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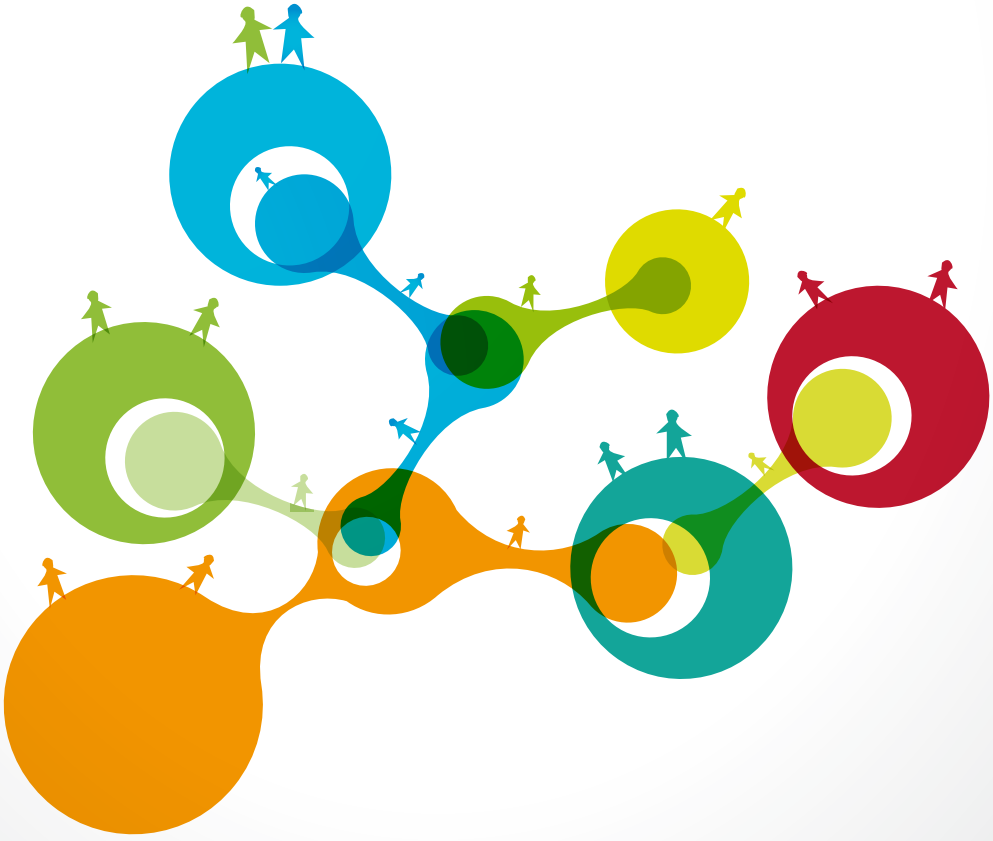
ANALYTICAL PAPER

MODERNISING PES THROUGH SUPPORTIVE DATA AND IT STRATEGIES



Employment, Social Affairs and Inclusion

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ICF

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CONTENTS

1. INTRODUCTION

The world of Public Employment Service (PES) organisations is changing rapidly. Not only are societal changes impacting how, where and when people work, technological developments are creating new channels to deliver services and improve processes, and new possibilities to collect and analyse data have the potential to change how PES measure their performance and better serve their clients. PES are trying to figure out how the different (external) developments are impacting their organisations. VDAB, the Belgian – Flemish PES, for example, is 'in the midst of a transformation that will radically alter its business model, with IT as a key enabler. Environmental turbulence, high government expectations, budget cuts and the involvement of a wide range of stakeholders exercise pressure on the transformation' (Danneels & Viaene, 2015).

Although, there are many different developments and, given how intertwined they are, they are not always easily separable. However, we can roughly discriminate between the following developments:

1. The first is the changing views on how PES (and governments in a broader sense) need to be run. Public sector agencies need to work more cost-efficiently and effectively. Despite the fact that most economies are in a state of recovery, PES budgets are not growing in most EU Member States and unemployment levels remain high. As a consequence, governments are rethinking their broader organisational structures and accompanying management philosophies.

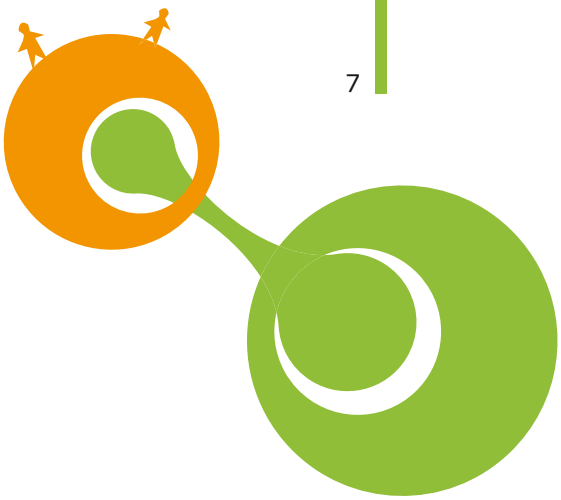
2. The second, is a broader set of societal changes that will impact PES in years to come. These include things like the increased mobility of jobseekers and how technology (e.g. Robotics) will impact the labour markets in which PES operate.

3. The third and partially driven by the first two, is the ongoing IT evolution. Digitalisation is increasing in most areas of general life and PES are following suit. Digitalisation is generally accepted to be a lower cost service delivery option for many clients, and one which improves processes. However, the goal of digitalisation and the implementation of IT systems is not just to work more efficiently. A modern PES should require up-to-date online services that support a well-functioning labour market, creates transparency and supports decision making.

4. The fourth is that this digitalisation should allow large amounts of data to be extracted that can be used to a) experiment with new or improved processes and b) improve the functioning of systems. The benefit of this Big Data is that it is (at least in theory) readily available, can be continuously extracted and is cheap to acquire and analyse. This data revolution places a bigger emphasis on the use of data to support decision making and allow PES to do more with less. Throughout the world, more and more governments are taking data more seriously. Although not yet especially common (especially in Europe), governments are creating dedicated groups led by chief data scientists or officers as a reflection of the 'growing acknowledgement that government must make data-driven decisions in order to be effective'[1].

Exactly how these developments will impact PES remains to be seen. One key reason is that there are many challenges. The PES playing field is, for example, complicated. With the heterogeneity of both workers and working conditions (wage, working time, location, and so on), labour markets are characterised by limited and incomplete information (Larsen & Vesan, 2012, p.468), making it very difficult by itself to build data driven tools that can improve decision making. As a result and as of now, it appears that the use of (big) data in PES is low. Where it is being used, it is a) for single applications (such as VDAB's job matching system) or b) for research purposes, such as large scale experiments in the Netherlands. There does

1 http://www.govtech.com/Introducing-the-Chief-Data-Scientist.html



not seem to be a single PES with a unified data strategy and execution in place. The furthest advanced seem the use of big data for Labour Market Information (LMI) (e.g. Prediction of unemployment) (Larsen & Rand, 2015) and the use of profiling or matching within PES.

Nevertheless, Di Maio (2012) argues that 'the nexus of forces', defined as 'the combined and synergistic impacts of social, mobile, big data and cloud technologies', will bring disruption and opportunities to government organisations. In the United States, McKinsey argues that 'by 2020, the wider adoption of big-data analytics could increase annual GDP in retailing and manufacturing by up to USD325 billion and save as much as USD285 billion in the cost of health care and government services.'[2] There is very little reason to believe such large savings could not be obtained in Europe.

In this analytical paper, we explore the possibilities and challenges regarding the use of (big) data in PES. The goal of the paper is fourfold, the first is to analyse the (historical) developments that have brought PES to where they are now. The second is to analyse the current status quo. How are PES using data, how are they modernising and how are they sharing and integrating data within and between organisations? The third is to start looking forward. What are the current trends and developments and what are PES planning for the future? Lastly, we look at barriers and perceived risks.

Source-material for this analytical paper stems from three sources. The first is publicly available material from the internet from PES and about modernising governments. The second is academic publications from journals and governments on the themes addressed in this paper. The last is the experiences and idea from PES as gathered during the 'modernising PES' workshop held in Zagreb, 6 and 7 July, 2016.

2 http://www.mckinsey.com/global-themes/americas/us-game-changers

2. BACKGROUND; WHY MODERNISING?

In this chapter, we discuss the reasons for modernising PES, as well as the goals PES want to achieve through modernisation and the use of data. Based on several publications in the field[3] we can define several areas where (big) data analytics are believed to aid a PES:

- **Improving the effectiveness of the PES**
  The PES have several objectives that need to be achieved. The unemployed need to be re-employed, vacancies have to be filled, etc. Data can help improve the primary processes by focusing on the effectiveness of the systems and processes in place. Increasing the number of positive matches in a system or improving the number of people correctly profiled is another example. For example, by increasing the number of variables included in a profiling application. A final example is the use of performance management systems[4] to monitor performance and make adjustments when needed.

3 E.g. Australian Government (2015): http://www.finance.gov.au/sites/default/files/APS-Better-Practice-Guide-for-Big-Data.pdf

4 Performance Management was a topic in another peer review in 2012. See: ec.europa.eu/social/BlobServlet?docId=7957&langId=en

- **Improving the efficiency of the PES**
  Working smarter, doing more with less, are keywords which apply to methods to make the PES more efficient. In general, a PES can work more efficiently if it saves time and/or money performing the same duties. Increasing the number of matches a system can make or enhancing the productivity of case-workers using data driven tools are examples of how a PES can work more efficiently. Efficiency might be a key driver in the public sector, aimed at achieving rationalisation. However, it also hampers other forms of innovation (Potts, 2009; Koch & Hauknes, 2005).

- **Improving customer satisfaction**
  It is important to deliver services that satisfy the clients of the PES (the obvious clients are jobseekers and employers, but we can also think of clients such as other governments (e.g. those a PES supplies Labour Market Information (LMI) to) or third parties (that pull data from a PES using Application Programming Interfaces (APIs)). Part of this, is the increasing need to be transparent to the public as well.

PES recognise the role of data in their organisation and realise that data creates opportunities to improve the organisation and achieve their goals. Most PES who participated in the workshop are concerned about better using the data they already collect. While most PES collect a large amount of data from their customers and from the implementation of their services, several recognise that they lack a clear strategy for integrating that data in their decision-making processes. Moreover, some PES recognise that, on occasion, they simply lack the capability. Moreover, most PES seek to become more data-driven organisations. Better use of data would be a first step for some PES towards becoming more customer-driven and proactive organisations (LU). For other PES (FI and DK), current reforms on digitalisation are triggering a move towards becoming more data-driven organisations. Indeed advanced digitalisation hinges on the availability of good data and, in this regard, being more data-driven is often linked to mature IT systems.

However, PES do not operate in a vacuum and we can distinguish between four broader developments that both cause and are caused by the goals PES have for modernising. For example, new public management philosophies are (partially) caused by technological developments, but also impact the use of technologies in PES. In that sense it is important to not see those developments as isolated entities, but ideally are addressed holistically.

2.1 Organisational perspective

The first of these is the way the PES is organised and/or managed. Although public management has been a field of study, it was not until the arrival of the New Public Management (NPM) that as strong case was put forward about modernising public management, in relation to the use of technology and data analytics. Pollitt (2007) suggests that, at a high level, NPM 'is a general theory or doctrine that the public sector can be improved by the importation of business concepts, techniques and values' (p. 201).

Main characteristics of NPM are:

- a greater emphasis on 'performance', such as goals, and the measurement of outputs,
- the move to small, disaggregated organisations,
- substitution of contracts for hierarchical relations,
- widespread injection of market-type mechanisms,
- an emphasis on treating service users, or citizens, as 'customers'.

Somewhere in the mid-1980s, PES started modernising. This was largely driven by the philosophy of New Public Management and it happened in tandem with the maturation of information and communication technology. During this time, computers were introduced, and skills demands on workers began to change, not only through the emergence of jobs in the service sector, but also through the increasingly global division of labour (Larsson, 2001).

Subsequently, the 1990s were characterized by PES shifting from systems based on 'management by regulation' to 'management by objectives' (Larsson, 2001). This move was often accompanied by efforts to decentralize the governance structure of PES in order to improve local flexibility, and by attempts to reorient PES staff toward embracing a new 'customer orientation' as well as a more private sector management mentality (Weishaupt, 2010a). Furthermore, many governments also sought to increase competition in the provision of services. In PES, this applies especially to skills training. Another important step toward more 'competition' included

abandoning of the monopoly on placement services for PES. This allowed new private sector actors to enter the market and thus 'forced' PES to modernise in the 1990s (Weishaupt, 2011).

