The Evolving Role of IT in Labor Market Management

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The imbalance between supply and demand in the labor market is a worldwide issue. But there are big differences between the strategies governments and Public Employment Services use to manage this imbalance. Some countries have only just begun to organize labor supply and demand, while others have sizeable organizations and advanced IT systems to support them in this challenge.

In this chapter, we will address the following aspects of this issue:

- Differences in Strategic Intent
- Trends concerning PES
- Technological Advancements in Search
- Requirements of a PES IT Solution to Support Any Strategy
- Implementation Models

Differences in Strategic Intent

Governments have various strategic purposes for organizing the supply and demand of labor. These are related to the economic, cultural, and political situation and the current state of the labor market in the region. Each combination has its own challenges and its own specific requirements. First, we will identify several strategic

goals in labor market management. Second, we'll discuss the level of sophistication needed to support each level of strategic intent.

A universal strategic goal is to decrease the amount of money spent on unemployment benefits. Short-term success can be achieved by matching people with the first job available. But this may lead to repeated unemployment – the first job within reach is not necessarily the most sustainable. Finding a jobseeker sustainable employment should not be based simply on the last job they held. That job might not be available or, as happens more and more often, it may be phasing out of the market ('sunsetting jobs'). Instead, caseworkers could advise jobseekers to look for interesting alternatives based on their skills, flexibility, ambitions, other interests, and even character traits. The advice might include getting training or coaching to widen the scope of alternative jobs. This approach not only leads to a more sustainable job, thus reducing the risk of repeated unemployment, but it also increases the value of the total labor force.

Another key purpose of strategy is managing the labor force: anticipating labor force developments and fluctuations in the demand for certain jobs. It is important to note that these insights can be gained at different levels of aggregation – not just at country level, but also at the regional and local levels. Consider, also, that labor market issues don't stop at the border. For example, management of foreign workers and labor migration should be part of the overall strategy. Of course, all this information must be readily available, not after years of analysis. Governments rely on relevant and timely insights to decide which long-term policies to implement. To increase the effect of these overall policies, a PES can tailor specific programs to small target groups in selected regions. These programs often include training, but also other kinds of support.

Perhaps the most interesting strategic goal is maximizing the potential of the total labor force. Everybody who works, or who could work, can be challenged to achieve their full potential during their working life. This is achieved by pro-active workforce development based on the country's culture and political situation. Various actions and agents are needed for successful workforce development. PES could facilitate assessment of individuals. People could get advice on adapting their personal development to prepare for changes in the market demand for their current skillset.

Governments could even allocate funds to ensuring that every individual's skills are constantly upgraded and adjusted to the demand in the market and most importantly on track with the individual's personal objectives/ambitions. Such measures keep the employed alert to changes and opportunities in the market and allow more people to maximize their potential, which benefits both them and the organizations they work for. Workforce development allows governments to plan for new industries to develop, anticipate on new occupations and emerging essential skills, and ensure the timely availability of trained workers. This decreases spending, because the system anticipates market imbalances rather than coming into action when it is already too late. (EmploymentAbility, a concept introduced in a recent whitepaper by Chris Brailey and Chris Gibbon, available through WCC's marketing department, covers this paradigm change in more depth).

Clearly these strategic goals, from finding a person a job quickly to maximizing the potential of the workforce, require very different strategies, processes, performance indicators, and even people.

Trends concerning PES

We observe and briefly address three important trends in PES.

The first is the ever-increasing pressure on budgets. More work has to be done by fewer people. That means working more efficiently. But another way to reduce work is being more *effective*. Technology boosts efficiency, but only more advanced software solutions can increase effectiveness. For example, by finding jobseekers sustainable jobs and lowering their chances of job loss and re-entry into the PES system. Better matching also gets people to work who were unable to find a job before. Effectivity is also gained by using systems that can dynamically manage execution of programs and influence the process as well as the results. Budget pressure is at the root of the current move from custom-made to COTS software. This move reduces initial costs and decreases the total cost of ownership.

The second trend is the constantly increasing expectations of users. They want smarter systems that communicate in a human way and offer services when they

want, where they want, and on the device they want – preferably adapted to their personal situation. To make this possible, PES look for IT solutions that accommodate variation between different groups and occupations. They also look for systems that grow smarter by capturing language, world knowledge, occupation knowledge, and local knowledge in taxonomies and ontologies.

The third trend is big data – the ever-growing volumes of structured and unstructured data available. This in turn sparked a demand for high-quality information: big data is of no use without a way to filter only the relevant data from all possible sources. Because the relevancy of data is determined by context, reliable knowledge bases have become crucial.

