ARTIFICIAL INTELLIGENCE IN EMPLOYMENT SERVICES - A MAPPING
FINAL REPORT

29.11.2019

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CONTENTS

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CHAPTER 1
INTRODUCTION

In this chapter, we describe the scope, background and implementation of the mapping exercise.

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BACKGROUND AND RATIONALE

This report presents a small-scale mapping exercise about the current state of the application of artificial intelligence in employment services

Objectives The Finnish public employment services (PES), governed by the Ministry of Economic Affairs and Employment (MEAE), has carried out a short mapping study on the state of the application of artificial intelligence (AI) in job matching and public employment services. The results of the mapping study will be used as background material and presented in the 12th PES board meeting, taking place on 12-13 December in Helsinki. The results will be disseminated also for the Afepas.

The study aims to create understanding of the key trends of AI utilisation in job matching and employment services, to map recent visions, strategies or policies of different countries for utilising AI in the future and to summarise key developments in this field in 2018–2019.

Background The Finnish Government has adopted an active approach in discussing the utilisation of AI in different services. As part of the Finnish AI strategy, a recent working group report states that AI provides opportunities for rapid productivity growth and a higher standard of living. To harness the potential of AI, society needs to invest in updating workers' skills, facilitating workforce mobility and generating innovations that complement human labour. The importance of a well-functioning labour market will be even greater than before. (MEAE 2019)

The European Network of Public Employment Services has recently worked with AI related questions on different occasions. In January 2019, the network addressed opportunities for using AI in PES and questions such as how to manage data, how to improve processes, how to integrate and share data and innovation and what the future will hold. The workshop was followed by a thematic paper which brings together all the insights generated by the PES network and provides an update on the latest trends in digitalisation and use of data within PES. The role of AI in PES matching services in the Nordic and Estonian context was further discussed in the workshop held in Helsinki in June 2019.

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INTRODUCTION
Mapping questions, methods and data

Mapping questions. This report presents the results of a mapping exercise which mapped out utilisation of artificial intelligence (AI) in employment services. The mapping was commissioned by the Finnish Ministry of Economic Affairs and Employment (MEAE) and was carried out during October and November 2019.

Our mapping questions were:

1. What are the recent trends, interesting phenomena and new initiatives in utilising AI in employment services or job matching platforms?

2. What kind of measures can be identified in different countries?

3. What kind of visions, strategies or policies different countries have for utilising AI in job matching in the future?

4. What are the key development projects or initiatives in the few country examples selected?

Methods and data. Two methods were utilised in the mapping. Firstly, in cooperation with MEAE, we carried out a short electronic survey to EU PES network members (N=27). This survey aimed to gather some insights on how AI has been utilised in PES across the EU. Total 20 countries responded to the survey.

The second part of the exercise concentrated on internet and research database searches (Google Scholar) and news source searches on AI utilisation in employment-related services, both private and public. This included content analysis of reports and also relevant news articles and web pages. Search combinations of key concepts are annexed to this report.

A single definition of AI was not used in this mapping study, but we have used those definitions that were presented in each data source. However, basic software automation was excluded from the searches. The main focus of this study was on PES, but also private sector developments were included in the mapping.

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CHAPTER 2

NATIONAL VISIONS, STRATEGIES AND POLICIES FOR USING AI IN PES

This chapter takes a look into the strategies that EU member states and other states adopt on AI and how AI is used in connection with PES.

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2 NATIONAL VISIONS, STRATEGIES AND POLICIES FOR USING AI IN PES

2.1 Background: National AI strategies

Most EU states have established some strategies or policies on how to utilise AI in the public services or how to advance the use and development of AI in society in general. There are several AI strategies with concrete actions and timelines, but in some cases, AI is understood merely as one tool in digitalization of public services, not as something deserving its own policy or strategy.

A continually updated list of national AI strategies can be found at Medium community. As of November 2019, 23 different strategies have been prepared. In overview, significant investments have been made in the development of AI. The focus is on the impacts that AI will have on different fields of society and on opportunities that the use of AI would create. Based on these, the need for R&D investments has been evaluated in relation to preferable outcomes and for the purpose of reaching the targets set.

Is there a national strategy (or policy) on how to utilise AI in public services in general? (count)

Yes	12
No	3

Are there AI strategies (or policies) on other levels of government? (count)

Sectoral ministries / equivalent bodies	4
Cross sectoral strategies (for example ministry-level strategies together with industries)	5
Regional government level	7
Individual cities / municipalities	7

