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Disruptive Technologies Supporting Labour Market Decision Making

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Report and model for developing pathways for disruptive technologies into public services

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Abstract	
<p>This report outlines a model for developing pathways for disruptive technologies (DT) into public services. It draws on the results of the HECAT project which benchmarked existing technologies in public employment services (PES) before developing and piloting a DT in partnership with the Slovenian PES using agile open innovation methods. This report outlines a model based on the experiences and best practices of the HECAT project, for introducing disruptive technologies into public services.</p>	
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<p>Disruptive technologies, public services, public employment services, best practice, model, pathways</p>	
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Acronyms

ALMPs	Active Labour Market Policies
AI	Artificial Intelligence
EU	European Union
DT	Disruptive Technology/Technologies
ESS	Employment Services of Slovenia
GDP	Gross Domestic Product
HECAT	EU project, Grant agreement No. 870702 https://doi.org/10.3030/870702
LTU	Long Term Unemployment
MLM	My Labour Market pilot created by the HECAT Project, available at: http://www.mylabourmarket.com/en
PES	Public Employment Service
PEX	Probability of Exit of Unemployment

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Report and model for developing pathways for disruptive technologies into public services (D5.4)

Executive Summary

This report sets out the approach taken by the HECAT research consortium to develop working methods and processes to take advantage of, and utilise, the knowledge and expertise contained within the sociological and technological disciplinary areas across the consortium. The consortium set out to develop and embed disruptive technologies (DT) into a public service. This report outlines our acquired knowledge and experience in achieving this. It draws on the experience and results of the HECAT pilot MyLabourMarket (MLM), available at <http://www.mylabourmarket.com/en/>, which demonstrated an integration of a pilot system introduced into public employment service (PES) counselling, showcasing the ethical and democratic use of citizen data. As part of the study, a baseline of existing approaches to algorithmic governance in PES made the case for a new and radical disruptive approach (Griffin et al., 2020). Our use case scenario draws on a benchmarking of governments' 25 years plus experience using labour market data to estimate probabilities of exit (PEX) of unemployment, with our own efforts to instigate a DT into this context.

The report highlights how the consortium builds on existing long form studies into experiences and practicalities of social welfare administration and labour market participation. It additionally outlines the challenges and opportunities faced by the consortium in developing the MLM platform to ensure that it reflects the reality of street-level practice. Challenges were also faced in developing agile and effective working practices between the sociological and technological discipline areas. The HECAT project set out to lead the development of the DT from a sociological perspective, to ensure the voice of the user was integrated into the platform, so to maintain our guiding principle of *working with and not on unemployed people*. The resultant processes created an interdisciplinary model of working through of iterative refinement of the platform, starting with siloed sociological and technological task force groups feeding back into the consortium to develop platform functionalities, followed by a series of specific memos on each functionality and finally interdisciplinary working groups to refine the functionalities of the platform. Analysis of the lessons learned throughout this process has been refined into a model that represents a pathway towards integrating and embedding DT into public services.

1. Report and model for developing pathways for disruptive technologies into public services

This report outlines a model for developing pathways for embedding disruptive technologies (DT) into a public service. It draws on the experience and results of the HECAT pilot MyLabourMarket <http://www.mylabourmarket.com/en/> which demonstrated an integration of a pilot system introduced into public employment service (PES) counselling, showcasing the ethical and democratic use of citizen data. As part of the study, a baseline of existing approaches to algorithmic governance in PES made the case for a new and radical disruptive approach (Griffin et al., 2020). Our use case scenario draws on a benchmarking of governments' 25 years plus experience using labour market data to estimate probabilities of exit (PEX) of unemployment, with our own efforts to instigate a DT into this context. We show how PEX data can be **used with rather than on citizens**. We emphasise opportunities for DTs to cut through the Gordian knot of *doing more with less*, responding to the wicked problems of megatrends using the tactics and strategies of DT. In this way, the project shows a pathway for the positive deployment of DT in public services.

1.1 Disrupting Public Services

Governments, for at least the past twenty years, increasingly think of radical transformational change in terms of disruption. Megatrends such as demographics, climate change, migration, urbanisation, geopolitical shifts and technological change have made Governments seek new approaches to delivery. These trends arise against the backdrop of the global financial crisis and ensuing austerity, as well as the pandemic, war in Ukraine, inflation and cost of living crisis— all of which challenge governments *to do more with less* — to reduce costs, improve quality and develop new services to meet new challenges (Eggers and Gonzalez, 2012). Citizens and their politicians are looking for ever more capable, responsive, resilient, adaptable and efficient public services. Increasingly, *disruptive technologies* are being seen to hold the potential to square that circle.

Originally the term *disruptive technology* was applied to radically new service delivery methods and business models applied to established industries (Bower and Clayton, 1995; Christensen, 1997), typically by a new entrant who exploited technologies to upend existing incumbent and dominant approaches. Central to the promise of DT is a consideration of how users, customers or citizens' expectations have changed, so it is necessary to turn away from other public reform strategies— new public management, or business process reengineering- which limit innovation to focusing on streamlining existing practices, or doing the same thing better and cheaper. Seminal commercial examples are mobility apps disrupting taxis and car ownership (Uber and Lyft), media firms with no content (Facebook and Twitter), communication companies with no physical infrastructure (WeChat and Skype), and retailers without stores (Alibaba and Amazon). Driving digital disruptions are smarter machines, exploiting ever more real data with a host of tools and platforms

being used by more autonomous customers and users.

To disrupt is to set aside existing ways of thinking and acting. The etymology of the term arises from the Latin *disruptus*, from *disrumpo*, commonly to break or burst asunder, and so the term follows the logic of Schumpeter's creative destruction, itself a Marxist form of radical social change. Technology here is the generative creative replacement of what is broken in change processes, with a Greek etymology in *tekhnē* meaning art, craft or system. In this, technology is a means, not an end, so technology is not disruptive, rather it is the change to the underlying social, organisation, economic or cultural process that is being altered. The starting point for disruption is a fundamental, elemental understanding and re-examination of the *raison d'être* for a particular activity. As a result, disruptive technology approaches try to avoid piecemeal or bricolage development of public sector services by emphasising returning to the first principle rationale for services, and radically reconceptualising them using new technologies and methods.

Public services are perhaps the most complex and ambitious organisations humans have ever produced and have always been disruptive— think of accomplishments such as the development of mass healthcare, education and welfare as well as scientific programmes that led to the internet, space discovery, and cures for multiple diseases. Nonetheless, once established, public service organisations tend to prioritise stability, capability, procedural justice and the status quo, so tend to follow the mode of classical Weberian hierarchical bureaucracy (de Vries et al., 2018), often considered adverse to change, innovation and disruption. With considerable practical wisdom, public service organisations tend to stay with what works, what is tried and trusted, and broadly accepted. As a result, disruption is led by contextual demands and is supported by some, but not all stakeholders. Within the wider public service delivery eco-system, public service start-ups, citizens facing overwhelming pressures, overall geopolitical policy towards the digital and, in places, public sector leadership is currently driving disruptive transformations.

We need to remember that disruption as a phenomenon is unpredictable and undomesticated. Transitions have often been described as non-linear social change processes (e.g., Geels and Schot, 2007; Tyfield, 2018). Moreover, governing transitions involve 'messy' interactions across different processes, levels of governance, and state and non-state actors (Castan Broto, 2020). As a result, public service DT carries considerable risks, as well as opportunities.

1.2 Digital disruption

It is now increasingly evident that digital disruption is changing how we live, work, connect, coordinate, and govern. While much of the focus is on novel and obvious products, the more subtle changes to services, processes and organisational models have perhaps greater institutional impacts (Hinings et al., 2018;

Nambisan et al., 2019). The promise of *the digital* is that services will be more accessible and convenient for citizens, at times and in ways that are easier, more flexible, more transparent and of a higher quality. In this way, digital services can foster greater civic engagement, compliance and participation. In the back office of government services, the promise is more efficient, more productive, rule-based self-service administration. With fewer public servants intervening in mundane administrative workflow, government employees' time is freed up to undertake higher-value, more strategic activities. Digital services foster better collaboration between government services, as sharing and comparing data is relatively easier.

