning their passions and strengths with future-ready careers.

Skill Development: Offers workshops, seminars, and training modules to build essential skills.

Networking Opportunities: Connects visitors with employers through job fairs and industry events.

Welcome to the MYFutureJobs Career Exploration Centre Online Booking

About MYCEC

Malaysia's first immersive career exploration centre. To learn more about MYCEC, please visit [MYFutureJobs](#).

Entrance Fee

No fee required

Address

Level 2.14, NU Sentral Shopping Centre,
201, Jalan Tun Sambanthan, Brickfields,
50470, Wilayah Persekutuan
Kuala Lumpur.

Operating Hours

Mon - Sun, 10:00 am - 08:00 pm

1300-22-8000

[See map and directions](#)

We are also available for walk-in customers (subject to availability). We would recommend pre-booking your slot for a smoother experience.

[Begin Booking →](#)

Empowering Public Employment Officers

Public Employment Officers (EOs) are now empowered with **real-time data access** through LMX

They can identify employer needs, understand regional job demand, and plan activities strategically

With **data at their fingertips**, they engage employers and jobseekers more effectively — organizing targeted job fairs, matching skills faster, and measuring results with precision

Digitalization has transformed their roles **into data-informed strategists**

Why choose us?



Free support
services for all
jobseekers.



Job opportunities
will be matched
based on
proximity.



AI-driven
skill-based job
matching.



Candidates will be
notified of our
upcoming events.



Career counselling
and individual
support service.



The Broader Transformation

Through automation and AI integration, PERKESO has transformed from a **data collector** to a **data enabler**

Multiple systems are now connected, reports are automated, and **data is democratized** for public use

This shift has strengthened policy responsiveness, improved transparency, and enabled **evidence-based decision-making** across Malaysia's labour ecosystem

Looking Ahead: The Future of Labour Market Intelligence



PERKESO's next phase focuses on predictive/prescriptive analytics, inter-agency integration, and natural language AI for **intuitive data access**

The goal is to create a **foresight-driven system** where policymakers can forecast trends, simulate labour scenarios, and design interventions in real time

The future of LMX lies in **proactive intelligence** and **inclusive collaboration**



Closing Reflections

From manual spreadsheets to machine-learning dashboards, PERKESO's Labour Market Exchange stands as a **model of innovation and perseverance**

The journey was long and challenging, but deeply rewarding.

Today, LMX embodies PERKESO's mission to transform information into insight, and insight into opportunity — ensuring that **data serves the people** it was built to protect and empower



Which part of Malaysia's approach do you believe would have the biggest impact if implemented in your PES?



YOUR GUIDE FOR
**BUSINESS & TALENT
DEVELOPMENT**

FUTURE UP

Preparing the Workforce for the Future in Costa Rica

DECEMBER 2025

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Our proven track record and +43 years of experience in investment and business development make us the one stop shop for your every need.

OUR PROOF OF CONCEPT

- 1 Extensive experience developing and enhancing collaborative ecosystems across sectors: Knowledge Intensive Services, Smart Manufacturing and Health & Wellbeing.
- 2 Deep knowledge of Costa Rica's business ecosystem, the global landscape and how each one affects the other.
- 3 Robust team of experts with profound expertise in their areas: investment advisory, research and monitoring, data analysis, marketing & communication.

WE SUPPORT COMPANIES THROUGH THEIR BUSINESS JOURNEY

INVESTMENT ADVISORY

Assistance during the site selection process and investment lifecycle

INVESTMENT ENTRY

Support during set-up stages and link to key service providers and stakeholders

TALENT STRATEGIES

Planning and guidance for specific talent acquisition and development strategies

INVESTMENT EXPANSION

Specialized support geared to new operational expansion projects or promoting diversification

\$2,8

MILLONES

IDB and
CRUSA
Investment

42

Months

Project
Duration



6 **Government
Ministres**

High Level
Advisory Board

1st

**FAIR LAC Hub
Project in Costa
Rica**

IDB – AI
Council



Models

- Work as a platform
- Skills & competences trends
- Market comparisons (local vs global)