Technological Advancements in Search

The technology for finding a person a job quickly has been available for years. Type in a keyword and some kind of answer will appear. But what is this answer based on? Even more important, is it relevant? Is it useful? Does it consider the labor market and specific labor market programs? Does it use knowledge about target groups, occupations, jobs, candidates, location, and so on?

Keyword search is a simple way of searching that can work when people know what they are looking for and what the options are. But these are not the people who come to a PES for support. The people who do usually have far more complex circumstances. They need the high-level support of a smart, experienced, and well-informed case worker. To provide that support efficiently and effectively, caseworkers need more advanced search technologies, such as contextual and cognitive search. The Forrester Research model for enterprise search outlines the evolution in search technology across four maturity levels:

1. Keyword search
2. Semantic search
    a. Structured and unstructured data sources
    b. Use language structures to look for e.g., similarities
3. Contextual search
    a. Use contextual information to make world, market, and domain knowledge relevant

4. Cognitive search
    a. Deliver insights using natural and human-like interfaces
    b. Leverage human insight and advanced analysis to continually improve

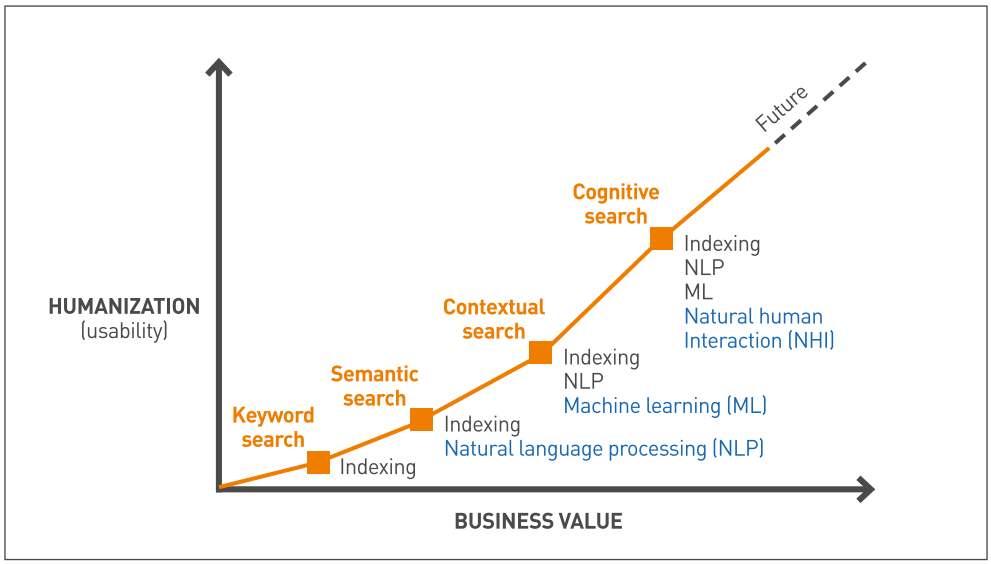

Figure 6: Keyword search evolves to cognitive search *(Source: Curran R and Gualtieri M (2016).)*

The business value of search grows with each maturity level, as does the usability or "humanization". The same maturity levels apply to matching in PES. For example, natural language processing is used to make sense of unstructured data in resumes and vacancy descriptions. Jobseekers, employers, and recruiters invent new job titles and skill descriptions every day. This raises the question which words and terms are relevant for matching a person with a job. Machine learning is a way to gain insights into what results are, and how PES can improve these with the right adjustments. For example, to improve an ALMP, we can analyze information about its input and effectiveness. Contextual information for a PES user is obviously information about the labor market. In a contextual match solution, this information comes in the form of taxonomies on occupations, skills, educations, certifications, and so on.

Cognitive search includes all the above and adds ways to interact and communicate with the system. This involves framing ideas in such a way that the system can understand the user and vice versa. For example, when jobseekers enter their data, the system should make helpful suggestions based on its existing knowledge. After the jobseeker enters their profession, the system could pre-load the most relevant skills and pre-tick certain checkboxes. The suggestions on the screen would be specific to each individual's situation, e.g., recent graduate, long-term unemployed, or recently unemployed. This functionality – we call it **Input Completion** – is based on knowledge organized in a contextual knowledge base.

We observe that technology is evolving towards cognitive systems. And that organizations responsible for labor force management have different strategies in line with the demands of their country or state. Systems that can support these different strategies and use contextual / cognitive search should be flexible, advanced, and easy to use. Are there suppliers that can deliver cognitive search systems for PES? There is still a way to go, but at WCC we believe we can meet most requirements of such a cognitive system. Our next challenge is to make communication with the system even more humanistic.