Dunleavy et al. (2006) note a move away from NPM after the year 2000. Main reason to abandon NPM is the increasing realization that many of the anticipated benefits failed to happen. Instead, we witness an increase in administrative complexity due such factors as the vertical siloing of agencies, and the challenges in coordinating joined-up service delivery across multiple (and vastly different) organisations. Indeed, siloing is still seen by PES as a problem, especially when it concerns integration of data across and between organisations. Another critique on NPM is the strong focus on efficiency. By forcing public sector organisations to think about their performance, and reducing costs, the risk arises that quality starts to suffer. Critiques of NPM (see e.g. Seddon, 2008) argue that NPM fails to address substantive issues of service design and service quality has emerged.

Instead, Margetts and Dunleavy (2013) argue that a new paradigm 'Digital Era Governance' (DEG) is overtaking NPM in prominence (see also Dunleavy et al. 2006). This is moving away from such developments as disaggregation. The three key points are:

- Reintegration, which overturns the fragmentation advocated by NPM by trying to de-silo public sector processes and organisations. It puts emphasis on:
  - true collaborative working (instead of creating silos);
  - 're-governmentalizing' issues that must be dealt with by governments (as with homeland security);
  - creation of centralised processes that do things once instead of multiple times;
  - reducing process costs and using shared services eliminate NPM's duplicate organisational hierarchies;
  - radical simplification of services, organisations and policies.

- Needs-based holism, which seeks to create client-oriented structures for departments and agencies. It seeks to implement an end-to-end redesign of services from the perspective of the client; to create one-stop processes; and finally to create a more agile and resilient government.

- Digitalisation, urges the public sector to completely embrace and embed electronic service delivery processes, wherever possible. This, however, will partly imply that (able) citizens have do more. This would develop some kind of isocratic administration — or a type of 'do-it-yourself' government. Risk of this strategy is a further neglect of the less digital savvy citizens.

According to its proponents, DEG can lead to a 'potential transformation to a more genuinely integrated, agile and holistic government, whose organisational operations are visible in detail both to the personnel operating in the fewer, broader public agencies and to citizens' (Dunleavy et al. 2006).

The changes in perspectives on management philosophies in the last couple of decades teach us the following lessons:

- Even though the theme of this paper and the associated TRW is 'Modernising PES', modernisation has been a constant in the last 40-50 years. In that sense, the constant stream of changes suggest that PES should start embracing a 'change is constant' attitude instead of seeing change as something that happens in projects with clear starts and endings.
- Siloing is one of the bigger problems PES face. Not only does siloing hamper collaboration in the organisation and effective sharing of information, it also leads to fragmentation of concepts and internal competition. Both of which hamper integration and the creation of holistic client views. Finding ways to break through silos and create internal networks instead of hierarchies should be important themes for PES. In that sense, the succession from NPM to DEG teaches us that, while there is still a large focus on technology and digitalisation, this digitalisation should go hand in hand with adaptations of management philosophies and organisational structure.
- With PES being fairly silod and the ongoing focus on performance management, it seems like PES are still focused on NPM principles. While this has brought many good things, such as a focus on efficiency and standardisation, the downsides are less attention for quality as well as a potential bias towards digitalisation. This ignores groups of clients that need high quality, in person services.

- However, both NPM and DEG stress the need to set goals and measure performance based on these goals. This for example would imply that organisations translate their mission/vision into concrete objectives that can be measured throughout the organisation at different points in time. At present, at a strategic level, PES use data and key concepts have been defined. However, few PES link their mission/vision to specific data and the use of that data does not yet fully trickle down the organisation.

2.2 Societal changes

Various studies have focused on the challenging fiscal situations and rapidly changing environments in which governments operate. These challenges force governments, and in that light also PES, to become more innovative in areas such as their internal processes and structures, service delivery and external communication, and transparency (Bertot et al., 2010; Reddick & Turner, 2012; Gil-Garcia, Helbig & Ojo, 2014). Some of these changes are especially relevant in the context of this analysis and we discuss them in this section.

The first is the change in labour markets. External labour market developments will very likely impact PES. The Bertelsmann Stiftung (Landmann & Heumann, 2016) has recently created a scenario study of how the German labour market could develop under pressure of digitalisation. Regardless of the scenario, three factors are likely to have an influence on the labour market and as a result most likely the German PES. There is very little reason to assume these factors will not also impact the labour markets in other (European) countries.

The first is **reorganisation of labour**. It is very likely that the labour market will become more flexible, as a result companies will hire employees only for shorter periods of time (e.g. For fixed term projects). As a consequence, it is a possibility that employees will become unemployed more frequently and as a result, this could increase the PES' workload. The second is the **pressure on the labour market**. Some people in certain job categories will face a decline in demand for their services. This will result in rising unemployment and social tension and, obviously, pressurize the PES. Lastly, there is **employee development and training**. A very dynamic and digitized economy will require development and training of the workforce. This could lead to a disconnect from certain groups from the job market (e.g. permanently unemployed, elderly, certain employees in certain less affected markets). As a result, training might become of more importance to PES. The is also reflected in the current discourse on employability, that reflects a trend towards increased emphasis on competition, mobility, flexibility, and continuous learning in contemporary Western labour markets (Garsten & Jacobsson, 2004).

In a similar vein, Accenture (2014) describes four key labour market issues based on, amongst others, demographic shifts. These issues are:

- **Geographic dislocation of jobs**
  Job vacancies in Europe are often geographically dislocated from the supply of skills, and many workers lack the ability or desire to move. Accenture found that with the exception of Italy, only one-tenth of jobseekers in European countries surveyed are very open to moving somewhere within their region or state to find a new job. This implies that mobility will probably become of increasing importance to PES. This creates new challenges in terms of regional, national and international collaboration. In that sense, in modernising PES, it seems wise to develop standards, processes and procedures that facilitate future integration.

- **Barriers to entry**
  Nearly half of youth (aged 18 to 24) cite lack of work experience as a major factor in not obtaining employment. The prospect of not earning a full-time wage has deterred one-third of women in the UK (35%) and Germany (32%) from entering employment. 45% of women in Italy, 42% in Germany, 35% in France and 33% in the UK did not accept a job as it was 'not financially worth it.' Barriers to entry could lead to more people turning to a PES for career guidance and/or training.

- **Mismatch between skills and jobs**
  With high levels of both unemployment and job vacancies at the same time, Europe clearly faces a skills mismatch. Despite general improvement in the quality of public education, Accenture's surveys show that not enough employees are equipped with the skills that employers need. In addition, there is not much need for unqualified workers any more. The other challenge is the dynamics of the labour market. Younger generations

tend to switch jobs more frequently and people no longer stay with one employer for decades. There appears to be more unemployment and more customers for PES, no matter how GDP changes, just because of labour market dynamics (IBM Center for the Business of Government, 2015).

- **Volatile business environments**
  Employers in the European countries surveyed believe the overall rigidity of the European labour market inhibits their ability to adapt to changing market dynamics and business cycles. As the pace of change in the labour market becomes more volatile.

Furthermore, the ongoing change in customer expectations and social values leads to changing requirements for service quality (Smith & Bolton, 2002). People have become more critical of public services and while an 'exit' is still in most cases not possible, given the government's monopoly on many services, using 'voice' to display your discontent with services has become increasingly easy due to the rise of social media.

PES are trying to create new models of working to address some of these issues. The Danish PES has received much attention in recent years, especially in a European context, because of debates concerning so-called flexicurity models, where the Danish approach has been seen as one of the front-runners. The term flexicurity refers to the combination of flexible labour markets with security for workers (Boll & Høeberg, 2013). The Austrian PES has adopted a similar model. Austria, unlike other EU member states, has limited dismissal protection. This is what some have called a cornerstone of Austrian-style 'flexicurity.' The Austrian labour law is relatively flexible and much more comparable to that of the United States instead of many other European countries. Although flexibility is beneficial to employers, it is less so for employees. Therefore, the Austrian PES combines that flexibility with security, mostly through very strong ALMPs. The Austrian government invests heavily in active labour market policies, and as a result. Even if somebody loses their job, the PES will typically get him/her back to a job quickly (IBM Center for the Business of Government, 2015). This type of flexicurity does require a PES that can adapt quickly to changing labour markets.

While certain PES are anticipating these societal changes, most PES do not seem to be planning for drastic changes in the labour market in the next 10-15 years. This applies both to their work in serving job seekers and employer, but also to that of the PES itself. As we will also see below, PES will probably require a different kind of labour force in the future.

2.3 IT Evolution

What is commonly referred to as the 'computer revolution' began with the first commercial uses of computers around 1960 and continued through the development of the Internet and e-commerce/e-government in the 1990s. The cost per computation declined at an annual average of 37% between 1945 and 1980 (Nordhaus, 2007). This led to telephone operators being made redundant and the introduction of the first industrial robot by General Motors in the 1960s. The 1970s saw the advent of airline reservations systems, which led the way in self-service technology (Gordon, 2012). Information and Communication Technologies (ITs or ICTs) have been in use at government agencies since the 1960s. The diffusion of IT in organisations in the past is often described as a succession of different, yet overlapping, generations of innovations:

- **Mainframe computing**
  The first phase happened in the 1960s and 70s and was aimed at large scale automation, largely in the back-office. This computerisation was aimed at improving productivity and efficiency through large 'number-crunching' mainframe systems. Public administration was a pioneering user of these systems, used for processing large volumes of information about, for example, taxes, pensions, and welfare benefits.

- **Personal computing**
  The second wave involves the adoption of mini and microcomputers, which could more readily be located close to users. This resulted in more innovations involving the front-office functions of the public sector. The aim of these innovations was to improve effectiveness and quality of service. Examples are systems used by caseworkers for data-entry and monitoring or terminals used by telephone agents. The work of caseworkers is increasingly to 'read' the clients according to standardized templates, which has led Caswell, Marston and Larsen (2010, p. 400) to speak of 'screen-level bureaucrats' replacing 'street-level bureaucrats' in government agencies (Garsten & Jacobsson, 2016).

- **Networking and mobile and ubiquitous IT** The last wave of IT innovations centres on networking and ubiquity. Not only are most computers connected to the Internet or intranets, computers have been miniaturised, and mostly through smart-phones, are now ubiquitous. This has led to new service opportunities (first email and website, later came mobile/adaptive websites, social media, and smart-phone apps) (Gallouj, 2002; Miles, 2005, Djellal, Gallouj & Miles 2013).

While we do lump together Information and Communication Technologies in one term, it might be relevant for this analysis to look at the differences between the two. Following the analysis of Garicano (2000), Bloom et al. (2014), make important points about the role of information and communication technologies in organisations. They argue that we need to a) discriminate between information and communication technologies and that b) they have different (sometimes opposing) effects on organisations. In determining where and how decisions are made in organisations, there is a trade-off between information and communication cost. Decentralising decision making will require the decentralised parts of the organisation to have the relevant information (and skills) to make decisions. This requires investments in the information capabilities of the organisation. Centralisation means that a central unit makes decisions and then disseminates this down the organisation. This requires investments in the communication capabilities. Therefore, as such, when modernising the organisation, the PES has to decide what kind of organisational structure is desired and then focus on the required technologies. The important lesson here is that information technology decentralises and communication technology tends to centralise organisations.

Theoretically, the same would apply to service delivery; investments in how information is presented to citizens could foster the type of 'do-it-yourself' government mentioned above. This would make innovations in technologies on how information (e.g. in natural or personalised language) is presented more logical. On the other hand, investing in more and better communication channels might make it more convenient for citizens to contact the PES. This would put the burden of solving the problem with the PES, but at the same time allows the PES greater control over the interaction, ensure problems are solved properly, and invest in the relationship with the client.

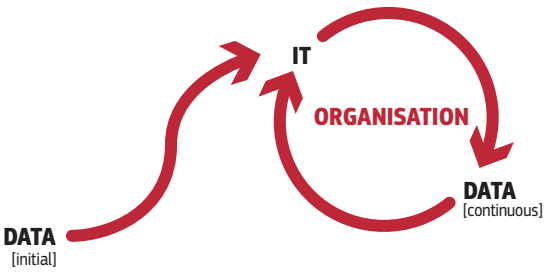
There are three important lessons we can learn based on this (short) overview. The first is that, here again, change is constant and there has been constant change in the past 50 years. However, more importantly, the speed of technological innovation is still increasing (Brynjolfsson & McAfee, 2011). While it took about 50 years for 50% of the population to adopt a (landline) telephone, it only took 5 years for the smart-phone to achieve similar levels of adoption. **If this increase in speed continuous, it might lead to problems in organisations that are slow to adopt these changes.** It might not be a problem for a PES to run one or two generations behind the latest technologies, it will become a problem once the organisation starts running multiple generations behind. This because clients might become increasingly vocal about the lack of current technologies/service channels, but also because the PES might become a less attractive employer for technology focused younger employees and the risk of interoperability issues with other organisations increases. This implies that the speed of technology change will eventually force slower organisations to speed up their pace of organisational change. In any case, it does warrant that PES start paying more attention to their changing environments.