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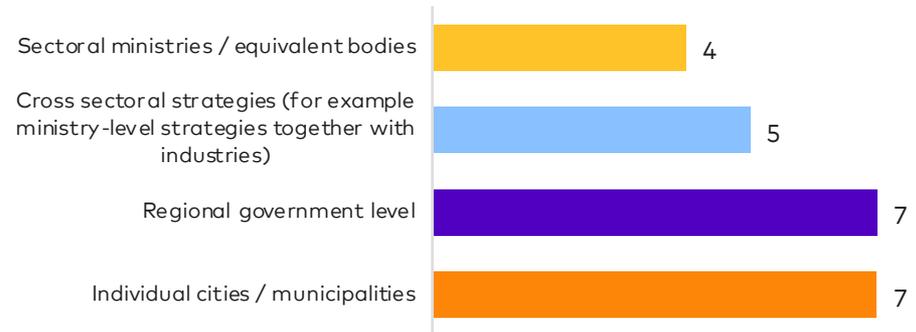
2 NATIONAL VISIONS, STRATEGIES AND POLICIES FOR USING AI IN PES

2.2 Inclusion of PES in AI strategies

Employment services are rarely mentioned in national strategies, which are mainly focused on technology, digital services and opportunities for citizens and enterprises. In relation to employment, national AI strategies focus almost exclusively and sometimes very thoroughly on what kind of impacts AI will have on work (i.e. shifting job market) and what kind of new skills are required (continuous learning). One exception is Croatia's strategy in which enhancement of employment services, employer services and related data are mentioned. In Finland the opportunity to improve the functioning of the labour market is addressed in reports of the working group on the transformation of work and society. Job matching and labour mobility are pointed out in particular. (MEAE 2019)

Even though PES are not directly mentioned in the national AI strategy or policy, there may still be direct or indirect resources allocated to the development work or utilisation of AI in PES. This is the case with Pôle emploi's project "Intelligence employ" in France, for example. The ministry responsible for the employment services may have been heavily involved in strategy preparation (for example, BMAS is a key actor in Germany).

Is there a specific policy for the utilisation of AI in employment services?
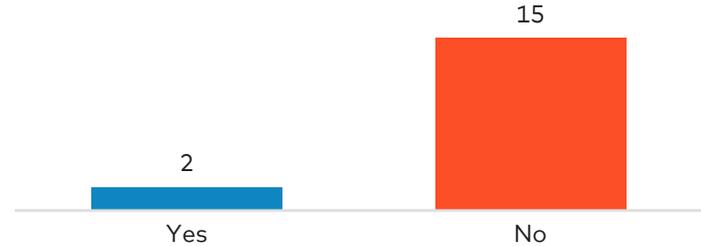
Furthermore, it is important to notice that several states reporting that an AI-PES-strategy is under preparation at the moment and that related actions will take place shortly.

In several states where AI is in use, it has been developed in isolated projects which may involve multiple actors but are still not part of any national or even local strategy. For example, VDAB in Flanders is often mentioned as a forerunner in utilising AI, but Belgium or Flanders do not have a national AI strategy. In Sweden, a national strategy is currently being prepared, but AI solutions are already implemented in PES. In these cases, AI oriented key persons have significantly advanced the development.

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2 NATIONAL VISIONS, STRATEGIES AND POLICIES FOR USING AI IN PES

2.3. Utilising AI in PES

AI is currently not very widely used in most of the European PES, but multiple plans and solutions are being prepared and piloted. Many employment services are involved in national AI development, either actively or at least as part of the network to gather knowledge. The importance of AI and its opportunities are shared extensively.

Highlighted factors/challenges in utilising AI in PES:

1) Importance of data
AI depends on availability and accuracy of data. It is necessary to share data among different actors (e.g. social services, PES, municipalities), and this should be taken into account from the very beginning of the development of IT systems. Transparency is important, and the quality and bias of the data should be checked and digital ethics acknowledged. One example of tackling data availability issues is Estonia's back-office IT system that collects data from different registries and verifies its case eligibility.

2) Technology in the public sector
As of today, not all public sector IT systems are compatible with AI platforms. Digital transformation is necessary, and in several countries complete reforms are planned or already executed. The new IT systems are necessary if the current systems cannot produce adequate data.

3) The need for definition
A clear definition of AI and its applications in the public employment services should be provided. In some cases, all the actors do not share an understanding of the concept, and this delays the development and complicates the transformation.

4) Legislation
Part of the digital ethics discussion is the legislative context. The use of AI may be restricted or delayed if the national or EU legislation is not up to date on the issue. The legislative framework changes slowly compared to technological advancement.

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KEY QUESTIONS FOR DISCUSSION

The findings lead us to ask some questions concerning the future

1 Public employment services or new employment possibilities are seldom part of the AI strategies. The connection between PES and national AI strategies seems weak at the moment. One question arising from this is: Is there something that could be done to increase the role of active labour market policies or public employment services in national action plans either tackling the challenges posed by AI or exploiting its benefits?

2 The challenges for PES to take up AI seem relatively similar. The need for shared definition and holistic legal framework for AI are seen as important future matters. One question which arises is the following: What kind of cooperation could there be between different public employment services in sharing the definitions and best practices?