- The Future of Education
- Re-skilling strategy

- National Labor Platform
- JOB's models evolution



Profiling

- Personality
- Interest
- Passion
- Skills
- Aspirations
- Education
- Context

Traceability

- Skills evolution
- New skills
- Skills association
- Skills predictor

- Local companies
- Multinational local and global
- Recruiting firms/Job Boards
- International labor market

Companies

AI Platform

Individuals

- High school students
- High school graduates
- University students
- Labor Market
- Unemployed
- Retiree

Training resources

- Assessments
- Academia, Industry and certifying organizations
- Credentials, certifications and/or nanodegrees)

Financial Aid

- Comercial Banks
- Scholarships
- Subsidies
- CONAPE
- Crowdfunding

Technical resources

- Data base integrator
- Analytics
- Predictive models
- Unbiased coding and algorithms



Public Policy

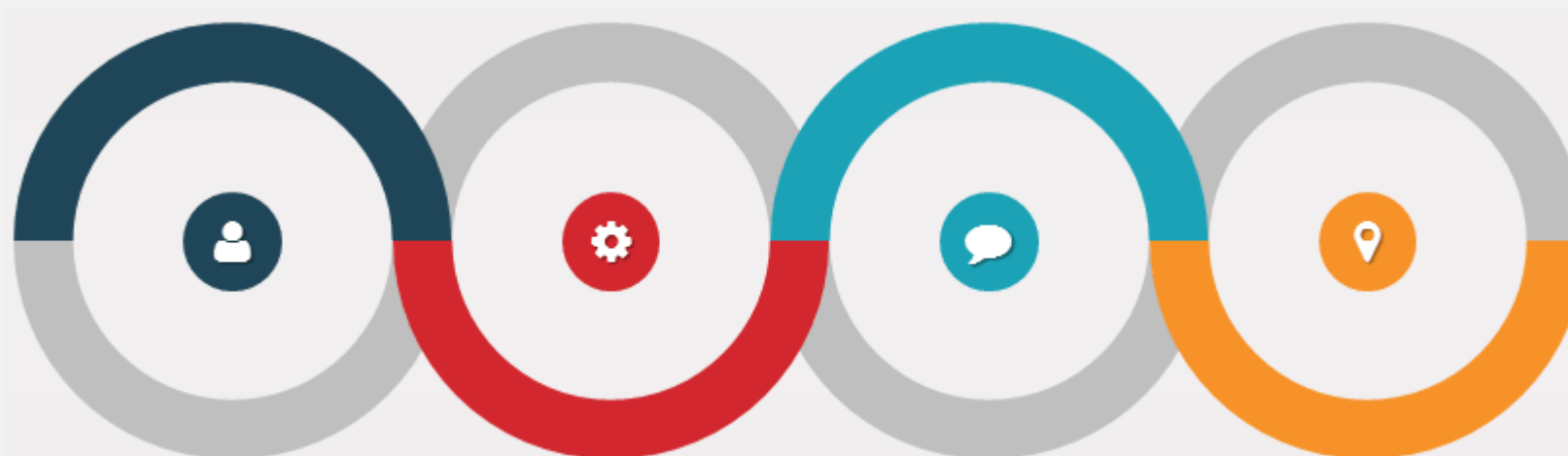
Model CYCLE

skill profile creation:

support candidates to compile a quality skills profile with an easy comfortable user interface

skill gap analytics:

calculate the gap between the individual skill profile and the required skills in the market



skill profile matching:

match those profiles against required skills profiles (compiled based on employer input, available market reports/statistics)

refer to relevant support programs

(training, counseling, financial support, ...) based on that gap



update profile
and restart the whole sequence



- **Developed the national digital platform** enabling skills-based matching between talent, employers, and training opportunities, using their Employment Platform technology on AWS.
- **Enabled personalized learning paths** through AI-driven recommendations, including identification of hidden skills, career pathways, and upskilling routes.
- **Provided advanced labour-market insights** with analytics tools for employers, policymakers, and training providers to map talent gaps and demand.
- **Demonstrated strong cultural and contextual adaptability**, learning Costa Rica's talent ecosystem and co-designing a tailored, build-to-suit solution rather than a generic tech deployment.
- **Supported national talent-development goals** by aligning workforce capabilities with high-growth, FDI-driven sectors and strengthening the country's competitive positioning.