Yet digitisation can also reorientate core institutional values, norms, and rules, which are indirectly, yet more profoundly, reconfiguring how organisations and industries perform. When such digital disruptions happen to government services, they can, in turn, gently, recompose society. In both public and private sectors, digital transformations are a form of creative destruction, and it is as important to examine the dynamics that are displacing institutional apparatuses, and how they, in turn, reform the assemblage of government. In this, the relational and performative impacts of digital changes cascade outward from the technology to the citizen and how they relate to the state. As a result, the starting point for any analysis of digital disruptions is a deep understanding of the institutional context of change and the underlying processes that are being recomposed digitally.

It has long been noted that disruptive technology can be “challenging and undermining rules and legitimacy of institutions” (Brown et al., 2013, p. 704) and aiming to “disengage rewards and sanction mechanisms associated with a set of rules, technologies and routines” (Duygan et al., 2019, p3). Disruption of networks or individuals can lead to shifting power positions from incumbents to new participants (Johnstone and Kivimaa, 2018; Johnstone et al., 2020). This is also likely to face intensive resistance from those in danger of reducing power.

1.3 Understanding public services?

Public services are any services provided by or for the state based on political decisions, typically supported by policy analysis. Public services comprise a wide range of organisations carrying out a vast array of activities, everything from ambulances to zoos. To situate the idea of DT in public services, it is useful to consider the range of activities incorporated as public services. Before doing this, it is useful to capture something of the scale and variety of services.

In 2021, total government expenditure in the EU amounted to 51.5% of gross domestic product (GDP), so in broad terms, half of the European economy is public services, and half is private sector. Exploring public expenditure demonstrates the enormous scale and range of services delivered by advanced states.

Governments deliver both soft, person-centred services as well as hard services such as utilities, public transportation and infrastructure. Surrounding services are a range of regulatory and governance organisations such as regulators, public and local authorities, and inspectorates, as well as internal functions such as policing, judiciary, incarceration services, diplomacy, migration and economic development.

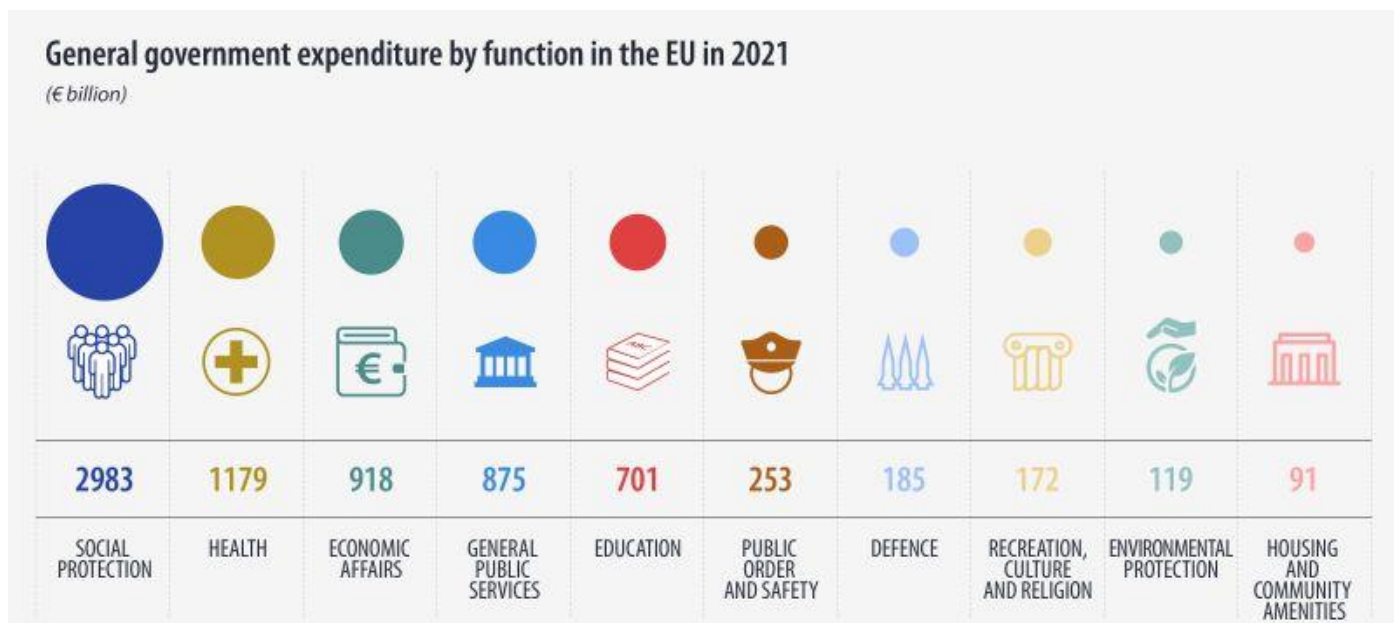


Figure 1 General Government Expenditure by Function in the EU in 2021

Source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:GeneralGovernmentExpenditureEN_2021.jpg

Social protection is the most significant domain of public services, accounting for almost 40% of government spending across the EU, and approximately 20% of EU GDP. Much of the academic policy research follows this expenditure pattern and so focuses on human welfare provision (Dean, 2012; Bailey and Sarter, 2023)—with some natural service connections to social and public/population health care, education and housing. Underpinning public services is the idea of the rights of citizens (Marshall, 1992), the rights of those who reside and are recognised in a particular polity and are entitled to access public services— as a social and civil right.

Total general government expenditure on social protection, 2021 (% of GDP)

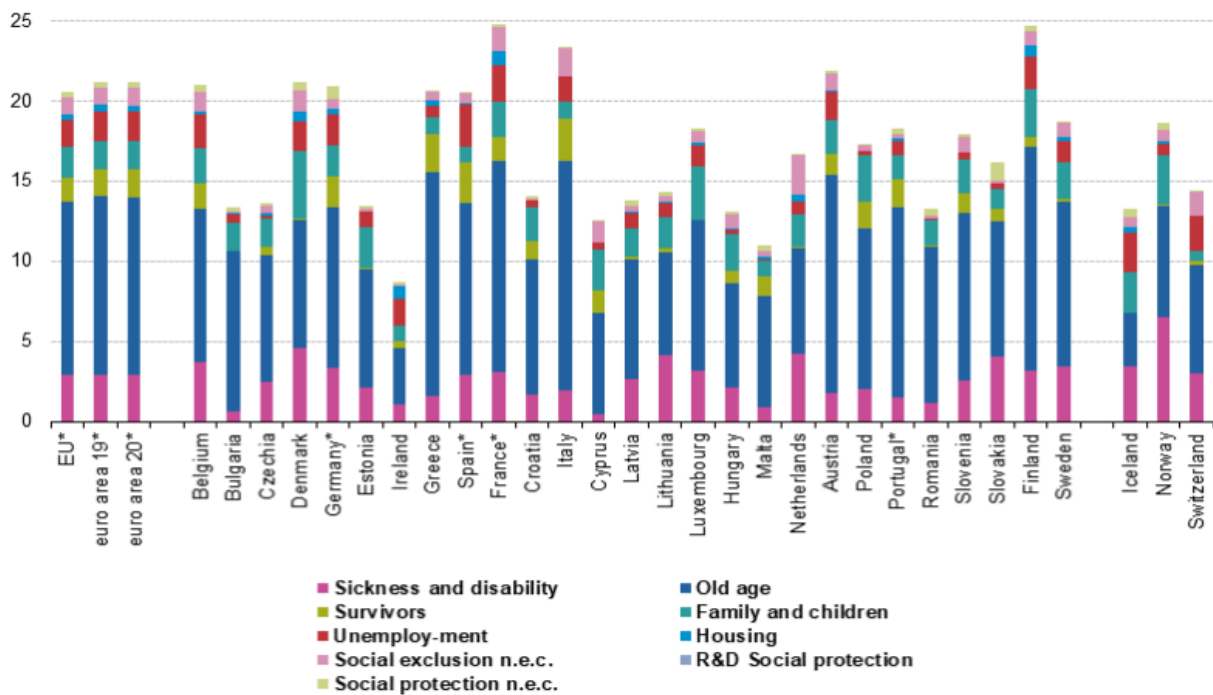


Figure 2 Total general government expenditure on social protection, 2021 (% of GDP)

Source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_social_protection
 Source dataset: Eurostat ([gov_10a_exp](#))

1.4 Leading public service digital transformation in Europe

DTs in public services is part of a broader approach to delivering on ambitious EU policy goals around digital transformation, as well as environmental and social goals.