3 Despite the lack of a clear strategy, there are practical initiatives for using PES in AI, as explained in the next chapter. One interesting question is: Do we need national strategies for PES using AI, or is this development something that comes from the bottom up or from the cooperation between PES and the private sector?

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CHAPTER 3
# AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

In this chapter, we elaborate on how AI is used in public employment and matching services. We start with an overall picture and then provide a couple of case examples.

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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.1 Trends, interesting phenomena and new initiatives around the world during 2018-2019

There is a lot of discussion around utilisation of artificial intelligence (AI) in public employment services (PES) or public services more generally. As noted earlier, there is no clear strategic linking between PES and national strategizing around AI at the national level. However, this does not mean that there was no room for practical initiatives and examples. This chapter describes them.

Firstly, we look at how our EU PES network survey sees the situation. Secondly, we shed light on some examples of utilisation in various countries discovered in our mapping exercise. It should be noted that these examples focus on applications in public employment services. This is also illustrated by the adjacent figure. Thirdly, we present few case examples from different countries in greater detail.

Perspectives in utilising AI

Current

Planned for near future

Matching open vacancies with data on customer and providing services accordingly

Managing customer information with profiling

Understanding customer needs better

Better and more personal services (i.e. personal assistants)

More efficient matching of open vacancies and other services
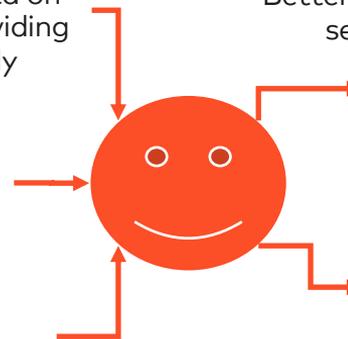
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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.1 Trends, interesting phenomena and new initiatives around the world during 2018-2019

The EU PES network survey provides insights on the level of the use of AI in PES, although the results only represent a sample of the EU states. More than half of the states utilise AI in their PES to some extent. Usually this involves matching, profiling or skills assessment. However, the difference between AI utilisation and automatization, algorithms or general digitalisation of PES (or other public services) remains in some cases unclear in the approaches of the different member states.

Is AI already utilised in the public employment services in your country?
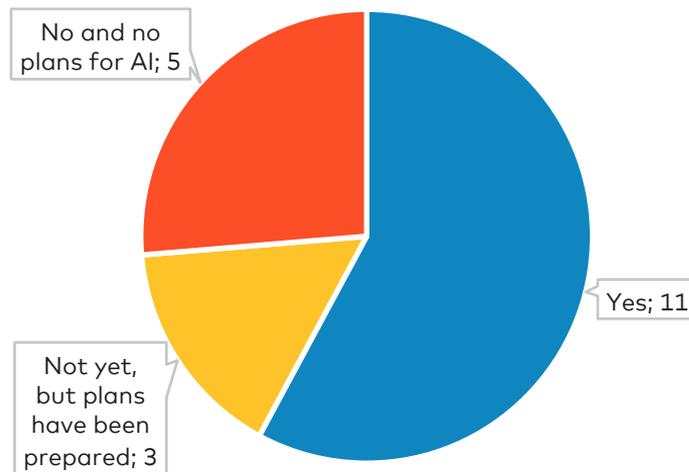
No and no plans for AI; 5

Yes; 11

Not yet, but plans have been prepared; 3

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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.1 Trends, interesting phenomena and new initiatives around the world during 2018-2019

In the field of employment services, AI has been put to use for more suitable and efficient **matching** of employers and employees.

AI-driven transformation is moving the ideology from data-driven to intelligence-driven. Even though AI is not widely used in employment services, Flanders (Belgium) has put it to use to produce more detailed **profiling** and predictions on employment/unemployment. Statistical profiling of unemployed persons is a more widespread phenomenon, but this does not necessarily contain any AI.

In **Flanders (Belgium)**, PES are using Radix.ai applied machine learning to PES data to provide better-targeted matches for its users. Deep learning, a subset of machine learning, enables machines to mimic human behaviour. The Flemish PES founded an innovation lab in 2014 that focuses on developing new apps and "big data" analytics. Using a random forest model with hundreds of variables (called features), this lab has developed a

statistical profiling model, called "Next Steps", that estimates a person's probability of becoming long-term unemployed (>6 months).

The model is built in a flexible way so that it can be updated regularly in order for it to remain accurate. The underlying data is collected and stored in a data warehouse and contains detailed information on jobseekers' socio-economic characteristics as well as some information on jobseekers' labour market history. Information collected by caseworkers during previous and current unemployment spells is also used in the model. An additional innovation is the use of "click data", which monitors jobseekers' activity on the website of PES, including clicking on job vacancies. Case Flanders will be introduced more briefly in the next chapter.

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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.1 Trends, interesting phenomena and new initiatives around the world during 2018-2019

AI has been put to use to produce better **customer insight** and better understand the needs of the customers of employment services.