In this sense, public sector organisations can learn from other types of organisations about how IT enables processes and services to be fundamentally redesigned. Starting with a random percentage to be spent on IT is not the best way to start. The real challenge is how to design and deliver optimal public services, based around clients' needs, and then the role of technology within that process. This could imply a higher use of IT in the design and operation of public services. However, an overall lower budget could be required as a result of the savings made elsewhere from improvements to public sector processes and systems (Fishenden & Thompson, 2013). This would argue that collaboration with others, a stronger integration of system, and most importantly, a stronger focus on the needs and behaviours of clients are needed for PES.

2.4 The data revolution

As IT systems become more mature, IT and Data become more intertwined. For example, a matching system relies heavily on data-algorithms that *need* data to create better matching recommendations and at the same time *generate* data (e.g. system logs) that can be used to create better matching systems. This creates a continuous IT/Data feedback loop.

Figure 1: IT/Data feedback loop



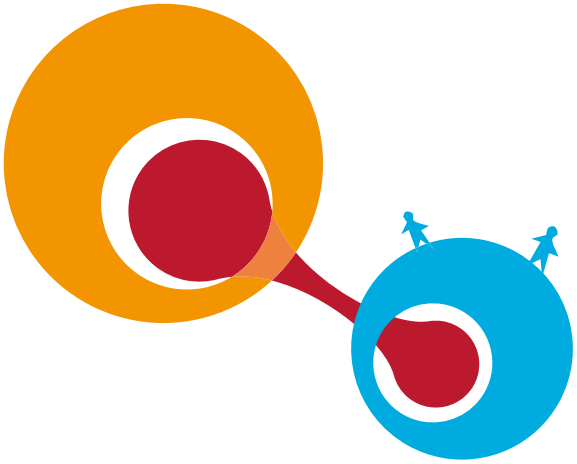
Once a functioning system has been created, data can be extracted to improve the system which would lead to better data, etc. To get there, however, the PES needs to collect data, either from current systems or through research activities (e.g. Pilots). In a sense, the evolution of data reflects the evolution of IT-systems (Kim, Trimi & Chung, 2014):

- 1960s: data processing
- 1970s-1980s: information applications
- 1990s: decision-support models in the 1990s
- 2000s: data warehousing and mining
- 2010s: Big Data

Even though the general trend is towards big data, we find that data warehousing and data mining are still relevant themes within PES. Most European PES do have a data warehouse (but not all), but mining of data is still an issue. In part because it has not been an actively explored issue, but PES also mention the lack of data analysis and issues with data integration and data quality. Nevertheless, European PES are moving towards big data and recognize its potential. Big data technologies alone are not, however, a silver bullet for transforming the public sector. Underlying data issues like quality, standards and bias still need to be recognised and addressed. Also, governments must have the capability to conduct, interpret and consume the outputs of data and analytics work intelligently (Yiu, 2012).

The problem with the four developments outlined above is that they don't happen in isolation, but correlate strongly. The IT revolution allows more data to be created and analysed, societal changes pressure governments to work more efficiently, thus requiring data to monitor performance, as well as more IT systems to replace 'expensive' human personnel. This leads to new complexities and changes in the organisation, calling for a rethinking of the way things are organised and so forth.

As data, and the interaction with IT in modernising PES, is the focal topic of this analytical paper, we devote the next chapter to an analysis of the role of IT generally and data more specifically within PES and governments.



3. STATUS QUO

With data and IT systems being more and more closely intertwined, the combination of IT and Data becomes a powerful means to modernise PES. The combination of exponential increases in computational power, allows for the analysis of very large datasets (big data), which could potentially create advanced data-driven applications that have the potential to improve services and processes and thereby achieve efficiency, effectiveness and satisfaction goals.

In this chapter we analyse the different stages in the process of collecting, storing and analysing data and the interactions between data and IT. Lastly, we discuss the state of the art in evaluation and dissemination.

3.1 Collecting data

As seen in Figure 1, we can make a distinction between two types of data used to create and sustain IT systems. The first is continuous data collection, used by in process types of data analytics. The second consists of stand-alone research projects where data are collected once, or in discrete moments.

- **Initial or incidental data collection**
  The first type of data collection we can define we label initial or incidental data collection. This data typically is collected in (research) projects with a clearly defined start and finish, very often meant to create and/or test new applications. In this category, the following are important (this list is not exhaustive, only key types are mentioned):

- **Pilots**. These are (smaller scale) tests of a new process and/or application. For example, when a PES develops a new registration tool, they can test the user experience with this tool using a pilot. These pilots can have a qualitative (smaller, often using such techniques as thinking aloud or eye tracking or inputs from literature reviews) and or quantitative (using for example system data and/or surveys) approach.

- **Experiments**. These are studies where different versions of a process and/or application are compared. For example, if a PES develops a new profiling application, they can build two versions of the same application and test which one performs better.

- **Evaluations**. These are projects aimed at assessing the effectiveness of a tool, application or process. These evaluations can be embedded (and just take the form of an in-process application), but it is more common for evaluations to be stand-alone projects where, at a certain point in time, the performance of an application is assessed. While these evaluations can be research projects in themselves, they can also happen continuously, as part of a process to benchmark or check progress against certain criteria.

In tandem with the creation of new IT applications, innovations or process redesigns, these types of initial data collection are typically used as inputs in the process. An example of a setting in which a PES conducts many of these research projects is the Belgian-Flemish PES (VDAB) innovation lab in which smaller scale, experimental research is being conducted which in the long-term could lead to new systems and/or continuous data collection.

- **Continuous Data Collection**
  The second type we label continuous data collection and refers to the ongoing extraction from data from IT Systems. In these types of data collection, very often the collection and analysis of the data are part of the IT system. This means that analytics work in the background and are embedded in the systems and procedures of the PES. Automated matching and profiling applications are areas where analytics are already being used. But as far as we are aware, most applications of (large scale) analytics are confined to those areas. Another distinction we can make here is between analytics as part of the primary process (e.g. Measuring the success rates of a matching tool) versus measuring secondary processes, such as the extent to which employees are meeting their targets (e.g. Number of cases processed).

Surveys or other tools can be part of this, e.g. when clients get a "pop-up' asking them to give feedback about their experience.

How you collect data influences what you can collect and store. There are different methods PES can use to collect data from customers. While some countries focus more on face-to-face methods (e.g. HR) or surveys, others focus on using online methods (e.g. EE, FI, DK) and/or extract data from their systems. There seems to be few all-encompassing strategies that outline why, where, when and how which type of data is being collected for what purpose.

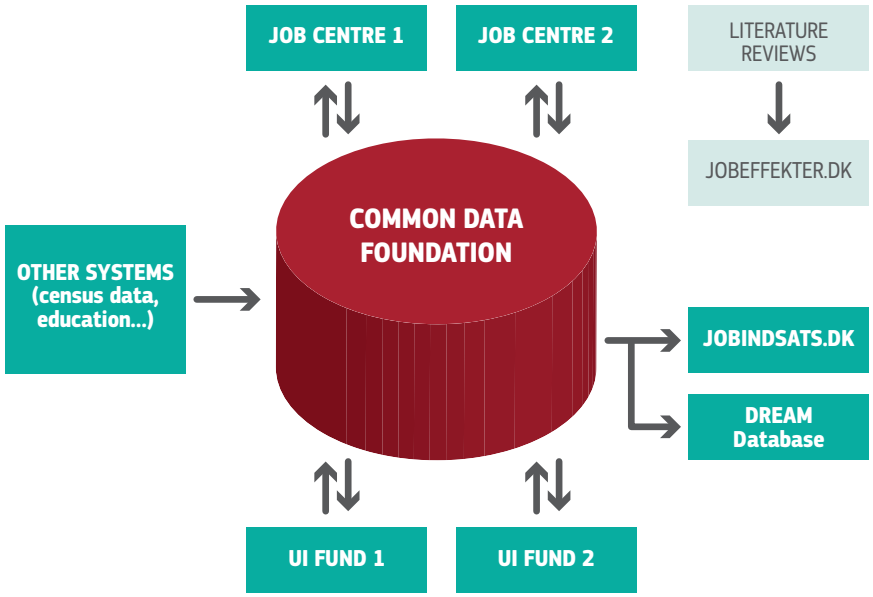
3.2 Storing data

There are different ways in which data can be stored and there are two extreme variants (and every permutation between the two ends of the spectrum):

- **Decentralised**. This is a situation where all data are stored locally, e.g. every process has its own database. Databases are connected on the levels of input and/or outputs to facilitate the process-flow. The benefits of this is that is more flexible to tailor to specific needs of a process. The downsides are that data are distributed and connecting the databases becomes more complicated.
- **Centralised**. This is a model where one central database exists and individual processes either process data in this database or pull the relevant data from this database and then return it once processing is done. Cloud based storage is considered centralised and is a topic of discussion within many governments (e.g. At the EU level).

In practice, most PES are likely to have a mix of both where typically one large database exists (e.g. containing all job seeker data) alongside auxiliary or proxy databases for specific processes (e.g. counselling). An example of a combined centralised/decentralised model is found in Denmark. The Danish PES has created a data framework that supports evidence based management. The system consists of one shared data foundation that is being used by the different offices which pulls data from other systems. On top of this common data foundation, three separate databases exist that perform different functions. The first, **Job-effekter.dk** is a stand-alone database that contains evidence from experiments and other studies conducted at the PES as well as inputs from external sources (literature reviews). The second, **Jobindsats.dk** is the main ALMP system used to store key ALMP indicators. Lastly, the **DREAM database** provides (condensed & compiled) snapshots of the main database that can be used by researchers and evaluators for research and evaluation purposes.

Figure 2: Danish database model



An example of a more centralised model can be found at the German PES. The German Data Warehouse was developed at the end of the 1990s and is used for performance management by controllers and managers in the PES. Controllers analyse data from the Warehouse for the performance management procedures, and managers mostly use the management information system that contains data from the Data Warehouse. Data sources for the data warehouse come from the operational systems in local offices. Data is gathered and processed by purpose, so not all the data that the BA produces is loaded onto the Warehouse.

We find a similar model in Poland. The Ministry of Family, Labour and Social Policy maintains one centralised (Oracle) database. The database itself contains three data repositories for a) the Labour Market division, b) Social Security and Family Affairs division, and c) the Disabled Persons division. On top of this centralised database, an analytical platform (CeSAR) has been developed, which is being used in the Ministry of Family, Labour and Social Policy. The platform delivers business insights and supports decision making. Users can explore their data using ad-hoc queries and advanced data mining algorithms. Analyses include visualizations (bar, line, pie graphs) and allow users to interact with data. The PES is planning to integrate with other public administration offices in the future, such as a) Boarder Guards, b) National Labour Inspectorate, and c) The Polish Social Insurance Institution.

3.3 Analysing and using data

Data is becoming increasingly prevalent in the world. The increase in storage capacity and processing power have made it increasingly easy to collect and store data. This, however is not without its challenges, as 90% of all data collected is unstructured (Kim, Trimi & Chung, 2014). This data needs to be organised and cleaned before they can be analysed. With the large amounts of unstructured data and -as we will see further on- the often low quality of data sets, it is no surprise that -of the entire data process- organisations spend as much as 90% of their time cleaning and organising data (Taylor, Schroeder & Meyer, 2014). As big data becomes more prevalent, and more organisations start integrating their data sets, this organisation of data becomes even more of an issue. In this context, big data analytics can be defined as 'the process of examining and interrogating big data assets to derive insights of value for decision making' (Yiu, 2012).

Currently, **PES have limited capacity in their analytics departments and data management is not a topic high on the priority list of PES**. At present, few PES have research teams (e.g. Belgian-Flemish PES, DE and DK) that provide the organisation with a better understanding of the labour market and information collected from their customers. Research conducted by PES is more often reactive and not aimed at innovating. However, PES do show an interest in new types of data analytics that could provide them with better information.