The European Commission’s Digital Compass 2030 targets 100% of key public services to be fully online by the end of the ‘digital decade’ (European Commission, 2021a). The digital compass tool is a monitoring and governance mechanism to track progress towards the four objectives (digital skills, transformation of business, public services and secure and sustainable infrastructure) each with key performance indicators. These policy priorities are connected to the European Pillar of Social Rights action plan with a target of achieving basic digital skills for at least 80% of all adults by 2030 (European Commission, 2021b). Underpinning this digital transformation is the ambition to provide European households with access to 5G networks. Each of these policies is essential to the successful implementation of digital transformation of public services. Member States have responded to the digital decade targets by creating public sector digital innovation plans and ministries for digital transformation. However, the Covid-19 pandemic has accelerated the planned digital transformation and revealed society's vulnerability to new digital divides while demonstrating the opportunities offered by digital tools (Negreiro, 2022). The progress of Member States

towards EU digital transformation and implementation of the social pillar principles are monitored and measured by the Digital Economy and Society (DESI) index (European Commission, 2022a, 2022b).

The von der Leyen Commission (2019-2024) has identified "a Europe fit for the digital age" as one of its six policy priorities. Other priorities include the European Green Deal, an economy that works for people, a stronger Europe in the world, a new push for European democracy, and promoting our European way of life. Although the European digital agenda includes important initiatives such as the roll-out of broadband infrastructure, Digital Services Act, Digital Markets Act, Artificial Intelligence Act, protecting children online, and cybersecurity, ensuring resilient and secure EU public administration is the foundation for digital transformation. This foundation is coupled with secure and borderless public sector data flows and cross-border interoperable digital public services (European Parliament, Directorate-General for Parliamentary Research Services, Bassot, E, 2022). The European Commission recognises the significance of the digital transformation of the public and private sectors through the co-financing of research, development, and deployment of innovative technologies as part of the €7.5 billion Digital Europe Programme. Other programmes involved in funding digital infrastructure include the Cohesion Policy, the Connecting Europe Facility, and the EU Recovery and Resilience Facility funds (Negreiro, 2021).

The communiqué from the European Union Social Summit in Porto in 2021 set out the European Pillar of Social Rights (EPSR) with three headline targets to bring the employment rate to 78%, at least 60% of adults attending training courses every year and lifting 15 million people out at risk of poverty or social exclusion (European Commission, 2021c). Behind these targets is the intensification of EU-wide coordination of social policy and the integration of traditional policy concerns by balancing employment, with social protection and equality of opportunity. Driving these policies and targets is considerable EU funding. As the key measure to accomplish these targets, the European Commission and most member-state governments look to active-labour-market policies (ALMPs). Despite decades of experience, however, there is little empirical evidence to indicate ALMPs long-term effectiveness or value (Card, Kluve and Weber, 2017).

1.5 Why public employment services?

Public employment services present a general use case for disruptive technologies in public service organisations.

European welfare states were originally developed to provide material support to address poverty and other social risks. The shape and nature of service provision emerged in the late 19th and early 20th centuries from a rag-tag of municipal schemes for poverty alleviation, old age, child and healthcare, all subject to political and policy contestation (Jeacle, 2016), as well as top-down grand policies for cradle-to-grave welfare.

Importantly, it is also an explicit gesture towards rapprochement in Europe, an armistice to the continent's repeated state of fratricidal war. In one sense, welfare is broadly an anti-revolutionary construct (Ewald, 2020), an insurance against unrest that guarantees the state's existence, maintenance and adaptation. This idea follows in the footsteps of Machiavelli's originality as a prophet of policymaking with a deep understanding of instrumental, managerialist political thinking, and his general concern for political continuity through internal stability (Berlin, 1974). In his lesser-known Florentine Histories, Machiavelli retells the 1378 Ciompi Revolt as a lesson where an excess of poverty spilt over into political violence that temporarily toppled the Medicis. From medieval peasant rebellions met by dispensations for the poor, to post-war opportunities for reconstruction, the state frequently prescribed welfare as a salve to inequality and suffering, without systemic change.

Welfare is a salve to moderate rather than address inequality (Wilkinson and Pickett, 2009; Piketty, 2020). But from the 1960s onwards a supposed side-effect was identified—that groups of citizens were becoming trapped on welfare and so deprived of agency. From this fuzzy notion ALMPs emerged. Standard histories trace ALMPs to post-war Scandinavia, particularly in the 1950's Swedish Rehn-Meidner policies, where extensive social provision was popular and activation policies were seen as important means of 'social inclusion'. The idea that welfare reform plays an important role in preventing 'labour market exclusion' is still current. These policies were adopted by the US, with a considerably harsher emphasis on conditionality, then spread to Australia, the UK and became adopted by the Organisation for Economic Co-Operation and Development (OECD) in the 1990s, becoming EU-wide policy by the end of the 20th century. Notable examples include welfare reforms under Blair's Labour Party in the UK, the Hartz reforms in Germany and the erosion of the rights-based French welfare state under Sarkozy (Hansen, 2019). Welfare reforms assume the provision of welfare entitlements; the logic of ALMPs assumes there is something passive that needs to be 'activated' (Hansen, 2019). These policies emerge in response to the provision of universal state-funded benefits to the unemployed, outside of systems of contributory 'social insurance'. The persuasiveness of ALMPs, particularly in America, is underpinned by the critique of the welfare state articulated by Von Hayek, even as the Beveridge report was being published in 1942 (UK) and popularised by Milton Friedman in the post-war period.

The services offered by PES are ground zero for this practical debate between assisting individuals through cash payments (now representing 1.1% of GDP in advanced economies), and ALMPs (0.6% of EU GDP), so a 2:1 split (Pignatti and Van Belle, 2018). ALMPs are a broad suite of policies that aspire to reform the 'dependent' individual so they are 'motivated' to work. As activation was embraced by the 'third way' political platforms of the 1990s, the metaphor of turning the safety-net of passive welfare states into a trampoline was used to guide policy formation. ALMPs variously entail training, reskilling and education,

behavioural modification through case-worker meetings, psychological and algorithmic profiling, motivational workshops, monitored job search, internships and/or mandated hirings. In certain countries, failure to comply with such programmes of self-development can lead to sanctions—with cuts to, or suspension of, claimants' welfare payments.

So, PES are one of the most significant aspects of public service, are vital to societal well-being, cohesion and peace, and they are also the site of contested politics of public service delivery. DTs in this context are currently envisaged in macro, EU-level policy, and so innovation, process and service change must be considered in light of the broader social and political impacts of this policy domain.

1.6 The transformative impact of disruptive technologies in public services

The HECAT project was funded under an EU Horizon 2020 call for proposals on the topic of the transformative impact of DTs in public services¹. The call text identified examples of DTs such as block-chain, big data analytics, Internet of Things, virtual reality, augmented reality, artificial intelligence, algorithmic techniques, simulations and gamification. It further outlined areas where the use of DTs is growing and where it can be beneficial, such as in public administrations, public goods, public governance, public engagement, public-private partnerships, public third sector partnerships and policy impact assessment. However, it acknowledged that the real potential impact of such technologies and the ways in which they can disrupt the existing landscape of public services and legal procedures and can replace present solutions and processes are largely unknown. It acknowledged that deploying these disruptive technologies in public administrations requires a thorough assessment of their potential impact, benefits and risks for the delivery of public goods.

This call for proposals challenged projects to pilot disruptive technologies, to engage with multidisciplinary partners, stakeholders and users to examine how emerging technologies impact the public sector (including the impact on public servants and the relation between public services and citizens) and explore in a wide-ranging fashion the issues surrounding the use of these technologies in the public sector. This method of piloting new ideas in a test phase allowed public authorities to develop pathways for the introduction of disruptive technologies, while addressing the societal challenges raised by such technologies, based on a thorough understanding of users' needs, to enhance knowledge on digital democracy, to develop new ways of providing public services, of ensuring public governance, of boosting public engagement with the help of disruptive technologies, to contribute to developing new practices, to optimising work processes and to

¹ Horizon 2020 Topic: DT-TRANSFORMATIONS-02-2018-2019-2020 - Transformative impact of disruptive technologies in public services. Available from: https://cordis.europa.eu/programme/id/H2020_DT-TRANSFORMATIONS-02-2018-2019-2020

integrating evidence-based decision-making processes in public services.