In India, AI was applied to build end-to-end business solutions so as to solve problems of youth unemployment. By collecting relevant data at the individual and city levels and by using machine learning algorithms, they were able to classify cities and adolescent individuals on the basis of unemployment. The causes of youth unemployment were then analysed further and potential business solutions were offered to address the problems. Similarly in **South-East Asia**, successful predictions of regional unemployment were made by using AI and standard mobile phone network statistics.

Use of AI has also raised ethical questions. Machine learning algorithms have been considered to be biased in some cases and prefer certain types of applicants. Moreover, the usage of AI requires at least a certain level of understanding from the applicant or unemployment. Sweden is a pioneering country in tackling such ethical questions.

In **Sweden,** plans have been made to make the labour market more accessible for jobseekers and to make job matching more efficient, in part through the use of AI and data-driven technologies. Local PES and the AI Sustainable Centre have announced a three-year partnership to ensure that the AI transition is seen through in a way that considers the impacts on society together with other efficiency gains and that the risks are accounted for and mitigated early in the process.

In Malaysia, a service called Adnexio has just launched. The idea is to use AI and data analytics to match employers and employees more efficiently. AI algorithms learn to identify what different jobs require and which candidates would be most suitable for the position. By doing so, they match better the expectations of employers, whose goal is to recruit as high-quality labour as possible, as well as the expectations of jobseekers, who aim to find as high-paying jobs as possible. Having such a portal that is compatible with the work ecosystem would aid the Malaysian government in solving the problem of youth unemployment in the country, and the industry would also win as employers would not have to manually search for young talents.

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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in case countries during 2018-2019

Flanders, Belgium

The Flemish PES VDAB in Belgium introduced the first products which utilise AI in 2018. The introduction of AI in VDAB's offering is part of its "digital first" approach. (VDAB Annual report 2018, 9)

Background

The purpose of utilising AI is to facilitate and advance the VDAB's performance in its core tasks – namely matching and assessment of jobseekers. (VDAB Annual report 2018, 9)

Applications

AI has first been used in jobseeker matching and assessment. The matching tool analyses millions of CVs provided by jobseekers in order to learn which job suits which jobseeker. AI has shown, for example, that seekers of certain

types of jobs (e.g. manager) are more willing to travel than seekers of other types of jobs (e.g. cleaner). The goal is to support jobseekers in finding suitable jobs as well as employers in finding suitable candidates. (VDAB Annual report 2018, 9)

Additionally, AI is used in assessing individual jobseekers' chances of getting a job. The "digital first" approach at VDAB has been used since October 2018. This means that jobseekers are expected to primarily use online tools when registering as a jobseeker. They will be offered the necessary support by VDAB officers via telephone, e-mail or chat. The purpose of this approach is to ensure that VDAB officers have enough time to serve and assist people who have low digital skills or have lower chances of becoming employed. (VDAB Annual report 2018, 8)

Six weeks after a jobseeker's registration, a VDAB officer will call the candidate to find out how the job search is proceeding. If the client can manage the job search on his own, the officer will call again after three

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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in case countries during 2018-2019

months to check how the job search is going. If the client needs extra help, the officer will offer personalised face-to-face service. (VDAB Annual report 2018, 8) Through the use of AI, these candidates with lower chances of finding a job are being identified, and VDAB officers can prioritise these candidates and contact them to help them with their job seeking. (VDAB Annual report 2018, 9)

Collaborative partners

VDAB established an innovation lab in 2014 which focuses on developing new apps and big data analytics. In the development of AI tools, the innovation lab works together with a Belgian start-up (Radix.ai). (PES AI Survey 2019)

A closer look at the tools used

The job recommender predicts how likely a jobseeker will be interested in a

vacancy. Radix.ai and VDAB built a Deep Learning model which uses information on the jobseeker and the vacancies available. (Radix.ai)

In profiling, VDAB uses a Random Forest model which estimates a person's probability of becoming long-term unemployed (over 6 months). The data used includes detailed data on the jobseeker (socioeconomic characteristics, information available on the jobseeker's labour market history, information collected by caseworkers during previous and current unemployment spell). A novelty is the use of click data in the model, monitoring the jobseeker's activity on VDAB's website, e.g. his clicking on job announcements. This information is used as a proxy for motivation and behaviour in job search. (OECD 2019, 17)

A new addition to the AI-based tools used by VDAB is the Competence Seeker, which deduces classification of occupations from text. Also, the development of a Skill Tag Extractor is in progress. This tool extracts hard and soft skills from CVs and Job announcements and detects new skills based on natural language processing and skill clouds. (PES AI survey 2019)

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3 AI IN PUBLIC EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in case countries during 2018-2019

A third addition to the family of tools using AI which is being developed currently is a system called Job Reach. This tool will indicate which types of jobs are within reach of an individual (PES AI Survey 2019).