Once the data has been cleaned and organised, PES can start analysing and using data. Here we already find a wide range of applications at the different PES. The following are the key applications:

- **Profiling**
  The first is profiling (or segmentation) of jobseekers. We can distinguish between various types of profiling using analytics. The first is statistical profiling, where a set of variables is used to create models of jobseekers and then to segment or profile the job seeker. This type is in relative widespread use, but the methods and models vary between the different PES. A variant is real-time profiling where, in real time, as the job-seeker registers the statistical model profiles the job seeker. This requires more advanced models and more processing powers, but enables registration and profiling to be confined in one step, thereby shortening processing times.

  Even though recent evidence suggests that profiling models are still unable to deal with jobseekers with complex and multiple issues (Barnes et al, 2015), big data should allow for more granular profiles to be created based on an ever increasing number of variables; 'there are significant technical challenges in designing and maintaining profiling systems. It is also important to note that profiling is often significantly (but not exclusively) based on information provided by the jobseeker who may withhold or exaggerate key information that will impact on the accuracy of the profiling outcomes.' Accuracy of profiling tools, cost savings and reduction in periods of unemployment have been evidenced by evaluations of the established and well-developed international profiling tools. Although in its early stages, new profiling techniques using psychological and personality traits and taking account of soft skills are being tested with positive results.

Loxha and Morgandi (2014) also highlighted additional rationale for using profiling. Firstly data from profiling jobseekers can improve labour market data and in turn improve the profiling tool itself. It was noted that it was possible to develop macro-level skills needs assessments from the data. Secondly, it was observed that the jobseeker data could also be used to support and improve jobseeker matching with available vacancies for the caseworkers.

There are several challenges with profiling, such as the number of variables and types of data needed to create well-functioning profiling systems. There are hardly any documented examples describing profiling models and testing the inclusion/exclusion of certain types of variables. Balancing the number of datapoints and accuracy is another challenge, as well as the effectiveness of the profiling tool itself. Improvement of profiling tools is on the agenda of several PES. The Polish PES, for example, looks to improve their profiling system through better use of data analytics.

- **Matching**
  The second type of analytics is matching jobseekers to vacancies. Here we can make a similar distinction as with profiling where a) matching can be a discrete step that happens independently from registration/ profiling or b) matching can happen in real-time, for example as the job-seeker is being profiled or uploads his/her resume. The Belgian-Flemish PES uses the latter method. Since the late 2000s the in-memory database 'Elise' has automatically compared and linked around three million search objects. The system compares new jobs with resumes and vice versa in real-time.

  At present, the Finnish PES is testing a semantic analysis and semantic search engine. This is an application that is intended to be sued in job vacancy (JV) and CV search but also generates an important basis to improve matching capabilities in the near future. The Maltese PES is also working on a new job matching system. Their approach is to integrate the matching system with their (new) website and move more towards a virtual labour market environment. Through this system job seekers and employers can be matched online without the need for them to physically come to the PES's premises. Through this system, matching will be done based on competencies as well as other criteria.

  The challenges with matching are very similar to those of profiling. While many PES use a system to match vacancies to jobseekers, there is no systematic comparison of how these systems work and how effective they are. Several PES report to have (new) matching tools under development and as such, this seems to be a relevant area for further study. Several PES are currently looking to improve their job matching systems (HU, LV and SE).

- **Personalisation of services**
  A third area is that of personalisation of services. Although matching and profiling can be considered examples of personalisation, there are other types of personalisation that are possible. Key examples are status overviews in personal web pages, personalised (or tailored) communication and more personalised forms of counselling.

  In theory, data and analysis should enable personalisation of services, appropriate to individuals' needs and capabilities, within the constraints of resources available (Wijnhoven and Havinga, 2014). This offers tremendous opportunities to streamline service delivery, but it does require high levels of systems integration. For example, the same data used to profile jobseekers could be re-used to create personal training or counselling plans. Vice versa, outcomes of counselling could be used to update profiles and improve matching. In theory, it should be possible to use predictive analytics to create more successful personalised job plans where the model predicts which recommendations would have the biggest impact on the career chances of the job seeker. On a more aggregate level these models could have uses in the ALMP domain. Outputs of such models could for example be used as input in educational programs. As far as we are aware, such applications do not yet exist.

  Currently, some PES (e.g. EE, DK in part) have platforms that allow customers to create their own personal 'web pages'. Through this platform, customers receive personalised (or tailored) communication from the PES and other services.

Three key challenges exist with personalisation. The first is that true personalisation requires many data points per individual to create individual profiles and reliable and valid personalisations. This requires PES to collect many more types of data than they most likely have right now and drastically increases the analytical complexities of the data models used. The second are the challenges in keeping data-sets complete and up to data. Especially when labour markets become more volatile, data needs to be refreshed more frequently and it will become more difficult to maintain data integrity (also see below). The last challenge concerns the trade-off between personalised services and privacy protection. True personalisation might require data that clients consider to be privacy invasive (and pose legal constrains). To this end, further development of personalised services should go hand in hand with a careful exploration of the privacy related issues.

- **Forecasting & Business Intelligence**
  A final application is that of forecasting of trends and developments in the LMI context and the use of information to support (future) decision making. Forecasting is essentially a predictive, future oriented, version of what we currently consider as LMI. Where LMI nowadays in most cases concerns present and near-future developments on the labour market, analytics offers the premise to extend the future timeline and improve the accuracy of the forecast. A current example of a (regional) application is that of the Skåne Region in Sweden which has developed a regional forecasting tool (Utbildungs- och arbetsmarknadprognos för Skåne (UAPS)). This is comprehensive regional forecast on education and training, covering all the major occupational areas of the labour market over short-, medium- and long-term time scales.

  The field of Business Intelligence (BI) is on the radar of various PES. The Maltese PES, for example, is intending to implement a business intelligence tool that gives access to all relevant managers. This allows them access to all data pertaining to their operational processes more easily and enables them to make strategic decisions more effectively. At the moment the PES is evaluating its operations in terms of inputs, outputs and outcomes in order to make its business operational processes more efficient.

  As with the other examples, we currently do not have comprehensive overviews of all types of forecasting being deployed as well as the models and variables being used and finally the validity of these models. Existing overviews focus on thematic areas, such as the 2012 report on skill forecasting[5]. Some PES (e.g. Belgian-Flemish PES (VDAB) and MT) are developing more sophisticated BI functions. Here, the focus is on PES promoting business development that is more data-oriented – and at the same time, promoting innovation.

3.4 Evaluation

The last step in using data is to evaluate the data collection process. The purpose of evaluation is to learn about something and to improve upon experiences. According to Rosset and Sheldon (2001), evaluation is 'the process of examining a program or process to determine what's working, what's not, and why. It determines the value of learning and training programs and acts as blueprints for judgement and improvement'. While, ideally, in continuous processes, the evaluation is a standard part of the cycle, for the sake of accountability and reporting, evaluations are often conducted as stand-alone activities. For example, Mosley (2012), describes between four types of accountability (and the way they are enforced), including (1) political (through public elections), (2) legal (through laws), (3) fiscal (through audits), and (4) performance (through management by objectives; evaluations). This, NPM inspired view, would require PES to set performance goals and measure progress towards those goals and be accountable for progress. Besides evaluations tied to specific goals that have been formulated, there are also 'goal free' evaluations (Scriven, 1991). In which the focus of the evaluation is on measuring *actual* effects as opposed to pre-formulated goals. The benefit of this type of evaluation is that secondary or side-effects can be uncovered more easily.

5 CEDEFOP (2012). Building on Skills forecasts. Comparing methods and applications. Luxembourg: publications office of the European Union.

There are different sorts of evaluations. The first concerns what is being evaluated (evaluation focus). The focus can be a) on the process of either data collection or the function of a system, or the design of a policy or programme or b) the actual outcomes of the process. An example of the first is how well a profiling system works, how long does it take to profile a person, what is the uptime of the IT system, how many errors show in the logs, etc. An example of the second is the outcome of the actual profiling. How many profiling attempts were successful? How satisfied were people? Within the second type, we also include outcomes such as the evaluation of policy design as well as longer term evaluations that focus on long-term impact of policies.

The second concerns the evaluation moment (also see figure 3). Here we can also distinguish between two different types. The first is the continuous measurement throughout the process. These *formative* evaluations can help gather information throughout the process to help make adjustments when needed. An example is a system that logs every activity done by job seekers on a website so that clicking and searching behaviours can be tracked and used to improve the system. The second is the more ad-hoc evaluation. This can have the character of a *summative* evaluation and typically happens at the closing end of activities or cycles, or a more general ad-hoc evaluation not tied to a process (e.g. Ex ante evaluations). Within this type we distinguish between process performance evaluations, these evaluate the performance of processes. For example, at the end of a pilot program testing a new matching system, a PES could evaluate such aspects as the average uptime or the number of complaints filed by clients. The last is the ad-hoc outcomes assessment in which the results of activities are evaluated. Annual customer satisfaction surveys and annual reports are a good example of this and these are probably the most common types of methods used to assess conducted within PES. Another example is ex ante evaluations of programs or designs. Ideally all types of evaluations would co-exist and used at different points in time and for different reasons within a PES.

For example, when a new profiling system is being planned, once the system has been designed, it would be piloted. During this pilot, there would be both evaluations of the process flow (e.g. Is the IT hardware and software working as expected, without bugs, issues and other errors), as well as the system outcomes (e.g. Are people being profiled properly). Outcomes of these continuous evaluations could be used to adjust the workings of the system during the pilot. Once the pilot is finished, in more summative fashion, the whole system could be evaluated. Aggregate process performance numbers could be used to assess the process and the outcomes assessment could be used to assess whether the system as is should be implemented. Once moved from pilot stage to a production setting, both continuous and post-hoc evaluations should be scheduled to keep monitoring and evaluating.

Figure 3 shows the different evaluation types and although more types exist, it gives an overview of the most common types of evaluations in use, which suffices for the purpose of this paper. It also helps to create clarity in how and where (big) data could help PES, which could be beneficial in deciding how PES can turn big data into smart data (see below).

Figure 3: Evaluation types

		EVALUATION FOCUS	
		PROCESS ORIENTED	OUTCOME ORIENTED
EVALUATION MOMENT	CONTINUOUS	Process flow evaluations	System outcome evaluations
	AD-HOC	Process performance evaluations	Outcome assessments

The workshop in Zagreb made clear that broad encompassing evaluations typically do not happen within PES. While most PES do have high level performance goals, they typically do not set these goals for lower level units, let alone systems and processes. Furthermore, typically the introduction of new tools and processes has evaluation components in some cases, but the norm seems to be (as with the use of data) that evaluations are more ad-hoc than continuous and happen mostly to assess high level outcomes.

3.5 Sharing and integrating data

Sharing and integrating data is considered by many PES one of the key challenges when moving forward in developing better services and processes. We can distinguish between three types of data sharing:

- **Intra-organisational sharing/integration**
  Despite the fact that most PES have data warehouses, this does not imply that all data PES have is available to all parts of the organisation. It is possible that a) parts of processes simply aren't digitalised yet, or b) different data silos exist in the organisation.

- **Sharing/integrating with other government agencies**
  Sharing data with other governments is a challenge in many countries. One of the complicating factors is that every country has its own set of regulations and (cultural) practices, making it difficult to create learnings across the entire European Union. Roughly three classes of countries exist:

  - Highly integrated countries (e.g. NL, DK, NO, EE). These are countries with highly connected data infrastructures where either common/shared data infrastructures exist or where databases or connected and information is shared frequently. In the Netherlands, for example, common registries (e.g. for address information) exist and governments synchronise their databases regularly with these registries. The Performance Management Analytical Paper (European Commission, 2012) mentions a study (Ecorys, 2011) that found that just three PES (AT, the UK and SI) have integrated PES, social security, as well as and tax records (though it remarks that some of the Scandinavian states may also have such unified citizen records). Although the situation may have changed by now, it does suggest that the number of fully integrated countries is low.

  - Partially connected countries (e.g. DE, FR). These are countries where certain governments are connected and/or where data is shared on an infrequent basis. In France, for example, the PES and Tax department share information once a year and when a citizen changes his/her address, he/she can choose with which organisation this information is being shared.

  - Largely Disconnected countries (e.g. HR, HU). These are countries where virtually no sharing infrastructure exists and where organisations are responsible for collecting and maintaining their own datasets. Consequence is that clients have to re-enter information whenever they interact with government agencies and this could increase the administrative burden as well as the number of data errors and it could decrease customer satisfaction.