2. Working Case of PES Techniques

The HECAT project started with a number of benchmarking exercises to establish the state of the art of the last cycle of disruptive technologies, identifying the 25-year development of profiling algorithms used by PES. In this we undertook a structured literature review (n=146), close work with our piloting partner on experimenting with various technological modelling approaches (regression, classification and neural network approaches), as well as building a rich understanding of the universe of data available to feed a model, TAIEX² briefings from PES administrators (France, Australia, Croatia, Slovenia, Austria) and with development and critical data scholars who did longform studies in their countries (Austria, Poland, Belgium and Ireland).

Salient HECAT Project deliverables on benchmarking:

Deliverable Number	Deliverable Title	Dissemination Level	Deliverable Link
D1.3	Report on ethical, social, theological, technical review of 1st generation PES algorithms and their use	Public	https://doi.org/10.5281/zenodo.7913458
D2.2	Technical report data sources and data protection for algorithm development	Public	https://doi.org/10.5281/zenodo.7914775
D2.3	An initial baseline study and sample database for conditions of employment and unemployment	Confidential	Confidential
D3.1	Report on commonly used algorithms and their performance	Confidential	Confidential

Table 1 List of HECAT Deliverables on benchmarking

In this section, we reflect on the working practices of DT in the public services.

2.1 Legacy of Profiling

Profiling algorithms are adopted as a service offering efficiency in meeting the needs of various jobseekers, particularly those of high need (Desiere, Langenbucher and Struyven, 2019). However, despite the idealistic expectations of the benefits of these tools, particularly in the age of advancing digitalisation, there are still few “best practice” scenarios which propel the standardisation of such technology’s adoption. Across adopting countries, various approaches to PES profiling are taken, at differing levels of sophistication meaning there is no ‘across the board’ metrics that can be used to explore just how well such systems operate in working scenarios (European Commission, Directorate-General for Employment, Social Affairs and Inclusion, Scoppetta, A., Johnson, T., Buckenleib, A., 2018). Concerningly, many of the key issues raised

² TAIEX is the Technical Assistance and Information Exchange instrument of the European Commission.

in the late 1990s, where such considerations began entering the mainstream, continue today.

2.2 Closed Innovation

Public service digitalisation projects are heavily contingent on existing structures and resources (Veale, Van Kleek and Binns, 2018). Within PES profiling algorithms, work to date follows 25+ years of implementation of both formal and informal methods of identifying those at risk of long term unemployment (LTU) (Desiere et al., 2019). However, the predominant working model sees such models developed using individualised approaches which rarely rely on the currently recognised ‘best practices’ globally (European Commission, Directorate-General for Employment, Social Affairs and Inclusion, Scoppetta, A., Johnson, T., Buckenleib, A., 2018). Adopting a case-by-case approach to development and deployment of new systems, failure to integrate across governmental factions and more concerningly, failure to scope initially, have detrimental impacts on the success of these projects. Adding to this, slow adoption of IT updates in governmental factions present additional ‘locked in systems’ that fail to be transformative in the manner expected (Wenzelburger et al., 2022). This leads to what can often be described as a close-looped innovation and is a keen factor in the failure of many such systems of this kind.

2.3 Limited User Engagement

Within their considerable work on the shifting power of data in the digital age, the UK-based Ada Lovelace Institute is but one entity that puts particular emphasis on the need to create a positive shift in the digital ecosystem towards focus on people and society (Ada Lovelace Institute, 2022). A growing body of work is looking at the role that humans play in algorithm development and deployment, in a response to the need to further include algorithm subjects in their development. However, while theoretical sense is made in the desire to build algorithms with their data subjects in mind, the stark reality reveals an almost oppositional case.

Algorithm imaginary for instance, is an idea used to explore ‘spaces where people and algorithms meet’ (Bucher, 2017, p.42). This considers not just where and when algorithms are deployed or indeed, their functionality, but rather delves into the role individual subjects should play in advancing the very tools under consideration (Büchi et al., 2021).

Eichhorst et al. stress that “approaches to profiling should progress towards more holistic profiling methods, moving away from simply gathering information about a jobseeker’s work experience and formal qualification to information on his/her generic and soft skills” (2015, p.18).

Barnes et al. note that there is a “significant gap in evidence concerning the effectiveness of profiling and

targeting support and resources using this process and the overall effectiveness of creating sustainable employment” (2015, p. vii).

There seems to be a general evidence gap in all countries with respect to the impact of different service delivery systems on on/off-flow rates from unemployment or benefit receipt (Konle-Seidl, 2011).

Blázquez (2014) sees a methodological challenge in measuring the impact of profiling and matching on PES efficiency and suggests the use of quantitatively based cost-benefit analysis tools. With respect to evaluation, Barnes et al. (2015) advise on the need to consider the respective aims and objectives behind the profiling tools when assessing their efficacy in different countries. Thus, a holistic approach, also including the costs of setting up the services, should be followed. The development costs for the ‘Virtual Labour Market Platform’ in Germany and its so-called ‘four phase model’ of re-integration, which includes profiling as one phase, amounted to €165 million (GHK Consulting, 2011) and involved up to 250 people in 2003-2006.

2.4 Reality in the Field

In assessing the plentiful examples of PES profiling models, a pattern of imminent failure emerges which does not have to be the operational case. One of the key reasons for this rate of failures comes from the notion that in their very design, profiling tools are designed to fail in the field (see deliverable D1.3). As previously explored, through low or little engagement with the actors within the PES systems, models are deployed without a key ingredient for success, engagement with data subjects. With added pressures to digitise public service offerings, contingency on slow-to-upgrade governmental infrastructure and closed innovation systems additionally complicate efforts. Clear is the need for a methodological change where PES profiling algorithms are concerned (European Commission, Directorate-General for Employment, Social Affairs and Inclusion, Scoppetta, A., Johnson, T., Buckenleib, A., 2018).

A more holistic approach, as adopted within the HECAT project, aims to rectify the sins of past profiling attempts; a visible and user-centric labour market decision-making tool that is built with stakeholder-engagement and sociological insights at the heart. Our approach to user design is to understand the needs of users (unemployed people, case workers, counsellors) and PES management in delivering efficient and effective services.

While we have explored and researched cases of algorithmic profiling and digital technologies in PES globally presented in HECAT deliverable D1.3 (Griffin et al, 2020), two cases that underpinned the initial design of the HECAT proposal are France and Ireland, which are described below.

The institutional landscape of support and compensation for the unemployed in France has been built in successive stages. First, the unemployment compensation system was established in 1959 by the social partners, who managed it within organisations with associative status: Unédic and Assédic. In 1967, a public agency, the ANPE, was created to support jobseekers in order to reintegrate them into the job market. This institutional dualism came to an end in 2008, when Pôle Emploi was created from the merger of the ANPE and Unédic, to manage both the compensation function and support functions in one combined agency.

In 1998, a program called “*Nouveau Départ*” (“New Start” program) was introduced because of the high rates of long-term unemployment among young people, long term unemployed and unemployed people at risk of exclusion from the PES. Implicit profiling was observed, with a long-term unemployment risk assessment made by counsellors through interviews with the unemployed (not with a tool or algorithm). Tension between the two institutional parts of the French PES, ANPE (support) and Unédic (compensation) was detected. Statistical profiling was presented as a solution by the government, because ANPE was unable to contribute to the fight against unemployment and Unédic faced a big budget deficit. The registration interview with counsellors became denser and classified the unemployed into 4 categories (Cour des Comptes, 2006). In 2005, the Social Cohesion Program differentiated offers according to the profiles of the unemployed and profiling was highly recommended as part of the reform. All unemployed were classified according to their individual risk of long-term unemployment in one of the following three categories: RS1 (exit within 3 months), RS2 (exit before 12 months), RS3 (exit after 12 months). They were then oriented by ANPE counsellors who orient jobseekers in three corresponding paths (P1: accelerated search path, P2: active search path and P3: accompanied search path). This was a hybrid profiling method, associating two institutions, combining a professional's diagnosis and statistical modelling. For the profiling made by the Unédic, two tools were implemented: statistical risk of long-term unemployment calculated by a “decision tree” plus a diagnosis of individual prospects on the local labour market (Delpierre, et. al, 2023).