Experiences

A benefit of AI-based job matching is that the tool learns from previous successful matches, to become more and more accurate over time. This also means that the tool follows the market trends. Another benefit in a multilingual country is that the matching works across languages, meaning that a French CV can be matched with a Dutch-language job announcement, for instance. (PES AI survey 2019)

Jobnet, the matching tool of VDAB, received two awards in Belgium during the year of its launch, the Innovative E-government Award and the ICT/digital Project of the Year award.

The lessons learned include that data availability is the key factor when developing AI-based tools. Data preparation takes up a large share of project time. The model is heavily influenced by the quality of the data, so any bias in the data will be reflected in the outcomes of the model. Special focus should be placed on digital ethics – transparency, trust and benefit. (PES AI survey 2019)

Future plans

In the future, the goal is to deploy AI as a personal assistant to the jobseeker, employee or employer, giving them helpful tips. These could include job suggestions for jobseekers or candidate suggestions for employers. (VDAB Annual report 2018, 9) The tool could identify skills gaps and suggest relevant training in order to match the jobseeker with a job. Or the tool could estimate the probability of being selected to a certain job. Furthermore, AI could support inclusion by adapting jobs to the individual jobseeker. Another idea is to support employers in the evolution of their workforce through the application of segmentation. (PES AI survey 2019)

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3 AI IN EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in different countries during 2018-2019

France

France's PES, Pôle emploi, has been using AI for the past few years.

Background

Digitalisation of public services and the introduction of AI have been subjects in many national-level strategies and programmes in the recent years. However, there are also regional and local strategies. In this section, the national initiatives in recent years are briefly summarised.

In 2017, the Government launched a new programme called Public Action 2022. The programme has three main objectives: to improve public service quality, provide public servants with a modernised working environment and decrease public expenditure by 2022. The aim is to build a new model for carrying out public services, one that takes fully into account the digital revolution and new ways of using digital technology.

One of the principles of the programme is that 100% of public services are digitalised by 2022. The programme provides significant resources for public transformation – a fund of 700 million euros over five years has been created, managed by the Ministry of Public Action and Accounts.

In 2018, Pôle emploi received a funding of 20 million euros from this fund for its project "Intelligent emploi" which aims at customising job search to the largest extent possible. (PES AI survey 2019)

Another measure was the establishment of #FranceIA by the Secretary of State for Industry, Digital Technology and Innovation and the Secretary of State for Higher Education and Research. #FranceIA is a group focusing on the identification of all research projects, start-ups, investors and public or private structures operating within the French AI ecosystem. (PES AI survey 2019) The group published the French AI strategy in 2017. The strategy states, among other things, that France must continue and intensify its policy of transparency, information and awareness of artificial intelligence.

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3 AI IN EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in different countries during 2018-2019

According to the strategy, the public sphere carries a responsibility in awareness raising, both at state and local levels. In addition to communication campaigns, showcases, demonstrations and particularly visible projects shall play a role. (French Government 2017, 14)

In addition, the Government launched a programme called TECH.GOUV in April 2019 which aims to accelerate the digital transformation within the public services. The strategy and its accompanying roadmap are set out for 2019-2021 and they include 6 challenges, 8 missions and 35 actions.

The strategy is supported by all ministries. The use of AI is included as an action in the roadmap under the goal of digital expertise accelerating the transformation of public services and the sub-category of designing public services otherwise. The roadmap states that the French State will develop its expertise in advanced technologies like artificial intelligence, process automation, Internet of things and 5G. One of the means is the investigation of the use of new technologies. (French Government 2019, 30-31)

How artificial intelligence is used at the moment

Pôle emploi uses artificial intelligence in its second-most popular service, which aims at identifying companies with a high potential for recruitment before they publish job announcements. The aim of the service is to provide access to the hidden job market and to decrease the time that jobseekers spend writing "useless" job applications to companies that are not hiring. The service is called "La Bonne Boîte" and the reliability of its algorithms is 70-80%. (PES survey 2019) The service has been in use since 2018, and it uses machine learning to determine the hiring potential of a company.

The tool uses a database which is updated each month and which contains pre-employment declarations, a formality that companies must fulfil when they recruit. The algorithm sorts companies based on positions and location and estimates their potential employment during the next 6-month period. The idea for the service originated from an internal idea competition within Pôle emploi.

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3 AI IN EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in different countries during 2018-2019

Future plans on usage of AI in Pôle emploi

In addition, there are many development projects at the moment which include utilising AI. Firstly, the Intelligence emploi service is described in detail, and further development projects are introduced more briefly thereafter.

As mentioned above, Pôle emploi received 20 million euros of funding from the national programme "Public Action 2022" to develop a service called Intelligence emploi (total project budget is 50 million euros). The goal of the service is to use AI in customizing job search as much as possible. The idea is that the service provides assistance for assessing the recruitment potential of jobseekers and offers them tailored guidance on matters such as the type of experience and expertise that previous successful candidates have had in applying for certain jobs, additional training considerations, occupational change considerations or job search possibilities outside the home region. (PES AI survey 2019)

Secondly, the tool is meant to support employers in their recruitment process by offering insights on their needs and necessary means for successful recruitment. It should provide information on subjects such as the time frame for finding a suitable candidate, key factors that could accelerate the recruitment process (type of contract, required skills, offered wage level), suggesting suitable candidates based on a prediction concerning the time when the company is likely to hire new staff.