Requirements of a PES IT Solution to Support any Strategy

For a system to support any labor market management strategy efficiently and effectively, four main elements are required:

- Knowledge management
- Effective management of ALMPs
- Relevant value-added services
- Easy maintenance and configuration

Knowledge management; high-quality data and knowledge of the labor market

Everybody knows the expression "Garbage in, garbage out". Bad data leads to bad results. To get useful results, you need two things: relevant data and a means to interpret that data. In other words, getting relevant data in the system is the first order of business. In a PES job matching system, data is collected from jobseekers, employers, providers of support measures and other sources. Sometimes one by one, but often,

especially with vacancy information, in big batches. The data is usually collected in the form of resumes, vacancies, and so on. But it cannot be used in these formats: resumes and job descriptions contain much more information than required. Most of it is not relevant for matching. Identifying the relevant data and collecting missing information is crucial to the quality of the match result. In a one by one situation jobseekers and caseworkers should be able to manually input data such as job descriptions, skills, competences, and diplomas. From experience, we know that this is more difficult than expected. Most jobseekers are not used to classifying their skills, and have trouble finding a job description that meets their requirements. Often, this lowers the quality of the data they supply. If they are supported in finding fitting job descriptions and the skills usually associated with these jobs, this improves the quality of their data, and thus their chances of finding sustainable work. For this purpose, we have available the **Input Completion Service**.

Making sense of resumes and vacancies and supporting manual input may be easy for someone with extensive labor market knowledge and experience. But for an IT system to do the same requires for all that knowledge and experience to be captured in the system somehow. The first step in making sense of unstructured data in resumes and vacancy descriptions is extracting all relevant data with the help of natural language processing. The next step is putting the relevant data in the right context. For this, the system needs excellent knowledge about the labor market organized in taxonomies and ontologies. This includes knowledge about job titles and their synonyms, related skills or competences, diplomas, and training. *The main knowledge system should be the PES's single source of truth when it comes to labor market knowledge.* All this knowledge must be managed, shared, updated, adjusted, and most importantly, made available to all kinds of applications. Preferably, it should interface either directly or through mapping with systems in other states or countries. This facilitates the exchange of matching data and enables jobseekers in one state or country to apply for jobs in another.

The success of context-based search and cognitive search hinges on managing knowledge to a high degree. Much labor market knowledge is available in the form of taxonomies, such as ESCO, ISCO, ASOC, and ROME3. However, it is essential that a PES has the means to manage and continuously enrich such taxonomies with

information related to the local labor market[4]. The knowledge base can help make sense of data in all applications and services, whether qualifying input, searching, matching, analyzing a gap, referring, or reporting. Currently, most countries use taxonomy information only as a basis for reporting. But labor market knowledge is increasingly needed in other applications and services, and should therefore be accessible to others in the organization. In such cases, it is crucial that opening the knowledge base to new users does not compromise its role as *single source of truth* for all applications in (and outside) the organization. WCC's **Taxonomy Manager** was designed with these principles in mind.

Effective management of ALMPs

Government and politics influence the strategy of most Public Employment Services. That is why they must be able to respond quickly to the demands of policymakers. Youth unemployment and unemployment in people over 55 are just a few of the issues that demand action. PES develop plans to address these issues and formulate them as Active Labor Market Policies. In an ideal system, ALMPs can easily be configured. To achieve this, the WCC Employment Platform uses **target groups, perspectives, and scenarios**. It helps select the right people for any specific ALMP and follows a path of considerations and actions for making the ALMP effective and successful. For example, an unemployed 28-year-old with a university degree needs another approach than a partially disabled 57-year-old. The WCC Employment Platform makes it very easy to configure value-added services for these specific programs. The services enabling these ALMPs can be managed without needing to involve the IT department.

Relevant value-added services to jobseekers, employers, caseworkers, and partners

A good system should make useful services available to all the stakeholders: jobseekers, employers, caseworkers, and management. Services may include **Search** for those who can easily find another job, **Match** when it is more difficult to find another job, **Gap Analysis** to get insight into which skills or certifications are missing to find a sustainable job, and **Referral** to give personal development advice to jobseekers to increase their chances of finding sustainable jobs in the future. All these services are

4 Also see www.pesep.org for the PEPTalk webinar on managing taxonomies by UWV, the Dutch PES, and the PEPTalk on the ins and outs of ESCO.

based on the central knowledge base of the system. Employers have their own need for services – **Search** and **Match** seem the most likely. PES managers need services too: to get **Insights, Intelligence,** and **Reports** about the efficiency and effectiveness of their processes and policies. Caseworkers can use services to support their daily work. This is especially important when high budget pressure forces PES to get all the work done with fewer people. One customer reported that since they started using our system they could handle the same amount of cases with 30% fewer caseworkers – a highly welcomed outcome.

As mentioned before, making communication between IT systems and humans more natural is still a work in progress. But the current technology and the central knowledge base already enable us to help people formulate questions and find answers in a humanistic way. The system can then use its knowledge to understand what the user wants and prefers.