The profiling project by Unédic was forsaken because of the merger, economic crisis and counsellors' lack of use. Counsellors didn't like profiling and tried to bypass the tool. They said it was not efficient and it called into question their expertise. The profiling system was not taken into consideration by the majority of the counsellors who found it faulty and lacking (Cour des Comptes, 2008).

In 2007 the “Intelligence Emploi” (IE) project began. Pôle Emploi initiated a big digitalisation project responding to a call for tender about the use of artificial intelligence in administrations: 17 of these projects were accepted with a €20 million budget.

Up to 1997, the Irish social welfare system provided passive income supports to the unemployed. From the mid-1990s, PES restructuring began to take place. With the introduction of the first activation reforms (1997-2011), things started to change. The National Employment Action Plans (NEAPs) targeted certain categories of jobseekers, initially those aged under 25 and then all jobseekers aged 18-65 years who had been unemployed for more than three months. However, profiling was not part of this strategy. The introduction of ALMPs to Ireland during this period included the provision of employment services and the creation of Personal Progression Plans for jobseekers. However, engagement with ALMPs was voluntary and not every jobseeker participated in the programme. With the backdrop of the global financial crisis and bailout agreement between the Irish government and the Troika (comprising the European Commission, European Central Bank and International Monetary Fund) in 2010, the second activation reforms were put in motion. Government spending was monitored by the Troika during the bailout phase and huge economic changes were required at a national level. With a political discourse of austerity, international pressure for cost efficiencies in public services combined with limited national resources, profiling of jobseekers was introduced. In 2011 the second activation reforms took place with the introduction of a new PES model, the National Employment and Entitlement Service (NEES). In 2012 NEES was rebranded as INTREO, with three agencies amalgamated into “INTREO One-Stop-Shops” and the strategy ran from 2012-2015.

The development of the Probability of Exit (PEX) profiling model took place with the cooperation of the Economic and Social Research Institute (ESRI). This model segmented new clients (unemployed population) into those with a low, medium or high probability of finding work, which in turn informed the engagement frequency with the PES. With the limited public resources now available to the PES and the country under constant scrutiny from Troika, activation measures were targeted at groups most at risk of long-term unemployment, using profiling (Government of Ireland, 2012). In addition, conditionality and sanctions were introduced, with a social contract between the State and the jobseeker, and penalties for failing to engage. The initial focus at this time was on the construction and retail sectors, with job losses of over 200,000 during the financial crisis. An evaluation of the effectiveness of INTREO activation reforms during the first year of profiling points to a process failure of the new profiling system: it was not properly implemented by case workers and it appeared to be an optional step in the PES workflow (Kelly et al., 2019) Under the next national employment policy Pathways to Work 2016 to 2021, the PEX profiling model remained the same (Government of Ireland, 2016). It is only in the 2021 to 2025 Pathways to Work policy that a commitment to review and update the PEX segmentation model emerged, ten years after its introduction. The Department of Social Protection engaged with the ESRI to update and recalibrate the PEX model, to reflect the experiences since its introduction (Government of Ireland, 2021; McGuinness, S., Redmond, P., Kelly, E., &

Maragkou, K. (2022). The current policy shows a renewed focus on profiling, rebranded as personalised service delivery, with a clear flowchart showing supports offered based on profiling calculations of low, medium or high risk of long-term unemployment.

2.5 The HECAT experience of benchmarking DT in PES

Our primary conclusions from this benchmarking study are:

- Despite 25 years of operational experience in profiling algorithms, no dominant design of the underlying approach (variable and mathematical strategies) was evident.
- Accuracy and ethical concerns were still significant and there are no strategies to overcome them. Indeed, these concerns consistently lead to failed deployments. The variables used in the models are discriminatory by gender, race and traditional markers of social class, and these models echoed and accelerated the prejudices and bias of the labour market.
- Data is extracted from citizens, widely (through the whole of the population mechanisms such as Census and Labour Force Surveys) and narrowly from the unemployed, exclusively for the use of policymakers and administrators and not returned to citizens, in what we call data paternalism that lacks data reciprocity. The government uses this data to make life-altering decisions about citizens without their knowledge or understanding. Indeed, the administrators in PES lack basic knowledge and understanding of these algorithmic decision-making tools and so cannot calibrate their reliance on them, even when a human override is in place.
- As a result, the worst visions of critical data study scholars about algorithmic authority and governance are realised in how these algorithms function— they offer nomic predictions that are poorly understood by users and have the potential to alter citizens' treatment by a critical public service.

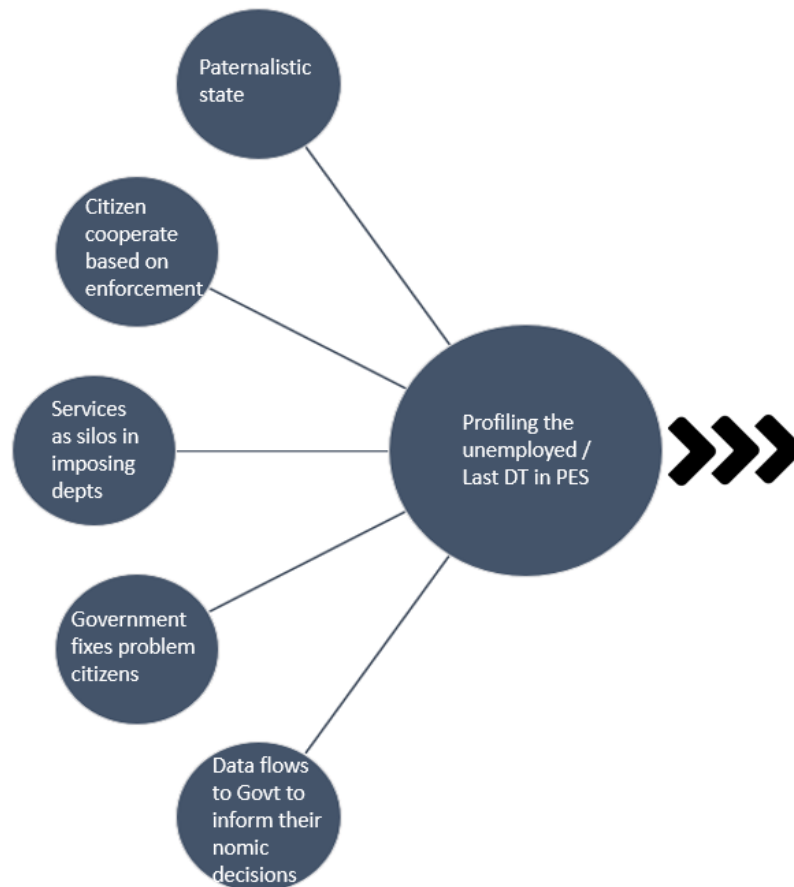


Figure 3 HECAT Benchmarking algorithmic profiling as a DT

From that benchmark, we established the need for a new DT public good technology— knowing that critique is not a solution — we conceived, established and piloted a new radical DT — the MyLabourMarket tool <http://www.mylabourmarket.com/en/>. Our design concern was to displace a racialised, gendered hetero-patriarchal algorithmic technique of profiling the underemployed.

3. HECAT approach

3.1 Guiding Principles

The main objective of the HECAT project was to develop disruptive technologies to support PES and citizens in evidence-based decision-making around unemployment, work readiness and job-seeking. HECAT achieved this objective through deployment of the My Labour Market tool, a co-designed and piloted set of decision support tools that values the experience of being unemployed, job-seeking, and being on the front-line of PES services. HECAT led the design of citizen-based systems through anthropological, ethnographic and sociological principles that informed interactive and interdisciplinary development of disruptive digital technologies.

Anthropology and ethnographies of data, algorithms and digital systems

At the outset of the HECAT project, the initial studies informing the design and development of the decision support platform were based on principles of anthropology and ethnographic work to develop a thorough understanding of complex user needs, in particular a deep understanding of the contemporary experience of unemployment within the context of PES administration and governance. In exploring the interactions of humans and systems (administrative and digital), the work commenced at the centre, exploring these relations between human and digital systems that define the micro-practices of PES among and between stakeholders, including Case Workers (or Street-level bureaucrats); their clients, PES management; Policy, Politics and Systems. In essence it aimed to develop a vision of the human in the labour market.