Thirdly, the tool would also be beneficial for employees working at Pôle emploi by saving them working time previously spent reading or answering e-mails. The idea is that the tool would help employees identify the most urgent e-mails, automatically forwarding e-mails to the right recipient or suggesting answers to simple questions concerning matters such as scheduling an appointment. (PES AI survey 2019)

The tool will utilise user data from Pôle emploi's website (e.g. on searches concerning job opportunities – 200,000 searches are performed there every

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hour).

In addition, there are several other services and tools in the "proof of concept" or "development project" phases (PES AI survey 2019):

Attractiv' Job – this is an application based on a partnership between Pôle emploi and a region. The region uses data collected by Pôle emploi and other institutions with the aim of helping users find the ideal job. The tool takes into account a variety of parameters like location of home, distance to workplace, infrastructures or activities close to workplace, outdoor air quality etc. The idea is also that the tool could make an employer appear more attractive to jobseekers by helping them find a complete set-up that meets their expectations.

Smart'emploi – the app is targeted to internal and external actors

like recruiters and jobseekers and is meant to provide information which supports the actors in their decision-making process. The app would be used in the local job market.

Vadore – a research project on the use of AI to reduce frictional unemployment with the help of data (through recommendations based on past experience, interactive map for job seeking etc.).

Widg'e – a tool that would give recommendations on courses and training to support and advice labour market actors (companies, recruitment advisors, local authorities).

Text2Job – an app which would create categories based on a given text according to the French classification of occupations. The tool would suggest the five most adequate occupations based on a given text along with explanations.

La Bonne Info – a chatbot which will be implemented on Pôle emploi's

website to assist jobseekers in the registration phase. The chatbot will provide information, suggest complementary digital services and generate a confirmation of information delivered (development project phase).

International mobility diagnosis – this is a development project which aims at reinforcing and securing the pathway for those jobseekers willing to search for a job abroad through integrating mobility in the "diagnosis" of the jobseeker (development project phase).

Back in employment scoring – this tool would estimate the likeliness for an individual jobseeker to find a job within the next 6-month period using a deep learning algorithm (proof of concept phase).

Occupation galaxy – a tool suggesting occupations which match jobseekers' experience and know-how in order to encourage them to extend their professional horizons based on matching algorithms (proof of concept phase).

Winning pathways – a tool providing recommendations on the best options related to career transitions, based on success encountered by the entire pool of jobseekers (proof of concept phase).

Avatar – exploring the clustering of jobseekers to enhance the quality of suggested services (proof of concept phase).

DAC analysis and suggestions – this is a tool aimed at the advisors of Pôle emploi. It will suggest services and steps needed to enrich the notification system. It will grasp and analyse steps already undertaken and provide calls for action (development project phase).

Maintenant – it would enable matching between a recruiter and a candidate without publication of a vacancy or CV. Both parties would connect to a specific website (maintenant.pole-emploi.fr) to submit a form. This form would contain information such as the time by which the position should be filled, availability of the candidate, e-mail addresses etc.

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3 AI IN EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in different countries during 2018-2019

The tool would match employers and jobseekers and notify both when a match is made (proof of concept phase).

Forma'diag – this is a tool to help the regions identify which skills are needed in their area. Each region would obtain recommendations on trainings they should invest in. The tool would provide the regions with information such as the following: key figures related to training, the main aspects to consider by region, the rate of return to employment after a given training, trainings to invest in and skills to develop in the area (proof of concept phase).

La Bonne Formation – a tool targeted to jobseekers helping them to find the right training according to location and occupation, based on analytics (proof of concept phase).

Predicting jobseekers' need for training – a tool which would predict an individual's need for training and support the decision-making process related to selecting trainings to invest in for the next 6-month period (proof of concept phase).

Suggesting training – this project involves integrating a widget based on the service "Find a training" which is available on Pôle emploi's website. The widget will suggest training courses which will increase the jobseeker's chances of returning to employment according to information on previous jobseekers who are in the same occupation and who have found a job after completing training (development project).

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3 AI IN EMPLOYMENT AND MATCHING SERVICES

3.2 Examples of measures in different countries during 2018-2019

Collaborative partners

Pôle emploi collaborates with multiple partners in matters related to AI (PES AI survey 2019).

- The start-up Whire uses Pôle emploi's Application Programming Interface (API) to reveal the hidden market of candidate skills. Through identifying hidden skills and attitudes, the AI-based tool selects the most relevant candidates for employers. The goal is to ensure fair recruitment processes and smooth internal mobility procedures.