- **Sharing with private parties**
  The most prevalent type of information shared with private parties is vacancy information. In certain cases the PES serves as a national registry for vacancies and shares these vacancies with third party job counselling services (e.g. NO). Other examples of sharing with third parties are countries where (large) employers human resource systems are connected to a PES so that employment data can be shared instantly (e.g. NO) and cases of open data, where PES make data available for the general public or certain parties under contract for the development of third party services (the UK's LMI[6] for All is the best example).

Some notable examples of data sharing exist. The most relevant one at this point in time is the Estonian X-Road. In the future, the Estonian PES is planning to develop additional data exchanges with national registries to retrieve information that already exists, so clients do not have to provide any physical documents. This is an example of how **integration** can be used to personalise part of the process and make the process more efficient and effective.

6 Labour Market Information.

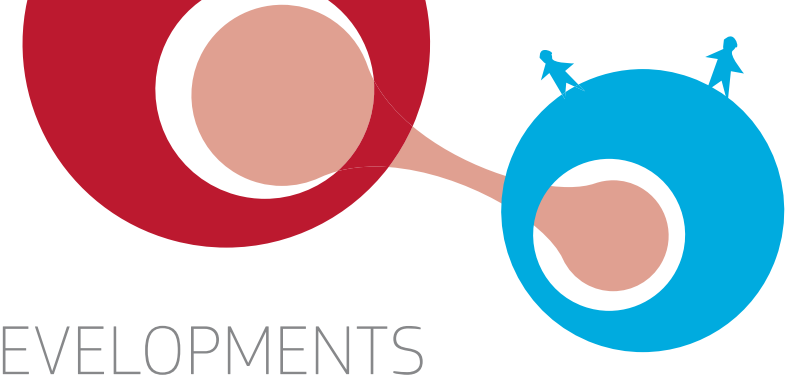
What can we learn from more advanced PES on the subject of storing and integrating data?

To date, it seems that well-functioning storage and integrated data system share the following **key success factors**:

- They build on a **coherent IT strategy** within the PES. A lesson for less established PES is that the organisation must first define a strategic framework to ensure that the system is credible and stable for all to get involved. In an integrated setting, other institutions should also be involved at strategic level and the framework needs to be agreed with them.
- **Strategic flexibility** is an asset: innovation can be hampered by a strategy that is not sufficiently flexible. Internal planning must encourage new ideas and freely allow innovation and change to emerge / be initiated or proposed.
- The **legal framework** is clear and allows the PES to develop an operational data system. A key issue for many PES is how their data systems handle data protection regulations. There is no 'one-size-fits-all' model, but each Member State should ensure a positive relationship between protecting customers' data and allowing an effective data information systems to operate in the public sector.
- **Data is comparable** and consistent across organisations. For data to be meaningfully collected and used by PES, connecting institutions need to harmonise how they feed data into the system(s) and connect their databases.
- Organisations buy into a **common identification infrastructure for citizens**. While this is a sizeable investment, it allows customers to navigate the information they provide and receive freely and independently. The key is that integrated institutions use the same customer identification method in a digital environment. For example, Estonia has a shared digital signature for citizens to enter the common data platform (based on an 'X-Road'*) where they can access all (or most) public services.
- Finally, well-functioning e-services and internal data systems have **secure servers**. Customers need to be assured that their personal information is protected and that interconnections and data entries from various organisations are safely stored and cannot be misused.

* X-Road is a data exchange layer for information systems, which enables secure and direct data exchange between its members.

Integration is an important topic for most European PES. The PES partaking in the workshop all PES underlined the need to improve the integration of their information systems in all three ways described above. IT tools are seen as crucial to exchange information and develop integrated connections between data systems. Workshop participants stressed the need to understand how best to proceed with such integration and therewith develop effective interoperability between diverse data systems in the public sector.



4. TRENDS AND DEVELOPMENTS

In this chapter we turn towards the future and analyse some of the key trends and developments we see at PES on the fields of modernisation, IT and data. Some technological developments (such as Augmented / Virtual Reality) could at some point be relevant for PES (training or coaching via virtual reality is an example that comes to mind), but these kinds of innovations are more geared towards service innovations, rather than the more organisational aspects related to IT and data.

4.1 Organisational Innovation

Organisational innovation is a topic high on the agenda for most PES. The organisations realise that many changes are ahead (see Chapter 2) and have started thinking about ways to innovate and achieve their organisational goals. And indeed, it is argued that innovation can help to improve quality of services, as well as the problem-solving capacity to deal with societal challenges (De Vries, Bekkers & Tummers, 2014). In this context, we see modernisation as a slightly broader term than innovation. We see innovation (in line with Rogers, 2003) as the creation and implementation of new ideas or ideas that are perceived as new. Modernisation is the overhaul of PES using innovations and innovation mechanisms. Modernisation could also include 'non new' elements, for example, substituting online services for face-to-face services could be part of a modernisation program, but could be considered the opposite of a technical innovation as well. In that sense, innovation is tied to (technological) advancement, whereas modernisation ties innovation to the broader organisational context (such as the organisation's mission and vision).

The concept of innovation can be broken down into different types of innovation. These innovation types are:

- **Process innovation**
  This refers to the improvement of quality and efficiency of processes in the organisation. We can further break this down into the following two types of process innovation:
  - *Administrative process innovation*
    This is the creation of new organisational forms, the introduction of new management practices and techniques and new working methods. New Public Management and Digital Era Government are examples of these (broader) administrative process innovations.
  - *Technological process innovation*
    This refers to the creation or use of new technologies, introduced in an organisation to render its services to users and citizens. Integration of databases (e.g. Estonia's X-Road) is an example of this type of innovation.
- **Product or service innovation**
  This type of innovation refers to the creation of new or improved services or products. The introduction of a profiling tool can be considered a type of service or product innovation. Most innovation within PES focuses on these types of innovations.
- **Governance innovation**
  Governance innovation focuses on the development of new forms and processes to address specific societal problems. Some of the broader changes described in the first chapter require governance innovation and in most cases these innovations require a focus broader than just a single PES. Given the complexities of intra-organisational collaboration and the lack of collaboration on basic levels (such as the sharing of information). It is no surprise that this kind of innovation is relatively rare in PES (and governments in general).
- **Conceptual innovation**
  This last type of innovation concerns the introduction of new concepts, frames of reference or new paradigms that help to reframe the nature of specific problems as well as their possible solutions (De Vries, Bekkers & Tummers, 2014). A good example is the concept of 'Big data', which (as we will argue below) according to some is simply a new conceptualisation of something that has been around for decades. The re-conceptualisation does help in getting renewed attached on

a subject and this could help in finding new applications and/or solutions. Conceptual innovation is also relatively rare.

Most innovative work in PES (and governments in general) seem to focus on product or service innovations (such as registration, profiling, matching tools, etc.). We can think of a number of reasons for this. The first is that product or service innovation can happen within the existing organisational silos and thus require relatively little organisational coordination. The second is the scale, creating a new profiling tool is a lot more concrete than reinventing the management structure of an entire PES. This scope makes it more manageable, predictable and financially feasible. The downside of this focus is the relative short-sighted focus on single applications instead of improving the PES as a whole and the lack of innovation to solve the larger problems PES need to solve.

Innovation is not just a matter of 'inventing' new processes, services or concepts. The innovation process consists of two different stages: the innovation generating stage and the innovation adopting stage (De Vries, Bekkers & Tummers, 2014). So far it appears that the focal point of most PES is on the innovation generating stage. The organisational change processes around innovation are complex and even those PES who have wide experience with ICT related innovations (e.g. EE) still struggle with resistance in the organisation and have not been able to completely solve these issues (also see below). However, in order to become more innovative, the organisation has to change (Gil-Garcia, Helbig & Ojo, 2014). This transition does require that:

- innovation is tied to specific goals and objectives within the organisation and that
- the organisational structure supports the changes.

In this sense, it is recommendable that PES wanting to modernise include the organisational aspects related to modernisation early on in the process. Empirical studies support the notion that the organisation needs to support the change. Garicano and Heaton (2010) found that IT investments were linked to increased productivity, but only when combined with complimentary organisational changes. Mulgan (2007, pp. 13–17) names the following as barriers and stimulants to the innovation process and this provides a good overview of the obstacles (and opportunities) that PES are encountering as well and could be included in the modernisation process.

Table 1: Barriers and enables

BARRIERS	ENABLES
Innovation does not respond to the context of the organisation (a short-time horizon, organisation does not need innovation).	National culture that promotes innovation (i.e., the Scandinavian governments).
General reasons named for avoiding innovation and change: the public sector does not need experiments; a wish to retain the traditional way of doing things; public sector should be a stabilizing force.	New needs of the political leadership and the public sector; civil society, service users, or radical professionals supporting innovation.
Innovations are not anyone's responsibility.	Creativity and seeing things in a new way.
Risk aversion.	Testing ideas with prototypes and pilots in real surroundings.
Many rules prevent innovation.	Benchmarking.
Uncertain results.	Replicating working pilots to a larger scale.
Public sector operates in silos, which block scaling of innovation.	Sophisticated risk management.
Structures of public sector do not support innovation.	

One of the more notable examples of innovation within PES is the DataLab at the Belgian-Flemish PES. Part of this innovation lab is Project 'Vick'. Project 'Vick' was set up in a particular way, inspired by Christensen's (1997) recommendations for disruptive innovation. Christensen advises to create an autonomous organisation, or independent entity, and stresses the need for CEO or other senior manager support. This was considered at VDAB, as Project 'Vick' would be run very autonomously and would fall under direct supervision of the CIO and CEO. The project received full support from the complete management team and the agency governance council (Danneels & Viaene, 2015).

Beyond some scattered examples, there are virtually no PES with an ingrained culture of innovation. As such, innovation is a challenge for all PES, as acknowledged by most during the workshop. However, it is becoming a necessity in today's fast-moving, digitalised societies. PES need to make use of innovation to be more data-driven and nurture useful digitalisation in their organisations. In this regard, PES must overcome internal barriers to innovation and secure time/capacity to innovate (also see the barriers below in Chapter 4).

4.2 Big Data

Closely tied to innovation is also the concept of Big Data. Some hail Big Data as the 'next big thing in innovation' (Gobble, 2013) or 'the next frontier for innovation, competition, and productivity' (Manyika et al., 2011, p. 1). Based on a review of the available literature, Wamba et al (2015) argue that the rationale behind this close link between innovation and Big Data is that the latter is capable of changing competition through a transformation of processes and ecosystems, it creates new organisational capabilities, and facilitates organisations to tackle their key challenges. In practice, Perrey, Spillecke and Umblijs (2013) found that retailers can realise a 15 to 20% increase in their return on investment by using Big Data based analytics.

In its simplest form, big data simply refers to very large data sets, although there is no unified idea of what 'big' entails (which arguably is also a moving target). In a more defined sense, Larsen and Rand (2015) refer to big data as data 'which are generated through different digital devices such as smart phones, websites, apps, sensors embedded into objects, scanning of machine-readable objects (barcodes) and Social Media postings' (p. 12). More commonly, big data are being described by the three Vs (Burns, 2015):

- Volume (referring to the quantity of information)
- Variety (referring to the multitude of information types)
- Velocity (referring to the speed with which data is stored, analysed and/or changed).

One consideration with this approach to big data, is that it emphasises the data itself. When analysing big data, neither the influence of the context nor the historical development are captured (Burns, 2015). Some have stressed that big data often leads to data mining and simply trying to find correlations even if no meaningful patterns exist. The starting point for using big data should always be a set of questions that need to be answered regardless of whether the relevant data to do so are available (Partnership for Public Service, 2012). For this reason, some have added a fourth V 'Value' to the three Vs. White (2012) suggests adding a fifth 'V', namely 'Veracity', in order to highlight the importance of high quality data and trust in the sources from which the data originates. Subsequently, Wamba et al (2015) define Big Data as 'a holistic approach to manage, process and analyse 5 Vs (i.e., volume, variety, velocity, veracity and value) in order to create actionable insights for sustained value delivery, measuring performance and establishing competitive advantages' (p. 239). Kreibich (2015) argues that the goal should not be to have big data, the goal is 'smart data' which he defines as follows:

Smart Data = Big Data + Utility + Semantics + Data Quality + Security + Data Protection

An extension of the concept of smart data, could be that of 'Smart Government', which can be defined as 'A smart government, or the organisations and networks within a political jurisdiction (e.g., a city, a town, a nation), would use emerging and nanotechnologies and various innovation strategies to gain a good understanding of their communities and constituencies (being percipient), they would use that ability to accurately assess situations or people (being astute), show sharp powers of judgment (being shrewd), and then make decisions and respond quickly or effectively (being quick)' (Gil-Garcia, Helbig & Ojo, 2014).