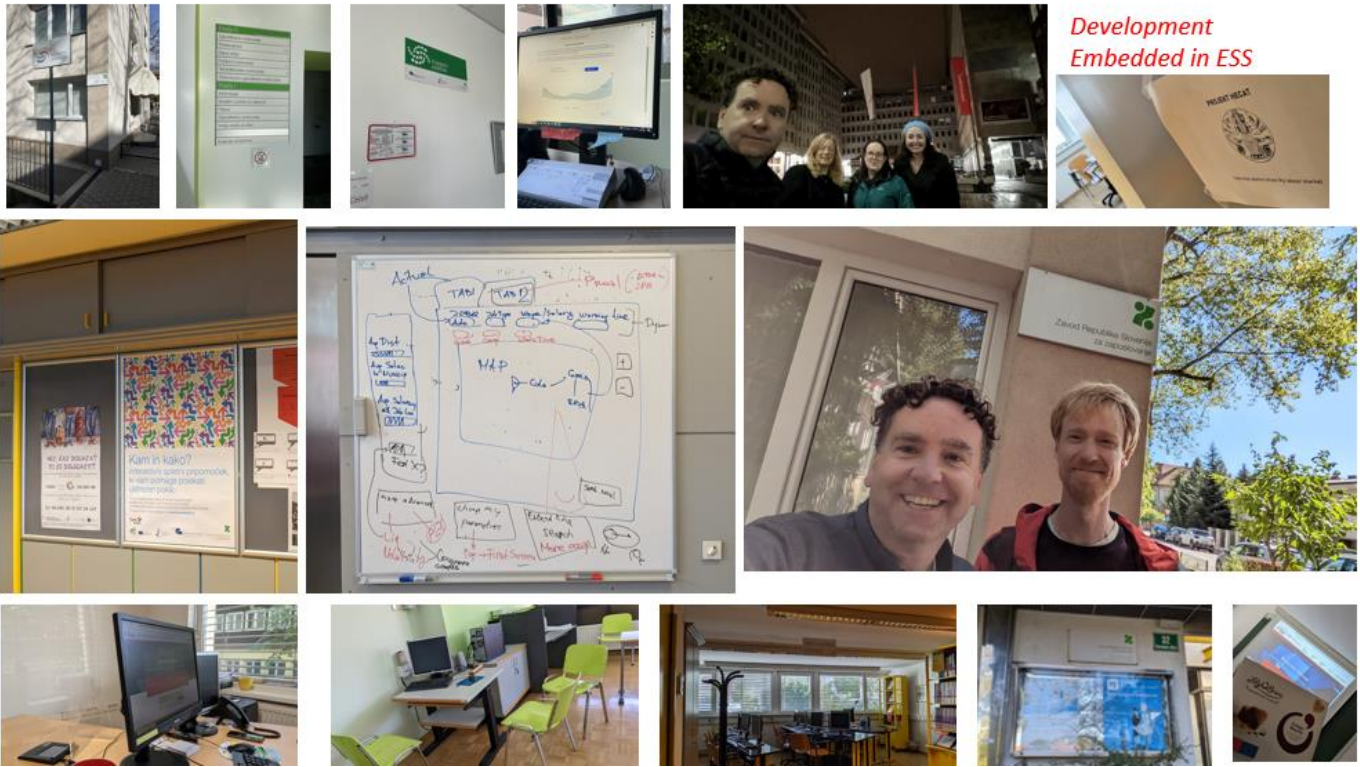


Figure 4 HECAT fieldwork at the Employment Service of Slovenia

Sociological perspectives and ethics

In concert with the ethnographic studies, sociological investigations move outwards and piece together the broader interconnectedness of each stakeholder within society and governing systems of political economy. Exploring the historical development of algorithms, artificial intelligence (AI), and digital systems for categorising, profiling and rationing social welfare supports, the sociological perspective forms the contextual landscape in the ebbs and flows of digital integration. The outcomes from this research point to digital systems in PES that are rarely formed with any real understanding of the experiences of unemployment, interacting with government and other PES services, or the extensive knowledge and experience of case workers and counsellors.

Emerging from this work is the need to consider the ethical dimensions of algorithmic and digital technologies. The HECAT research set out to ensure that the development of digital tools to support decision making would be achieved within the primary ethical principle of working with, and not on, unemployed people. Ethical considerations and the fundamental assumptions of the sociological perspective shaped the research and the development of the HECAT tools as being user centred though co-development and within the iterative cycles of piloting and demonstrating of the tools. Additionally, ethical considerations around user data were considered as the team developed a deep user context for the HECAT tools. This included identifying stable and trustworthy datasets that would feed the mathematical models and algorithms, and identifying how to statistically habilitate job quality and job sustainability through metricisation of the labour

market to ensure that the HECAT platform correlates with the individual needs of job-seekers and improves the efficiency and effectiveness of PES supports.

Interactive Development

In bridging between the ethnographic and sociological foundations of the research and the technological development of the tools, the research collaborative processes were utilised to engage with and mesh the vast levels of knowledge and expertise across the consortium. Inspired by the Chesbrough (2006) model of open innovation which calls for “the purposive use of inflows and outflows of knowledge to accelerate innovation”, the consortium viewed it as necessary to supplement internal knowledge with external expertise in the co-development of the tools. The initial design phase was confined to the consortium, where persona scenarios, based on baseline studies of the experiences of unemployment and case work, were agreed along with a series of platform functionalities based on the available data. At each step along the way sociological analysis and consideration was given to the ethical and practical functionality of each tool in the platform.

Once this phase was complete, and a pilot system was agreed within the consortium, an initial scoping study of the pilot sites in Slovenia was conducted with members of both the sociological team and the technological teams conducting sample user interviews and in locations in Ireland, France and Denmark. The ideas and tools were showcased to panels of expert users in the format of vignette-based focus groups. Expert users from government agencies, policy, 3rd sector supports, academic researchers, unemployed people, jobseekers, career-focused students, case workers and counsellors gave their opinions, relayed their experiences and critiqued the proposed ideas and tools around data ethics, usability, content, visualisations, trust and potential for engagement. In using this format, the HECAT platform and tools were formed in a co-creation and co-design method that validated and ensured quality and relatability of the theoretical underpinnings for the research.

The iterative nature of the development phase included ideas, data and functionalities that were both used and abandoned. For example, the persona scenario development was useful for initial framework designs of the platform but were then replaced by live user situations and needs from the piloting phase.

Salient deliverables on the HECAT approach:

Deliverable Number	Deliverable Title	Dissemination Level	Deliverable Link
D1.1	Detailed User Context Document	Public	https://doi.org/10.5281/zenodo.7908566
D1.4	Interim report on User Vision Statement	Public	https://doi.org/10.5281/zenodo.7914248
D2.1	Report on Supply and Demand Statistics in the Labour Market: Selecting the suitable job quality items in profiling and job matching algorithms for public employment services	Public	https://doi.org/10.5281/zenodo.7914628
D2.4	A final baseline and benchmarking study database for conditions of employment and unemployment	Public	https://zenodo.org/communities/hecat/
D4.1	Interaction Design Principles for PES: Interaction Design Framework	Confidential	Confidential
D4.3	Gamification Strategy for the Platform	Confidential	Confidential

Table 2 List of HECAT deliverables reporting on the HECAT approach

3.2 Methods

In keeping with user-centric design principles that work with and not on unemployed people, the initial framework, technical design and user needs plan was followed with an iterative cycle of development, piloting and refinement based on user experience and feedback from expert panels. The innovative and aspirational nature of the research necessitated multidisciplinary work to meet the ethnographic, sociological and technological objectives. That is, to deliver a platform based on an ethical use of algorithms and data that serves the needs of users.