- Pôle emploi has set up a partnership with the Sorbonne University's LIP6 IT laboratory around a research project called NumJobs. The aim of the project is to develop an AI-based tool that models and simulates the impact of digital innovations (digital technology, digitisation, automation and AI) on the labour market.

- Pôle emploi is the founding partner of HUB France IA, which is part of the governmental programme #FranceIA. The objective of Hub France is to create a French artificial intelligence network by interacting with bodies such as SMEs, start-ups, NGOs, schools and universities, research institutes, associations and competitive clusters.

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KEY **QUESTIONS FOR DISCUSSION**

The above findings lead us to ask some questions concerning the future

1 It seems that the customer is the cornerstone in the utilisation of AI. Two questions arise from this: Should it be researched how the customers themselves have experienced the new initiatives, and would this lead to provision of better services to them?

2 Some trials have taken place in using AI for customer profiling. Additionally, some articles in our searches point out applications in employability services (i.e. in the case of vocational rehabilitation or increasing competencies). Some key questions are: Is there potential for AI in profiling and providing a better guidance for customers among different (public) services, and what would be its next steps, for example, in making recommendations for continuous training or education or other services outside PES?

3 If most of the current applications are based on bottom-up initiatives among PES, but with a lot of different types of connections and cooperation among research organisations or other agencies, two questions that arise are: What kind of leadership does the utilisation of AI require among these various organisations? How can we ensure the plethora of competencies required to better utilise AI in PES?

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CHAPTER 4

AI IN PRIVATE EMPLOYMENT SERVICES AND HR

In this chapter, we take a closer look on what is happening with the adaption of AI outside the public employment services. Two domains can be distinguished: AI used to help the HR work, and AI as part of private employment services, namely the staffing industry and different platform solutions.

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4 AI IN PRIVATE EMPLOYMENT SERVICES AND HR

4.1 Trends, interesting phenomena and new initiatives during 2018-2019

Short look to the private sector development might give us some thoughts how AI is utilised overall. The key goal in incorporating AI algorithms to companies' HR processes is to automate tasks and produce insights and recommendations concerning the workforce. Recruitment processes have seen a vast change since AI entered the field of HR. In the private sector, AI is utilised the most in **job matching.**

Businesses offer machine learning algorithms to other businesses to mitigate the recruitment process. LinkedIn is a model example in using AI in job matching. They use the information about the users' preferences and skills and teach machines to show these users job ads that are likely to be highly relevant for the users' respective individual situations. Forbes predicted that 2019 will be the year when talent acquisition moves from data-driven to intelligence-driven. Here are some other examples of AI applications in job matching:

- TalentAdore
- IDEAL
- Avrio
- Entelo

Companies and businesses are training machine learning algorithms to help employers **automate repetitive tasks in the recruitment process**, to help identify the top candidates from large candidate pools, to pre-screen candidates and to respond to inquiries regarding positions using natural language processing. For example, according to a Korn Ferry survey in 2018, around 1/2 of the surveyed talent acquisition professionals utilised AI in recruitment.

IBM is another interesting example in the field where AI and HR meet. The company says it has developed AI-driven algorithms that can with 95% accuracy predict when an employee is about to leave. IBM says that so far they have saved already $300 million in retention costs. IBM is a company that has roughly 350 000 employees.

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4.1 Trends, interesting phenomena and new initiatives during 2018-2019

Training and skills development is an area where solutions are being developed to keep pace with the rapid changes in skills requirements placed on today's workforce. AI systems can process unstructured information similar to humans. These systems understand language patterns and sensory inputs, including text, pictures and auditory cues. Because of these capabilities, AI-based software can deliver individualized content adjusted to employee-specific needs and preferences, encouraging an employee's continuous development. With the power of AI in the workplace, employees can receive more personalized recommendations to facilitate evergreen, curated learning paths and anticipatory career management. The result is that AI solutions enable perpetual training and development, so that employees can maximize their performance on the job and throughout their career.

AI-powered chatbots have proven helpful in many fields. In HR, chatbots can help with candidate screening and answer basic inquires regarding the open position. Overall, chatbots can be automated to perform mundane repetitive tasks of HR personnel. These can be seen spreading also in the employment services (which can be from either public or private providers).

AI-based person assessment is another new phenomenon. HireVue's "AI-driven assessments" is one example where AI is carrying out tasks for the recruiter and making decisions based on the analysis of facial data, used by large companies in their recruiting.

Alternatively, AI is also used in matching start-ups with potential investors and companies. This is relevant only for those countries linking employment services with enterprise services (such as Finland).

Many news articles and internet sources reviewed in this mapping point out that healthcare with its diagnostics applications is driving the development of AI applications which target services for people. From this perspective, there could be potential for using the same in employment services, but the actual applications are still scarce.

One observation from this could be, that public employment services could benefit in researching and discussing with private sector actors in this field to find out possible relevant applications for utilising AI.