fAIr LAC+



- **Promotes ethical and inclusive AI adoption** across Latin America and the Caribbean by aligning technological innovation with transparency, fairness, and social impact, promoting cross sector collaborations, engaging governments, private sector, academia, and civil society to co-design policies, standards, and tools for responsible AI.
- **Practical tools and frameworks** include ethical AI assessment guides, algorithmic audits, governance toolkits, and capacity-building programs for public institutions.
- **Focus on high-impact sectors** such as education, health, social protection, workforce development, and digital public services to reduce inequality and improve decision-making.
- **fAIr LAC for Future Up provided an ethical AI and data-governance framework**, ensuring the platform's design and algorithms aligned with principles of transparency, fairness, privacy, and responsible use of talent data.



Objectives:

To create a **platform** that offers it's users an easy, personalized and up to date offers of **learning paths**.

1

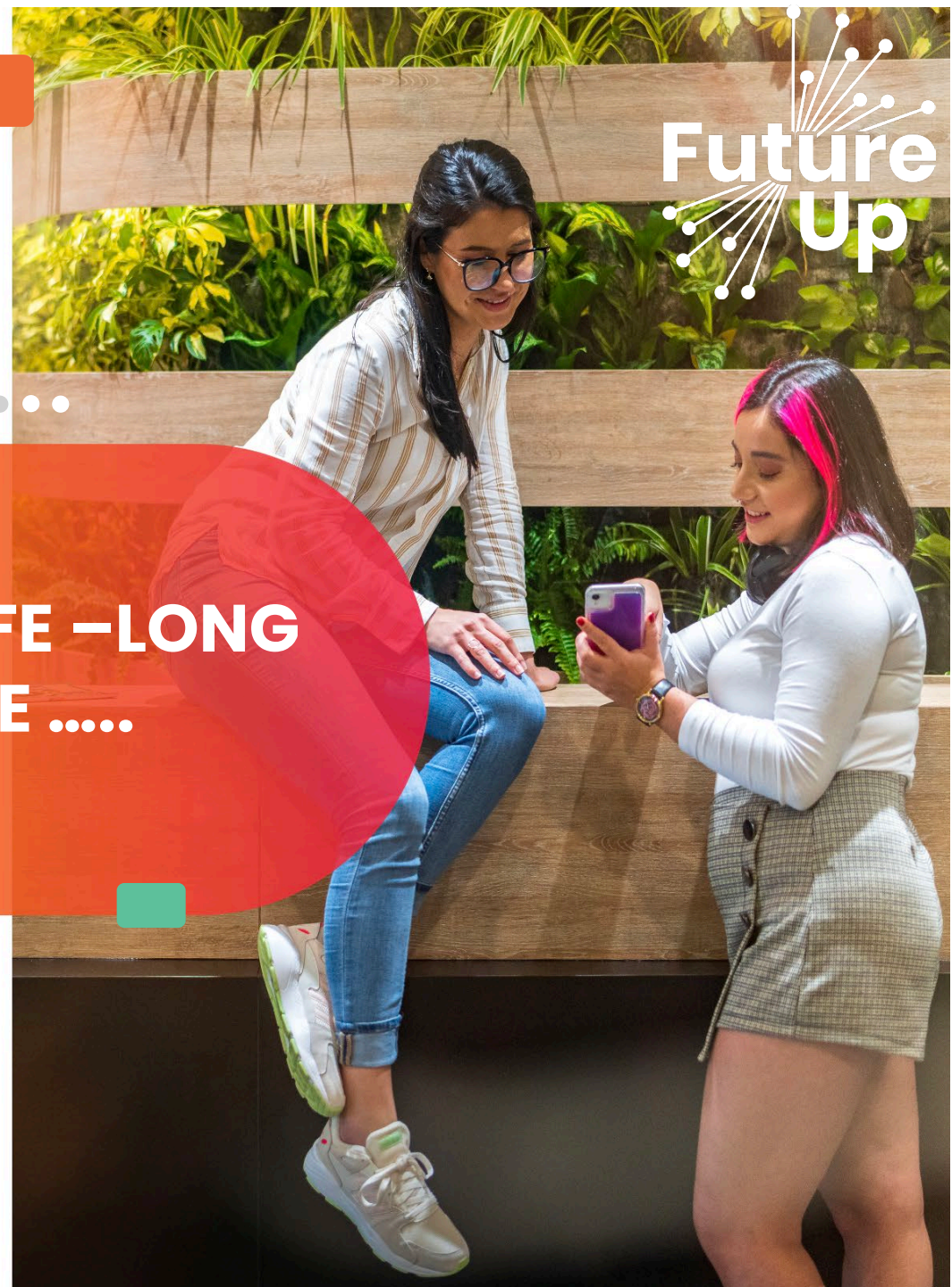
Promote a permanent **continued learning culture** (Long-term)