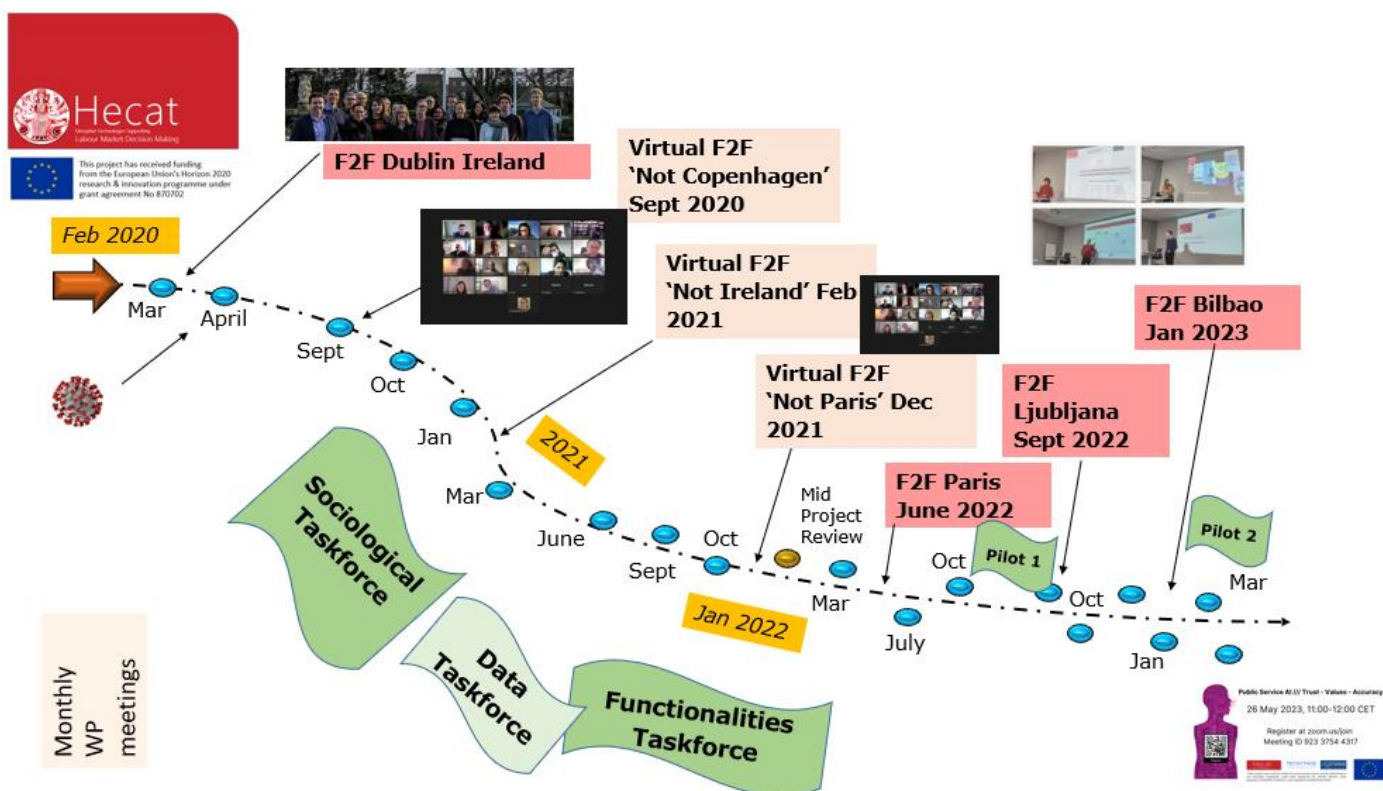


Figure 5 HECAT Consortium Journey 2020-2023

Piloting 1

The first phase of piloting the HECAT MyLabourMarket platform was carried out in two PES offices in Slovenia (Ljubljana and Ptuj) from 19-23 September 2022. Prior to commencement of the piloting, the platform website was made available to potential participants who had the opportunity to review the platform and the labour market decision support tools in advance of the piloting.

The purpose of interviews during piloting was to: (1) assess the usefulness of the platform tools in decision-making around job search and visualisation of labour market data; (2) discover if there were functions missing from the platform that would assist with job search; (3) check the technical functionality of the system; (4) assess if users felt that they would use the platform on an on-going basis.

The primary users taking part in the piloting interviews were unemployed people (n=14) and job counsellors (n=6). Each participant was observed as they moved through the platform tools and carried out live job, occupation and career searches, while noting their opinion on the usefulness of the platform. During the pilot sessions the participants were also asked about data protection, trust and transparency in digital systems, their use of additional digital tools, platforms and services.

In addition to the piloting sessions, interviews also took place with the heads of each office in Ljubljana and Ptuj to assess the wider landscape, needs and concerns within the PES in Slovenia. A focus group of 8 unemployed people yielded further information on the particularities of job search and careers in Slovenia, and in the use of digital tools and concerns with data protection.

Piloting highlighted a number of areas for improvement and additional thought for improving the initial platform design, including – the number of functionalities, visual presentation, variances in understanding of the graphical visual representations, user digital skills, technical glitches and optimisation, and responsiveness to multiple device platforms. This round of piloting also indicated that the platform was considered to be usable and functional and contained relevant and trusted data and information.

Expert Panels

Running concurrently with the piloting, but over a more prolonged period from September 2022 to March 2023, the consortium engaged in focus groups with expert panels. These activities are discussed in deliverables D5.1 (Feedback report from expert user panel meetings report), D5.2 (Report on data collected during and after pilot including benchmarking– Technical) and D5.3 (Report on data collected during and after pilot including benchmarking– Sociological), which report on the piloting and expert panel data (see Table 3 *List of HECAT deliverables* reporting on HECAT Methods for details). Three expert panels including

unemployed people, policy makers, and case workers were convened in Ireland, France and Denmark. The format of the expert panel focus groups was repeated in each location.

The piloting coordinators developed a series of vignettes that represented a series of user scenarios. These were presented to the expert focus groups for discussion about the potential for uptake of the platform and the needs of users. The data from all countries were reported in a standard structure, collated and analysed (D5.1 Feedback report from expert user panel meetings, confidential to HECAT consortium).

Iterative Refinement

Following the first iteration of piloting in September 2022, and with initial feedback from the expert panels, the consortium engaged in a series of meetings to discuss the findings and set out plans for improving and altering the HECAT platform. The findings from the piloting included technical functionalities and user feedback.

To expedite the cycles of refinement, three working groups were established to examine elements of the platform:

- WG1: platform landing page and integration of job quality metrics
- WG2: Advanced tools (PEX, job preparedness)
- WG3: Job progression routes

Each working group consisted of cross-functional members of the consortium and met concurrently, analysing the feedback from piloting and the expert panels and making recommendations for changes, improvements and alterations to the platform. At points across the refinement cycles, each team reported to the consortium and in a final meeting in January 2023, each element of the platform and the tools were refined and agreed. Using data from the piloting and expert panels, the functionality was refined into three tools for job seeking and longer-term career planning. During the iterative cycles of refinement, a number of functions were removed or replaced with more appropriate forms of data representation for the users. Version 2.0 of the HECAT platform MyLabourMarket was launched and ready for piloting by March 2023.

Piloting 2

The second iteration of piloting took place from 13-17 March 2023. It followed the format of the first piloting phase, using the same two PES offices in Ljubljana and Ptuj and using the interview format. During this phase of piloting, unemployed people (n=10) and counsellors (n=6) were involved in the study. As before, each participant was observed using the MyLabourMarket tool, where they were free to move through all of the functionalities of the platform and to give their opinion and feedback on usability and functionality.

Following this phase of piloting, the HECAT platform and tools were presented to the PES management team at the Employment Service of Slovenia (ESS) for review, while the consortium made adjustments and outlined requirements for future use and development of the platform.

Salient deliverables on HECAT Methods:

Deliverable Number	Deliverable Name	Dissemination Level	Deliverable Link
D2.2	Technical report data sources and data protection for algorithm development	Public	https://doi.org/10.5281/zenodo.7914775
D3.4	A library with fully operational implementation of the algorithms (source code)	Confidential	Confidential
D4.2	Functional User Interface & validation report	Confidential	Confidential
D4.6	HECAT functional platform, final version (Web platform)	Confidential	http://www.mylabourmarket.com/en/
D5.1	Feedback report from expert user panel meetings report	Confidential	Confidential
D5.2	Report on data collected during and after pilot including benchmarking– Technical	Public	https://zenodo.org/communities/hecat/
D5.3	Report on data collected during and after pilot including benchmarking- Sociological Report	Public	https://zenodo.org/communities/hecat/

Table 3 List of HECAT deliverables reporting on HECAT Methods

3.3 Practices

The challenges of working across disciplines and learning from the deep knowledge possessed by the research across diverse expertise and in geographically dispersed locations, especially during 2020-2022 travel restrictions, required new formulations for working practices within the consortium.