One consideration, however, is the question to what extent big data is actually a new phenomenon. The Oxford Internet Institute, having interviewed business leaders states that 'business leaders do not see 'big data' as a new phenomenon; rather it is perceived as being a continuation of a process by which companies seek competitive advantage or efficiency through the application of (data) science and technology' (Bulger, Taylor & Schroeder, 2014). Nevertheless, in creating the 'conceptual innovation', Big Data receives the attention (and hopefully resources) that could lead to process, product or governance innovation in PES and thereby help PES achieve certain organisational goals.

The UK's Policy Exchange (Yiu, 2012), and the Australian Government (2013) suggest several of these areas where big data could potentially create innovations that are relevant to the public sector:

- **Sharing of information**
  Every government agencies has sets of data that could be relevant to other organisations as well. Finding ways to connect these data sources could potentially save citizens' time as well as taxpayers' money. Related is that of *Data Management*. Potentially, agencies could achieve savings in time and money if they implemented smarter data management practices. For example, not asking for the same information multiple times could reduce administrative burdens.

- **Decision making and learning**
  Digitisation has massively increased the amount of information available that managers could use to improve decision making and learn about their organisation and clients. It does require proper analysis and visualisation of the data for managers to act upon.

- **Personalising**
  The level of granularity in big data creates new possibilities to personalise services. Analytics might create value by creating a clear picture of individual customers or groups. This would allow for more personalised or tailored services. This personalisation is most useful when the data relates to the users' needs, and when the personalisation is done in a way that is salient for the services being delivered.

- **Problem Solving**
  First, very large and/or multidimensional datasets can be examined to look for previously hidden patterns and correlations. Second, big data opens up the realm of reliable predictive analytics (also see below). By examining the relationships embedded in large datasets it is possible to build a new generation of models describing how things are likely to evolve in future and these predictive analytics could support decision making.

- **Innovating for growth, productivity and efficiency**
  Analytics based on big data can be used to identify cost savings, increase efficiency in the organisation, and contribute to a direct improvement in productivity. For example, with the availability of big data, a wide range of non-routine cognitive tasks are becoming computerisable. The use of big data is afforded by one of the chief comparative advantages of computers relative to human labour: scalability (Frey & Osborne, 2013).

Even though most authors agree that big data creates many possibilities, several publications warn of several challenges and risks. Based on several publications (e.g. Australian Government, 2013; Kim, Trimi & Chung, 2014), we mention the following:

- **Silos**
  Each government agency or department typically has its own warehouse, or silo, of confidential or public information, with agencies often reluctant to share what they might consider proprietary data.

- **Security, privacy and trust**
  Privacy when using records, authority and legitimacy for accessing database and data records, furthermore, consumer organisations could be protective of citizens' privacy. Some people even warn of the 'big brother' type of surveillance and distrust governments could develop towards their citizens. Lastly, organisations need high levels of trust in sharing (real-time) information.

- **Variety**
  Although high levels of variety in data types and sources contribute to the potential of smart data, data in all forms (traditional, unstructured, semi-structured) also create the aforementioned challenges of data management and organisation.

- **Data management and sharing**
  A survey among Australian Government Agencies (OAIC, 2013) found that one of the most challenging aspects of good data management was the 'establishment and maintenance of an information asset register'. Simply know what data there is, how to share it and manage the data that is being collected by different organisations at different points in time creates logistical and coordination challenges.

- **Technology and analytical systems**
  Big data itself is useless. It only becomes smart data when analysed. In order to get there, PES need to develop good (new) systems to make sure existing systems don't suffer from too much stress on the existing infrastructure and create new analytical systems that provide reliable and valid analytics.

- **Skills**
  In order to use big data, PES will need to attract personnel with diverse new skill sets, such as data engineers and data scientists (also see below). This means that a) PES need to develop the appropriate hiring competencies, b) need to be able to integrate these people in their existing organisation and c) have to compete with other organisations in an increasingly tight job market (for people with data backgrounds).

Although overlapping in certain situations, Big data is not the same as Open Data. The latter refers to the fact that (big) data can be opened up to third parties (often using Application Programming Interfaces (APIs)) so that these parties can use the data for other purposes. Regardless of the definition of the concept, big data is being hailed as a positive development and it is said it can help identify emerging trends, improve business decision making and develop new revenue-making strategies (Bollier, 2010). Others argue that big data is still 'just' data and its impact should not be overstated. Furthermore, data by itself is a means that, if used properly, could help PES achieve their goals. By putting too much focus on the data itself, 'doing something with big data' could become a goal in itself, which is unlikely to generate value.

Big data is a relatively new topic for most governments and most specifically PES. In 2014, the Dutch PES was one of the first to experiment with big data. At present, the Belgian-Flemish PES calls itself a frontrunner in the 'Volume' and 'Velocity' aspects of big data (VDAB, 2015). Currently, the PES is implementing Hadoop[7], which should allow for distributed and scalable computing of large data sets. On top, they are creating explorer tools for big data discovery. Currently, PES seek to move towards smarter data. More than the amount of (big) data, they recognise and value the concept of smart data. However, it does imply that the utility of data needs to be defined or articulated somewhere and this is something PES seem to be lacking currently.

4.3 Advanced analytics

Closely related to big data is the field of advanced analytics (or big data analytics). In that sense, advance analytics can help to create the *utility* out of big data in order to create *smart data*. These advanced analytics often rely on large data sets to create sophisticated models and validate these models. Many of these advanced analytics are based on concepts rooted in artificial intelligence (which is a field in computer science). The following (sub) types of analytics and (potential) application areas seem relevant for PES at this point in time (there are many more):

- **Predictive analytics**
  Predictive analytics uses models based on statistical techniques that are rooted in areas such as machine learning (see below) and data mining to make predictions about the future. While such predictions have been made by PES for decades now for example in predicting unemployment and other labour market indicators, developments in big data and analytics could potentially realise tremendous improvements in these predictions. One of the key difference with traditional models, is that current predictive analytics focus more and more on the (sub) group or individual level behaviours, rather than populations as a whole. A second key difference is the speed at which predictions can be made. Banks, for example, use predictive analytics for fraud detections and for each transaction determine on the fly the likelihood that the transaction is fraudulent.

7 See http://hadoop.apache.org

Predictive data by itself is a means that, if used properly, could help PES achieve their goals. By putting too much focus on the data itself, 'doing something with big data' could become a goal in itself, which is unlikely to generate value. Analytics could potentially be used in a wide range of applications within PES. Obviously individual fraud detection (e.g. benefit fraud) is an area that comes to mind, but one could also think of more proactive and personalised services (also see sections 2.3 & 3.2). On a more macro level, one could think of improvements in forecasting (see section 2.3) and to test the effectiveness of ALMPs. At present, PES show a growing interest in applying better forecasting tools to measure trends and developments.

- **Machine learning**
  The second type of analytics feeds (partially) into the first, but could also be used in a much broader sense. In machine learning, computers learn to recognize patterns and subsequently draw some conclusion. A more formal definition is 'A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P if its performance at tasks in T, as measured by P, improves with experience E' (Mitchell, 1997). With the enormous amounts of (unstructured) data available to PES, machine learning could be powerful in finding patterns in data that could be used to improve processes and/or services. In this context, machine learning could be used for such applications as semantic analytics, such as CV processing to help job seekers improve their resumes; pattern recognition, such as the analysis of unstructured email communication or search patterns on websites to create better communication experiences; the fraud detection patterns that underlie the aforementioned predictive analytics.

Current levels of deployment of advanced analytics within PES is low. There are some large scale econometric and BI analyses, but no PES currently has dedicated teams of data scientists and engineers working on larger scale applications. The aforementioned innovation lab at the VDAB is (probably) the only exception of a PES experimenting more structurally with advanced analytics. This, by itself, is not a plea to PES to increase the use of advanced analytics. Rather, it points towards the possibilities of advanced analytics to create smart data and help the PES in achieving certain goals. In that sense, PES could consider exploring the possibilities of advanced analytics and at least start experimenting with its uses.

4.4 Further automation

In chapter 1, we described the IT evolution since the 1950s. Even though we are still in the midst of a phase of increased networking and mobility. Some argue that we have entered a new phase of IT innovation and this concerns the phase of 'robotisation' or increased automation of labour. Although the extent of these developments remains to be seen, estimates by MGI (2013) suggest that sophisticated algorithms might substitute for around 140 million full-time knowledge workers worldwide. The trend is clear: computers increasingly challenge human labour in a wide range of cognitive tasks (Brynjolfsson and McAfee, 2011). This will affect PES in two ways; the first is that it will make their work harder as more people will become unemployed and become harder to place in new jobs. Beaudry, et al. (2013), for example, document a decline in the demand for skill over the past decade, even as the supply of workers with higher education has continued to grow. The second is that it creates possibilities for innovation within PES as well, as more and more (expensive) labour within the PES can be automated.

An example of this work is that of call centre agents. A company called SmartAction now provides call computerisation solutions that use machine learning technology and advanced speech recognition to improve existing conventional interactive voice response systems. As a result cost savings of 60 to 80% over an outsourced call centre consisting of human labour have been achieved (CAA, 2012). As many PES have extensive telephone interactions with clients, this creates a large potential source of (cost) savings.

In the longer term, it is expected that more jobs will be automated. For now, it seems that this only applies to certain types of jobs (but this is a moving target). In theory, computers will be more productive than a human in situations when a problem can be specified (Acemoglu and Autor, 2011). The extent of job computerisation will thus be determined by technological advances that allow engineering problems to be sufficiently specified.

However, Frey and Osborne (2013) go beyond simply specifying problems. They argue that three characteristics of work make robotisation difficult (Frey and Osborne, 2013): perception and manipulation tasks, creative intelligence tasks, and social intelligence tasks. While algorithms and robots can now reproduce some aspects of human social interaction, the real-time recognition of natural human emotion remains a challenging problem, and the ability to respond intelligently to such inputs is even more difficult (Frey and Osborne, 2013). Furthermore, the key reason why human labour has still prevailed originates from humans ability to adopt and acquire new skills by means of education (Goldin and Katz, 2009). Yet as computerisation enters more cognitive domains this will become increasingly challenging for humans (Brynjolfsson and McAfee, 2011).

5. BARRIERS AND RISKS

The analysis so far has shown that there are many (external) developments facing PES, however, there are also many opportunities on the horizon to innovate and modernise parts of the organisation. However, there are many barriers on the way and risks that may hamper a successful execution. Rawson et al. (2013) argue that modern organisations should focus on end-to-end service journeys, rather than locally optimising satisfaction at singular touchpoints. Indeed, recent literature points to European PES moving towards more integrated approaches to dealing with jobseekers (Barnes et al. Wright, 2015) and it is likely that the use of data and IT will accelerate this movement. This means that the organisation itself will have to change and this change will have to be more holistically than has happened in the past. While PES have been good at product and service innovation, they are lagging in process and governance innovation and this hampers the use of data and IT to modernise the organisation. This stems from siloing, lack of integration within the organisation and beyond as well as a range of other factors. In this chapter we given an overview of the most important barriers and risks.

We break this analysis down in four groups; a) intra-organisational factors, b) inter-organisational factors, c) data related factors and d) societal factors.

5.1 Intra-Organisational factors

- **Redefining processes and the organisation**
  If PES want to integrate their processes to be more work orientated and evidence based, they will most likely need to be re-designed and re-organised. With current organisational complexities this will be a challenging process. In practice, many activities in the PES processes are stand-alone (e.g. 'Unemployment Registration', 'Job Matching'). Very few PES have analysed their complete workflows and assessed where steps can be shortened, integrated and how data coming from one step can inform another.

  As PES are functioning better and make better use of data, their own role might shift. For example, if PES have better functioning systems and are better equipped to use data to measure their performance, they could potentially work much more efficiently. Clients who currently still have to find their way in complicated systems and as a result strain the customer service infrastructure of the PES could, in a well-functioning PES, be served mostly online and only if needed use face-to-face or telephone services. More and better data equips PES with information to review their own role as organisations. Knowing more about customers helps PES to (re-)focus their efforts on those customers who are most in need, which is a trend that a number of PES are following today. The key implication is therefore that PES get smarter through better IT and better data. For example, PES who automate their processes by some form of self-service tool can use customer data to identify who is best served online. However, PES agree that the organisation as a whole has to be 'ready' to look at data and use data in this way. Leadership has to be open and be seen to endorse the messages and possible changes that emerge from having better data at hand to make different decisions.