2

Build a "space" to find and learn about the **trendy skills** according to my **market needs and changes**.

3

PROMOTING A LIFE –LONG LEARNING CULTURE



Future
Up

What is Future Up?

- A platform to **understand the future of skills**, and how it is tied to job opportunities and personal growth
- A platform for **discovering possible interests and** relating them to learning development opportunities
- A guide where users can **develop an ongoing learning strategy**
- A space to get to know about learning throughout life and how **everybody is responsible for their own development**

What it's **NOT**?

- A job exchange
- A learning management system (LMS)
- A formal educational tool warehouse
- A platform for professional/work education

SUCCESS FACTORS

- **People-Centered Talent Development**

The platform placed individuals at the core, mapping their skills, aspirations, and learning needs to personalized pathways, helping democratize access to opportunities regardless of background, geography, or education level.

- **Responsible, Ethical Use of Technology**

Future Up integrated ethical-AI principles such as transparency, privacy, fairness, and responsible data governance, building trust among users, employers, and institutions while promoting tech adoption without compromising rights.

- **Innovation in a Traditionally Rigid Education & Labor System**

It introduced a modern, data-driven platform into historically siloed sectors (education, training, employment) and showcased how digital technologies can streamline pathways, improve decision-making, and enable agile upskilling.

- **Cultural Shift Toward a Skills-Based Ecosystem**

The initiative helped move Costa Rica from a credential-based mindset to a culture that recognizes skills—formal, informal, and emerging, as the core currency of employability, mobility, and competitiveness.

- **Shared Value Through Multi-Stakeholder Collaboration**

Success was driven by active participation from companies, training institutions, government, and civil society, aligning workforce development with real industry demand and translating insights into actionable talent strategies.





CHALLENGES



Earning public trust in data use and personal information management

Future Up had to overcome skepticism from users wary of how their information might be used. Ensuring transparency, privacy protections, ethical AI principles, and clear



Driving cultural change from credentials to skills

Shifting institutions, employers, and individuals toward a skills-first mindset required sustained advocacy, evidence, and alignment across stakeholders.



Integrating tech innovation into fragmented, traditional systems

Education, training, and labor markets often operate in disconnected silos with legacy processes and low digital integration. Future UP required coordination, interoperability, buy-in and adaptation of the ecosystem.





YOUR GUIDE FOR
BUSINESS & TALENT DEVELOPMENT

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Final Q&A.