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4.2 Platforms, employment services and staffing industry

This section will shortly map out the relationships between the discussion of platform economy (and job-matching platforms) and employment services. The data is based on our own internet mapping, an analysis performed by the Staffing Industry Analysis and the responses received from our survey on the PES network in the EU regarding the use of AI.

There is a lot of ongoing development in this sector in terms of start-ups and investment interest, but the role of employment services (or the staffing industry) is still relatively small in the context. Some of the platform companies are cooperating with PES (for example, in France, Belgium, Finland and Estonia). However, many of them are not. Most of this is about matching and staffing. In some countries these activities are still in their start-up phase, whereas in others they are already more established.

There exists plausible lists of relevant software in the literature, some including AI to assist recruitment: https://ideal.com/top-recruiting-software/

- Other articles map out new launches of technologies using AI in recruiting: https://www.techrepublic.com/article/careerbuilder-launches-new-ai-based-hiring-platform/
- Others sketch out the current facets of the uses of AI: https://harver.com/blog/uses-ai-in-recruitment/

Staffing Industry Analysis 2019 has estimated that in the 2018 global contingent economy (gig economy) business, the human cloud is relatively small (118 billion dollars out of the total 4.5 trillion). The share of B2B business is estimated at just 8 billion dollars, from which Upwork is estimated to account for 23%. In B2C, Uber is estimated to represent around 39% (SIA 2019). However, it remains unclear how AI is used within the sector.

Nevertheless, there is general interest in the staffing industry to develop the overall workforce solutions ecosystem, and since 2014 it has been surveyed that around 36% of the acquisitions by staffing firms are targeted at talent acquisition technology (SIA 2019). There are quite extensive lists available describing the acquisition activities.

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4.2 Platforms, employment services and staffing industry

Some of the examples might be companies providing technologies enabling online staffing, as in the box below:

At the same time, larger conventional companies are moving towards the staffing industry, and they also are more readily adapting AI. The box below features some examples.

Workn (http://workn.com/)
Tempbuddy (https://app.tempbuddy.com/)
Shiftgig (https://www.shiftgig.com/)
(allwork) (https://www.allworknow.com/)

Google: Google for Jobs
IBM: HR Consulting, Training and testing and provision of SOW Consultants
Xerox: HR services
Bain & Company: MSX International
ADP: WorkMarket
IKEA: TaskRabbit
Microsoft: Utilising LinkedIn's job searching methods and the AI behind it

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KEY QUESTIONS FOR DISCUSSION

The above findings lead us to ask some questions concerning the future

1 The private sector, as employers recruiting jobseekers and as part of the staffing industry (or private employment service providers), seems to drive the development of AI utilisation in the employment sector. However, PES do not seem to cooperate with private sector companies to a large extent. One key question for the future is: How can this cooperation be enhanced so that public services increasingly become part of this ecosystem?

2 There are some interesting initiatives in new AI-based technologies where AI carries out some pre-activities before the actual decisions. There is still a lot of potential in other sectors (i.e. diagnostics, healthcare) which have not been thoroughly analysed by PES. The main focus so far has been on more efficient matching and targeting of the services. One question we could ask from PES is: How PES or PRES as sectors can learn from other sectors' utilisation of technologies?

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CHAPTER 5
SUMMARY AND KEY OBSERVATIONS

This chapter summarises the key findings of the mapping.

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KEY OBSERVATIONS

Key points from the mapping

1 **Interest in the use of artificial intelligence (AI) in public employment services (PES) is emerging but is still in its own "start-up phase".** There seems to be a lot of discussion and interest in AI utilisation. Most countries have strategies for facing this wide set of technological developments, but they rarely have any objectives or measures for employment services. Threats to employment dominate the discussion in connection to employment in national AI strategies.

2 **Public employment services do not yet have a strategic perspective on how to utilise AI, barring few exceptions.** Very few countries have a truly strategic orientation (an articulated strategy and a related development investment) for utilising AI in PES. Examples from France or Belgium (Flanders) are pointed out in most of the mapping articles available, and they are described in this report as well. Technological limitations and a need for clearer definitions or national policy responses seem to hinder the development.

3 **The most visible examples for using AI in PES still relate to job matching and some examples of profiling.** Visible examples include the Flemish PES in Belgium using application for matching (as well as profiling) and examples helping to profile the hiring potential of a company (such as the one taken from France). There is still room for utilisation of AI and learnings from the private sector in public employment services.

4 **Private employment service and AI applications to facilitate recruitment for the recruiters seem to drive the activity of utilising AI in the employment sector.** Most of the recent developments in utilising AI in the private employment service sector relate to job matching algorithms and related platform companies, AI assisted assessment or automatization of the recruitment processes themselves. This sector has a lot of activity generated by new start-ups and also has a lot of acquisition activities. Based on the responses, PES do not seem to cooperate much with private employment services in terms of utilising their expertise in AI.

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