- **Organisational structure & breaking down silos**
  As a consequence of redesigning processes, PES will probably have to make changes to their organisational structures and bridge existing silos. This, however, is challenging. A majority of all change initiatives in organisations related to IT fail[8] and PES are no exception to this rule. More evidence based working implies that the number of changes in organisations impacted and the pace with which these occur will increase. The bureaucratic nature of most PES will therefore not facilitate the agility needed to cope with these changes. For this reason, PES should start rethinking how their organisational structure fits a more data driven workflow.

  In his analyses of the 50plus jobs initiative in Germany, Knuth (2014) found that 'steering elements designed into these transactions were very soft; steering and coordination was largely left to network mechanisms. The result was superior to standard operations, which rely on law, hierarchical allocation of funds based on rules rather than targets, and on a contract market with tenders prescribing services or outcomes in ultimate detail' (p. 253).

  Markets, hierarchies, and networks have often been presented as either alternative (Hudson 2004), complementary, substitutional, or rival modes of governance (Entwistle et al. 2007).

- **Organisational implementation**
  The third consequence is the impact upon actual implementation of new practices in the organisation. Many public sector innovations are not being effectively diffused within public sector organisations (Greenhalgh et al., 2005) and as we saw above, the focus in PES is typically on the 'innovation generating stage' rather than the 'innovation adopting stage'. Research findings of Beer and Nohria (2000) shows that around 70% of change programs fail.

In the United Kingdom, a study of the Parliamentary Office of Science and Technology found in 2003 that a mere 13% of all IT projects were successful. This number dropped to less than one percent of IT-development projects (Parliamentary Office of Science and Technology, 2003). These failures are expensive. A 2010 study by the Independent found that the total cost of ten failed government IT projects exceeded GBP26 billion[9]. Fishenden and Thompson (2013) argue that the failures of IT projects result at least partially 'from the creation of a culture of IT-enabled service delivery with little incentive to innovate and introduce newer, standardized technologies that would generate a platform for greater competition and greater value for money' (p. 984).

One of the other key challenges is the resistance to change in the organisation and PES struggle with this as well. For example, in Finland, a statistical profiling tool was withdrawn in 2007 (Loxha & Morgandi, 2014). The profiling tool was part of an integrated IT system that calculated a risk estimate for the jobseeker at registration using administrative data. The risk estimate was used by the caseworker during the interview with the jobseeker to guide their decision on segmentation and targeting. Caseworkers did not think the tools were helpful or useful for the jobseeker, and overall results were not trusted. However, the model was found to be 90% effective at estimating the likelihood of a jobseeker being unemployed for over 12 months (Kureková, 2014). On the flipside, analytics start becoming successful once staff members understand that good use of data has the potential to enhance mission and programs and that simply complying with reporting rules does not (Partnership for Public Service, 2011).

Engaging staff in these changes can facilitate the successful introduction of new methods and tools. For example, the Norwegian PES shared the beta versions of new IT tools with their staff in order to collect feedback and introduce changes accordingly. Similarly, the Estonian PES tested new tools with their staff before introducing them officially.

8 See http://www.businessperform.com/articles/change-management/change_management_practice.html and http://www.forbes.com/sites/victorlipman/2013/09/04/new-study-explores-why-change-management-fails-and-how-to-perhaps-succeed/

9 See http://www.independent.co.uk/news/uk/politics/labours-computer-blunders-cost-16326bn-1871967.html (accessed 09/09/2016).

- **Changing workforce**
  As PES implement more technologies and start working with data, their staffing needs will change as well. The Partnership for Public Services states that the '3Ts'; technology, tools and talent should go hand in hand when transforming organisations. The increasing importance of data leads to many organisations appointing Chief Information Officers (CIO) or Chief Data Officers (CDO) and dedicated teams of data scientists that need to be close to the core process in the organisation[10]. In the context of Big Data, Gonzáles-Bailón (2013, cited in: Larsen et al, 2015) argue that successful utilisation of big data is an interdisciplinary endeavour that requires IT specialists, statisticians (data scientists), social scientists, legal experts and even philosophers. Many organisations make the mistake of focusing solely on the technical aspects of data and do not hire people with a social science background that can help to formulate the right research questions and help interpret the data. Another aspect is the training of the existing workforce. Case workers and other employees that need to use data and help improve it will need training in order for them to understand the data and work with the tools that provide and analyse it. A last question is how will PES succeed in attracting the data talent needed in the face of the 'Coming Jobs War'.

- **Performance monitoring & optimisation**
  The last consideration is important once new processes are in place (see figure 1). This concerns the monitoring of performance, as well as creating feedback loops that translate performance measurements into evaluations and actions. While most PES measure certain aspects of their processes, few PES have feedback loops in place that tie outcomes to actions as well as keep on optimising these loops. What we have seen is that many data related projects are either standalone pilots or experiments or continuous data projects that are rarely being evaluated.

- **Fragmentation**
  Fragmentation happens when data is scattered across the organisation and no unified system of data storage exists. A good illustration of fragmentation can be found in Poland where Sosnowska (2015) did work to develop knowledge about the labour market using big data. She notes that 'existing data sets are fragmented and they are at the disposal of different institutions. Furthermore, a coherent and all-encompassing system that would cover knowledge on the labour market at all levels of administrative divisions has not been developed yet' this is likely to be an issue applying to many more PES. Furthermore, it highlights the issue of interoperability of data between government agencies.

5.2 Inter-Organisational factors

- **Exchanging and sharing information**
  As a minimum this is needed to support jobseeker mobility (e.g. When they move from region to region or country to country) and if services are developed that span different institutions. This creates challenges on an organisational (management) level. For example, in Finland the PES has no reliable information on the status of their (former) clients when they leave the system since data exchange with other institutions is strictly limited). To solve this problem, the Finnish PES is working to integrate their databases. Furthermore, In Finland all public (and partially private too) sector master data can be connected via a national 'serviceway' that enables information transfers nationally. This integration offers the potential for Finland to better monitor their systems and clients once they leave (and in the future possibly re-enter) the system. The Polish PES is solving this issue through the use of an advanced Enterprise Service Bus (ESB). This brokering system enables the communication between the IT systems of PES (e-services, sending the messages) and external IT systems. It is used, for example, to facilitate data exchanges between the national and local PES.

- **Dealing with external forces**
  One of the factors slowing innovation in the public sector down is the fact that public sector organisations are typically dependent on other forces (e.g. The government for funding) and have to collaborate with other organisations over which they have no control. This creates performance problems as well. If PES are allowed the same levels of flex-

10 http://www.businessofgovernment.org/sites/default/files/audio/Gerald%20Ray,%20SSA,%20Part2.mp3

ibility and funding as private sector or charitable organisations, they could match or surpass the performance of these external parties (Davies, 2008). However, managers in the public sector have very little control over the types of services provided and the service delivery process, unlike their counterparts in the private sector (Fox, 1999). They cannot stop providing most types of services or simply change the method of service delivery. Furthermore, public service managers have to stick to rigid rules and procedures to protect the principles of equality among citizens and frequently don't have much freedom to re-allocate resources (Lovell, 2002).

'Facilitative management' is the term coined by Hudson (2004) for the type of coordination where the coordinating party acts as a 'spider in the web' (i.e. in a central role), but with very limited formal power. This might create somewhat of a solution to solve problems of coordination.

5.3 Data-related factors

- **Missing and/or partial data**
  Having good standards and good processes to guarantee completeness of data is a prerequisite for successful analysis. This hinges on two criteria: a) a common set of definitions and b) systems that force the collection of the key data points. However, this does not completely solve problems with partial and/or missing data. While techniques such as data imputation could help complete data sets, they are far from ideal given the underlying theoretical assumptions (e.g. Consistency of data across cases or variables). A better approach could be to mandate completion of forms, but this creates the risk of higher dropout rates. Very little knowledge exists to help PES with this issue and we are not aware of any having a good answer for how to deal with this problem.

  A related issue is that of a PES not being connected to other organisations and as a result having to ask clients for information they might have already supplied elsewhere. In this case the missing data needs to be supplied by the client for the wrong reasons. Some PES acknowledge that customers are still required to supply their system with repeat information, which creates redundancy of information, increases the rate of failure, slows down processes and possibly lowers customers satisfaction. A single and unified view of the client can help to resolve these types of inefficiencies and that is what better data and IT tools can help to achieve. For other PES, understanding the customer journey in detail to identify areas for improvement will help to design better data collection systems and relevant tools to improve their customers' experience as a result.

- **High data reliance**
  Several studies mention the drawbacks of a heavy focus of organisation on using data in their (decision making) processes; 1) staff may become less satisfied with their working conditions as they feel permanently watched due to the accompanied comprehensive monitoring exercise, which, in turn, could lead to higher staff attrition. Recent experiences in Denmark seem to suggest this development (Weishaupt, 2010b), 2) re-regulation or bureaucratisation due to the high focus on the numbers (this could turn the means into an end itself). 3) less innovation as actors increasingly follow 'good practice' examples rather than experimenting with new techniques, which include a risk of performance failure (Weishaupt, 2010b), 4) lower flexibility of autonomy for actors to deviate from procedures.

- **Ownership**
  Ownership of data is another challenge that becomes more relevant once more data is being shared within and across organisations and once processes become more intertwined. Data ownership in this sense is closely related to accountability. When data is being extensively shared within and/or between organisations, the question remains, who owns the data and who can be held responsible if something is 'wrong' with it? Furthermore, are mechanisms created where clients can monitor and adjust their information?

  In this context, PES need to decide whether customers can/should be given the right to access all the information collected and stored about them. While some allow customers to access information directly (EE) or by means of a more formal request (FI), the extent

to which customers can access different documents varies between PES. Some (e.g. DE, FI) share practically all the documents created on individual customers, including counsellor notes. Others limit access and do not even share the results from their profiling. However, all PES agree that granting access to customers is an effective way to empower them and encourage them to take responsibility.

- **Maintaining data integrity**
  As data is being shared and used throughout the organisation, the risk of damaging the integrity of the data increases. Creating the proper checks for data integrity and having sufficient back-up systems in place can help mitigate this risk.

- **Quality of data**
  An important practical obstacle is the quality of data sets. The largest obstacle to big data use is the often low quality of open datasets. As a result, some experts say analysts spend as much as 90% of their time cleaning data. One reason for this, especially in government is that data is often provided in non-machine readable or non-standardised formats requiring manual re-entry. (Bulger, Taylor & Schroeder, 2014).To solve this, experts recommend standardisation of codes, formats, and change management as well as accurate metadata to describe these codes (Bulger, Taylor & Schroeder, 2014).

  In this context, PES need to consider the validation of the information that customers provide them. For example, on validating skills and competences, PES tend to apply one of two models: i) Some (e.g. Belgian-Flemish PES) rely mainly on the information provided by their customers without exhaustively checking it. The aim is to encourage jobseekers to take responsibility for their own profile and empower them in their search for a job. ii) Most combine validation of official documents with counsellors' own assessments. PES stressed that this helps to verify the profile of their jobseekers, but recognised that it fails to measure jobseekers' actual skills and competences. This does raise the question whether a common set of standards is needed to assess and guarantee the validity of the data PES are working with.

- **(Semantic) Interoperability**
  This breaks down in two issues, a) are the different systems within the PES speaking 'the same language' and how difficult is it to connect the different systems, b) is the same terminology used to define (parts of) the process. For example, are names of jobseekers used, or are consistent identifiers used throughout the system?