Easy maintenance and dynamic configuration

A good system should be flexible, easy to maintain, and easy to dynamically improve. Custom-made software is expensive to build and maintain, taking it out of the reach of smaller countries and states. In many cases, custom-made software is inflexible: knowledge is often statically coded into the system and very difficult to change. This slows down the adoption of new insights and demands from policymakers and the changing labor market. One of our customers said that it could take up to 6 months to get something changed in their system. That made the system very slow to respond to changes in the market. It also made it hard to study the effect of changes in the system.

A good system should be modular. Trying to implement everything at the same time is usually impossible and probably not advisable either. When new needs arise, it should be possible to add modules or configure these needs into the system, rather than having to develop additional software. Configuring value-added services for ALMPs should be easy, just as managing taxonomies and ontologies. People managing the system should be able to try out possible improvements without disrupting the operational systems. The WCC Employment Platform facilitates this. It allows you to

"experiment" using real data without influencing the operational system. When the test is successful, the new configuration can be published using the **Publication Manager**, which updates the operational system. What makes WCC's software special is that all these management functions can be done by labor market specialists in the PES. They can manage and improve independently from IT department update processes or external consultants.

Modular, easy to configure, ready-made software lowers the total cost of ownership and improves flexibility and results. Finally, the system should include tools to analyze its own performance, the effect of certain processes, and so on.

Implementation Models

Not every country can afford large systems and a big staff to run them. We define three segments with different characteristics and needs:

- Big countries such as Germany and France in Europe
- Medium-sized countries and larger states
- Small countries, states, and regions[5]

Big countries already use custom-made software and staff to manage their systems. They generally handle taxonomy management, ALMP implementation, and systems improvements in-house. They can get additional functionality either by adding more custom-made software or by buying ready-made software modules

Medium-sized counties may prefer an out-of-the-box (COTS) solution. Taxonomies and other knowledge based on general standards and best practices may already be pre-configured. Final configuration can be managed by the staff to fine tune their own labor market model. Configuring and managing ALMPs and regular support is likely also done by own staff.

Small countries and regions may be looking for a complete solution including services like taxonomy management and data management support, preferably in the form of

5 In some countries, Public Employment Services are organized on the regional level.

SaaS with support services. For example, Malta has chosen to outsource the matching process, and is the first to use Matching as a Service (MaaS).

The question remains: can advanced software truly improve the efficiency and effectiveness of getting people jobs? Ehlert (2015) investigated 'the causal effect of the implementation of a new placement software, VerBIS, in German employment agencies'. He found a significant positive effect not just on the employment rate, but also on the quality of placements. The software increased the likelihood that candidates stayed in a job longer than a year and decreased the likelihood of their losing the job within a year. In other words, more people found more sustainable jobs. Ehlert concludes that "although the implementation of the new software [was] costly, the benefits in terms of reduced unemployment greatly outweighed these costs. In general, investment into the technology of the placement process in public employment agencies seems to pay off in terms of more regular employment and in terms of more sustainable placements that exhibit longer tenures". WCC is proud to be part of VerBIS as the provider of its core search and match technology.

WCC is the world's leading supplier of software, consulting, and implementation services for Public Employment Services and Staffing companies. Its Employment Platform sets the standard for a knowledge-driven system that enables PES core services. It is easy to configure, manage, and maintain. Its modular architecture allows for a phased implementation and integration approach. Founded in 1996, WCC is headquartered in the Netherlands.

The new world of work is characterized by globalized employment, a mobile yet vulnerable workforce, and the challenges of demography and rising income inequality. Technological changes in both the demand for and supply of skills have a cross-cutting influence on how labor markets develop. In this book, different stakeholders from international organizations in the private and public sector discuss which role Public Employment Services and Workforce Development Agencies ought to play in the labor market today and in the future, why cooperation is crucial, and what kind of support digital services and software can provide for a more effective and efficient delivery.

Managing Workforce Potential – A 20/20 Vision on the Future of Employment Services seeks to inspire decision-makers in and around the labor market to reflect on governance, services, and partnerships to better cater to the new world of work.

Why this book?

As a world leader in Public Employment software solutions, WCC believes in sharing knowledge. It is our vision that combining what we know and sharing this with the world leads to maximum value across the board. This is why we take initiatives to both exchange and expand expertise. For example, we started the PEPTalk webinar series, which provides a platform for Public Employment Services to share their knowledge about best practices and their vision on the labor market. This book is another example; with its publication, we aim to contribute to an all-round clearer vision on the developments in public employment.

*The term **20/20 vision** is used to express normal sharpness of vision. It means you can see clearly at 20 feet what should normally be seen at that distance.*

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