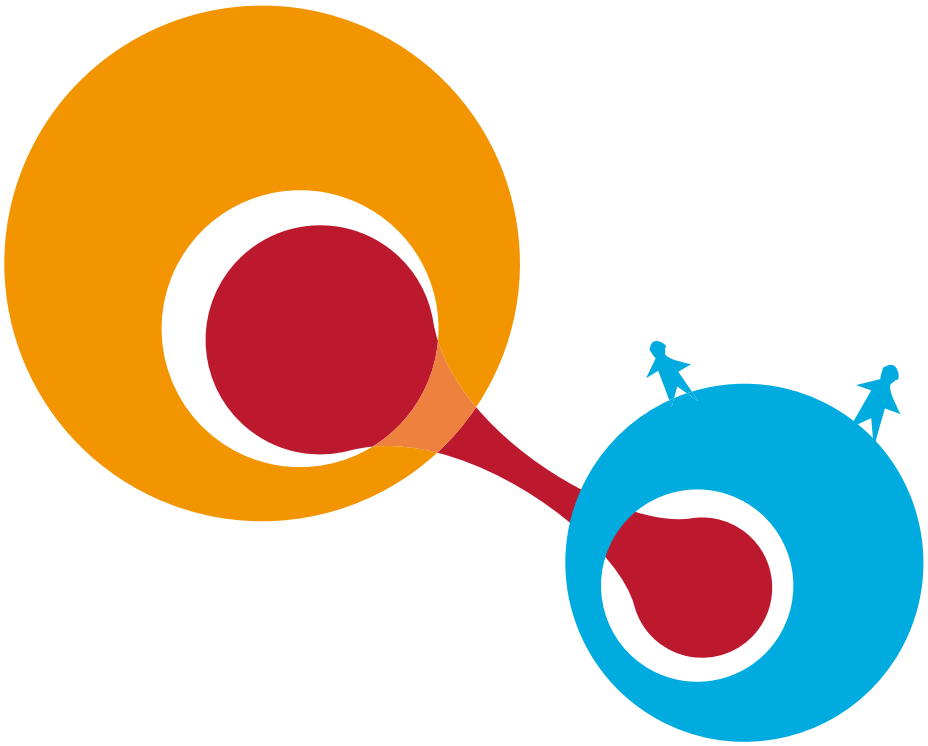
- **Common standards**
  Are common standards used throughout the system? For example, are vacancies classified consistently across the PES and do training programs follow comparable coding schemes to job classifications? This becomes especially prevalent when sharing data with other organisations. For example, does a ministry of education use the same schema as the PES, so that LMI can be used the steer educational programs? To give an example of how the lack of exchange is hurting, Sonny Angaras[11] notes that 'part of what causes a rift between schools and jobs is the lack of a systematic way for collecting labour market information'. That is, there is no institutional mechanism from which schools and companies can signal to each other what they're doing or what they need. APIs and other extraction tools, if fuelled by common standards could ease this problem.

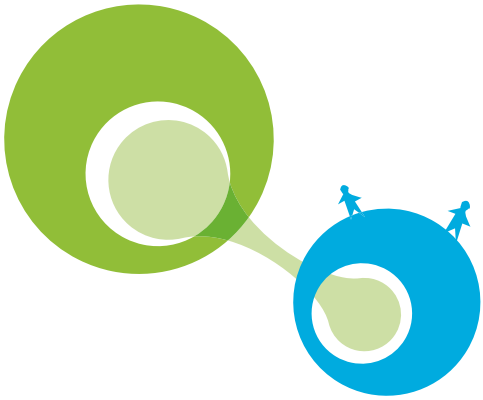
- **Difficulties in extracting**
  The last issue concerns how easy it is to extract data from systems for analytics purposes. Do systems offer (similar) APIs, what data types can be extracted and how are security and privacy guaranteed? While data extraction is always an option, simply by scraping or pulling data from the database, APIs allow for convenient extraction that does not cause excessive work for the engineers working to maintain the systems themselves.

11 See https://www.britishcouncil.ph/sites/default/files/sen._sonny_angaras_keynote_speech.pdf

5.4 Societal factors

- **Privacy (Big Brother) vs. Transparency (Open Data)**
  Another concern lies with balancing the needs to protect privacy of jobseekers, employers, and other identifiable sources as well as trying to be an open, transparent organisation. Transparency through open data is not only a great way to increase PES accountability, at the same time it could lead to novel applications that could aid the work of the PES. A prominent example of the latter is the LMI for All (see http://www.lmiforall.org.uk) initiative, an online open web portal providing access to a comprehensive set of LMI that are freely available to the public. The tension lies between providing rich enough data for meaningful applications to be developed, and being generic enough so that individuals cannot be identified. In this context, it is also important to have very clear consent procedures and to be explicit to clients about the purposes for which their data is being used.





6. CONCLUSIONS

Modernising public organisations is hard. Governments are not known to be the fastest changing organisations and with the number of changes in a) perspective on how government needs to be organised, b) technology, c) data and d) societies as a whole, changing becomes more and more challenging. Added to this, the pace of change in many domains is increasing, making it even more difficult for PES to keep up with what is going on in the world. As a result, PES recognise that innovation is indeed a challenge, but do recognise that a clever use of IT systems and data can help them face at least the short term challenges. In this paper we have analysed in more detail the different challenges, as well as the current status quo and the (short term) future developments. Based on this analysis, we draw the following conclusions/ recommendations:

1. **Modernisation becomes increasingly complicated and requires holistic approach**

   As we saw above (chapter 1), changes seldom happen in a vacuum, but are often intertwined with changes of a different nature. However, current attempts at modernising are often fragmented and aimed solely at implementing new IT systems or overhauling processes. Given this realisation, it is no surprise that most change initiatives (also see below) fail; too often important aspects are being ignored in modernisation programs that could cause programs to fail. In the same vein that various authors argue that performance management should be at least partly a political and social governance process as opposed to purely a technical managerial one (Nunn et al., 2010; Weishaupt, 2011), we can build the same argument for the implementation of IT and/or data.

   Modernisation through IT and Data strategies is a necessity for the future, but it does require a (much) broader focus than just the IT and data components. For IT and data strategies to be successful, PES need to look broader, to what is going on in society now and what will happen in the (short/medium term) future. Furthermore, they need to design organisations that fit the IT and data strategies. Many of the data-related challenges (e.g. Siloing and lack of integration) stem from mismatches in the design of the organisation and the desired state of the data infrastructure. While there are, obviously, many legacy systems and organisational infrastructures causing these problems, the question does arise whether it would be beneficial to start thinking about what a modern PES would look like if it were designed from scratch and how such a design exercise could help PES in realising true modernisation and face the challenges that PES will face in the coming decades.

2. **Good IT strategies are key to good data strategies**

   IT and data increasingly become close siblings: IT generates data and (good) data is needed to monitor not only the performance of IT systems, but of the processes that are (more and more) driven by ITs. Presently, extracting and organising data are big challenges for PES and beyond. These challenges could have been largely prevented in the design phase of IT systems where a) data formats need to be specified and b) the necessary *hooks* (e.g. APIs) to collect data are implemented. In that sense, the design of IT systems should not just be about the architecture of the system but should include such broader questions as a) what are the key data points we need to extract from the system to measure its performance, b) what are the data points needed to measure the quality of its outcomes, c) what are the inputs the system is working with and how can we connect the input side to other systems (to prevent redundancies in information collection), d) what are the outputs of the system and how can we connect these outputs to other processes in the organisation or even other organisations.

   Data thus needs to move from being an afterthought in creating processes and systems to a key element of the design and implementation phases. At the same time, we should warn for the rigidity that could come with sticking to strategies. In an ever faster evolving world, sticking to a strategy that will only pay off in several years in the future could hamper innovation and create a certain rigidity in that it forces the organisation to 'stick to plan' instead

of being flexible in adjusting to a changing environment. For this reason, ongoing evaluations are important, as well as creating strategies in the first place that a) allow for changes and b) that have realistic time-horizons.

3. **PES need to start with clearly defined objectives when working with data**

   While all PES have some (often clear) goals in mind when delivering their services and running their businesses, only very few PES have fully integrated systems with clearly defined key performance indicators (KPIs) that can be continuously measured. The types of data that are being collected are typically more ad-hoc measurements (e.g. Surveys or quarterly overviews) of some indicator. Evaluation and monitoring in continuous feedback loops seldomly happen. Virtually no PES has a) clearly defined goals, b) on all levels of the organisation, c) for all processes, services, and/or projects and d) have translated these goals into KPIs, e) formulated (continuous) measurement strategies, f) systematically collect data to measure these KPIs and g) evaluate, monitor and adjust based on the outcomes.

   This in itself is not a call for a highly rigid system where every goal is translated in KPIs and 'everything is being measured', we do believe that a more stringent focus on data and clearly defined data cycles can help a PES in fine-tuning its performance and deliver better, more high quality services.

4. **Data integration needs to be a priority**

   On different levels (local, regional, national and international), integration of data needs to be a priority. Not only is integration one of the key challenges as defined by the PES, it will most likely become even more important in the future as clients no longer accept to supply the same data twice and advanced analytical models rely on (up-to-date) data from a multitude of sources to deliver personalised services. This requires ongoing efforts in terms of creating semantic interoperability between systems, the needed infrastructural connections, a common definition of terms, security, privacy protection, data ownership, clients' consent and the institutional willingness to break through silos.

   Furthermore, as integration happens on different levels (within the PES, with other governments, and private parties), PES need to start working on the different types of arrangements and requirements at these different levels.

5. **Big data is a means, not an end**

   Data itself is not the goal and big data is more a buzzword than a magical potion that will somehow fix all problems. When a PES has clearly defined goals, data becomes a means to reach these goals. PES should then think broader than just the (big) data, but focus on smart use of data and make sure aspects such as security are guaranteed. In that perspective, PES need to start planning on how to handle to complexities (e.g. In terms of data management and handling) of the large volume of data, but many of the key aspects of smart data, such as the focus on security and value should apply to all data collected and used.

6. **Innovation is a challenge**

   Innovation is a key driver behind modernisation and while PES are all, in some way, innovating, it is being recognised as a challenge. Innovation is not a part of normal processes and, unless dedicated teams or organisational units exist (such as in the Belgian-Flemish PES), it is to be expected that innovation will remain an activity low on the priority list. At the same time, the need to innovate increases. Technological trends such as robotisation will not only affect the labour market which the PES tries to serve, but will also impact the PES as an employer. How is the PES going to deal with this? What processes can be automated further and how do PES make sure even the less digital savvy remain being served well?

   During the workshop it became clear that innovation is a very relevant topic for PES and PES are seeking ways to innovate. The biggest barriers to them are the lack of capability and priority in the organisation. Furthermore, a key question is whether innovation needs to happen at the member state level or whether EU level innovation is needed. Many challenges, such as the increased mobility of workers and the (potential) future need to further integrate data and processes would require higher levels of innovation on a larger scale. As such, it is worth exploring how to best orchestrate innova-

tion within PES (and the public sector as a whole) to make sure all PES and the EU benefit.

7. **PES could benefit from stronger focus on data analytics capacities and research**

   While use of data is of growing interest and relevance, data capabilities are lagging behind. PES seldomly employ dedicated data science teams with the accompanying staff of data engineers, data managers, data scientists and social scientists to make sense of all the data. While it may be more common to have more traditional research teams (e.g. to conduct surveys), now seems like a good time to start thinking about the needs of the organisation and the capabilities needed to reach organisational goals. This also includes such questions as the (external) data types needed to solve the most critical questions.

8. **Organisational change is human change**

   Implementing change in the organisation is very complicated and even those PES who are at the forefront of implementing IT and have good experiences managing the implementation struggle with the 'softer' side of changes. Resistance to change remains an issue and in many cases the organisation underestimates the impact of human aspects on the success of the change. For this reason, PES staff should be involved in the process of improving IT tools and the use of data early on. Not only are staff a great source of information that can be used in designing tools and processes, they can also help in creating usable and user friendly interfaces. Furthermore, the involvement will likely decrease resistance and clear communication and training will increase acceptance of the proposed change.

9. **Privacy and ownership need to be guaranteed**

   Especially when data becomes more integrated and shared across organisation, ownership of the data becomes more of a challenges. Who is responsible for keeping the data accurate and up-to-date? Furthermore, what do clients have to say about their own data? Are their consent mechanisms and are their ways for clients to revoke their consent and/or manage their own data. An extension of this is the need to secure all data at all times.

   It seems no PES currently has an answer to all these questions and, while privacy statements certainly exist, few PES have broader strategies in place and are building tools to manage data effectively.

6.1 Closing remarks

Modernisation is a relevant, yet complicated issue for PES. The role of IT and data to provide better services and improve processes in society are increasing in importance. For PES this provides the opportunity to (potentially) 'do more with less', if IT and Data are used properly to innovate and transform the organisation. And we do see that PES are making a lot of progress in embracing the possibilities of new technologies and data.

However, we do also see challenges. Modernisation is not just a matter of 'using big data' or 'digitalising a service'. It means a more radical transformation that affects all parts of the organisation; its structure, its culture, its decision making, the design of the service delivery process, the hiring processes, the role of evaluations and data-driven feedback loops etc.

Furthermore, all these parts are intertwined. Simply collecting and analysing big data will not yield (much) value, only when embedded in the heart of the organisation and embraced by everyone in the organisation can smart data be realised and value created. Although many short term gains can be achieved, simply by improving processes or sharing more data, it is to be expected that PES should start thinking more fundamentally about their future role in societies, integration with other governments (and private parties), the design of their processes and the roles of technology, data and ongoing innovation therein.

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