Working Group Task Force

To advance the design of the HECAT platform, three taskforce groups were established within each of the expert areas, to ensure that a single agreed narrative concerning the design of the platform. Each taskforce met regularly and discussed arising issues and developed ideas. The discussions concerned feedback from pre-piloting, PES piloting site, consortium brainstorming and emerging design ideas. Taskforces relayed information to the whole consortium and to the other taskforces where needs requirements merged. The three taskforces were:

- Sociological taskforce
- Functionalities taskforce
- Technical taskforce

Functionalities Memos

The functionalities element of the platform was the most creative experience of the project, where small

groups worked interactively across the disciplinary divides in an agile and interactive mode to conceive, design, develop and produced the final three DT tools for job search, career decisions and labour market conditions. The functionalities were primarily formed through negotiating between available data and the wishes of the consortium, led by user needs. This led to a series of memos from the consortium and the taskforces, to the data and back-end design experts to develop the most appropriate set of functionalities for the end-users.

3.4 HECAT vision for Disruptive Technology (DT) in Public Employment Services (PES)

Across this experience of working to develop DTs in PES, we developed a distinctive vision for the next generation of DTs in PES.

HECAT vision
To develop data-driven transparency tools to see the labour market

Core principles guiding the development

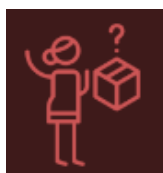
This approach uses three core principles to guide the development:



See the labour market: to render visible the labour market for all market participants—particularly the most vulnerable individual actors. Markets, at the centre of the original European project, are public institutions that, when fair and regulated by politics for the common good, unleash undreamed of prosperity. Overcoming informational asymmetries by ensuring high-quality information flow within the labour market is essential to making them fairer. By providing all market participants with publicly collected data about their labour market, we aspire to make the labour market a fairer place. Behind this formulation is a clear distinction between the role of the state in regulation and the role of the free economy.



Data-driven: Surprisingly, except for profiling algorithms very little labour market data is used by PES, and rarely is it formally used in most frontline PES counselling of the unemployed, as our longitudinal studies of PES and the piloting of the MLM have revealed (D1.3, D5.1). Our approach here is to return data extracted by national statistics offices, by creating a reciprocal flow of data back to the citizen, breaking the singular direction of data from citizens to policymakers. Central to this, is repurposing national statistics which aggregate, flatten and subjectify, back into useful categories and constructs for individual citizens (in terms of time horizons, geographical and occupational loci of interest).




Transparency tool: This vision culminates in a tool <http://www.mylabourmarket.com/en/>. We pull back the challenge of supporting unemployed individuals to the core challenge of restoring the primacy of the agency of the citizen in finding work that suits them and works for them. To achieve this, the tool provides a visual representation of the labour market that is accessible to both unemployed people and case workers or counsellors. Recognising that technically driven solutions often go too far— instructing and coordinating to specific uses that overfit a single problem— we use the term tool to capture a device that assists (rather than leads) people in doing something. Tools are useful and work under the direction of people. Here, our tool aspires to use labour market visualisations, and interactive/gamification job search methodologies to allow the general public to meaningfully interact with their labour market.

Three distinctive functionalities

MyLabourMarket <http://www.mylabourmarket.com/en/> offers three distinctive functionalities, which are the technology of our DT:

- DT1: Reconceptualising profiling
- DT2: Moving from job first to sustainable high-quality work
- DT3: Moving from job title search to a skills and preference-matching job search

<p>DT1</p> 	<p>Reconceptualising profiling: developing two distinctive algorithmic models for estimating survival probabilities (similar to profiling algorithms, but not utilised in this way)- one black-box (AI complimentary) model, and one explainable spyc model. Both are designed to be used in casework discussions about feasible work and managing the expectations of the unemployed about their duration of unemployment and the scale of the challenge they face, as well as significant data that allows them to see a personalised labour market (by location and occupational interests). Here we also introduce new statistical constructs about the labour market (such as liquidity and volatility) to offer deeper insight into how the market functions.</p>
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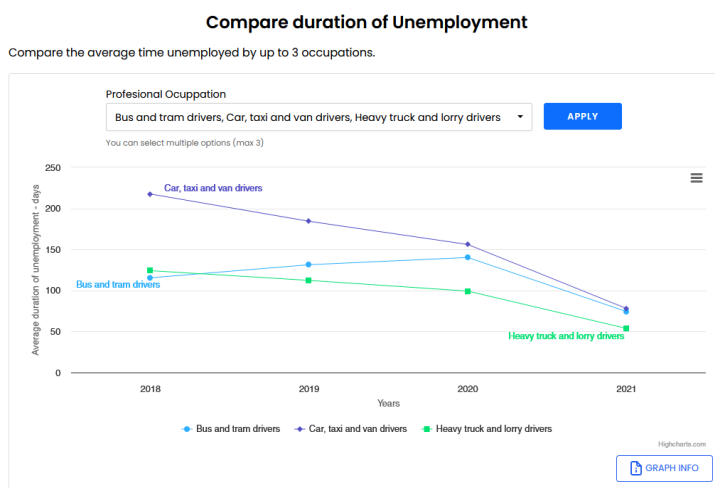


Figure 6 Two HECAT measures of probability of exiting unemployment



Figure 7 Obscured photos of HECAT team working with unemployed people

DT2



Moving from job first to sustainable high-quality work: by developing a job search decision model that uses job quality aspirations to lead job search, individuals can explore the job quality tradeoffs in their personal labour market. In this, we exploit underused data on job quality to support job search that is broader than job first approaches.

BESPOKE VACANCIES MAP

Here you have the chance to see what are the quality of the current job offer in Slovenia.

Please, fill in the following data and choose what are the main aspects for you for talking about the quality of a job. And the algorithm will show you the level of quality regarding the aspects you selected.

FILL AND CHOOSE

Current location: Professional Occupation: User wishes for working time:

(Specify your current or nearest location.)

What are the most important aspects for your job?

HERE YOU CAN NARROW YOUR SEARCH

- Autonomy and control over working tasks**
E.g. ability to choose your methods or speed of work and influence decisions important for your work. (i)
- Meaningful work**
E.g. having a job that gives you the feeling of work well done or of doing useful work. (i)
- Training opportunities at work**
Jobs including training opportunities. (i)
- Career advancement**
Good prospects for career advancement. (i)
- Limited physical risks**
Removes job offers carrying high physical risks (e.g. painful positions, lifting or moving heavy loads or people) from search results. (i)
- Limited psycho-social risks**
Removes job offers carrying high psycho-social risks (e.g. worrying about work when you were not working) from search results. (i).
- Standard working time**
No night work or week-end work. (i)
- Flexible working time**
Removes job offers where you may not adapt your working time to your needs. (i)
- Worker representation**
E.g. Trade union representative at the workplace. (i)

Figure 8 HECAT Quality-led job search



Moving from job title search to a skills and preference-matching job search method to broaden the horizons of job search.

CAREER OPPORTUNITIES TOOL

Have you ever asked yourself changing to another economic sector? What are your possible occupations, with your experience and your life conditions about working hours or location? What if you learn languages...? CAREER OPPORTUNITIES TOOL allows you to test both your real and simulated data and wishes, in order to obtain as result the top rated occupations based on your preferences.

Please note that the results are estimates forecasts obtained by Artificial Intelligence algorithms.

(*) indicates a required field

OCCUPATIONAL PROFILE ^

<p>Available Experience * Choose the professional experiences or knowledges that you have available.</p> <p>Select an item on the list <input type="text"/></p> <p><small>You can select multiple options</small></p>	<p>Wished experiences * Select the fields in which you would like to work in.</p> <p>Select an item on the list <input type="text"/></p> <p><small>You can select multiple options</small></p>	<p>Current location Specify your current or nearest location.</p> <p>Select an item on the list <input type="text"/></p>
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WORKING TIME ^

<p>Contract type * Select the type of contract you are most interested in.</p> <p>Select an item on the list <input type="text"/></p>	<p>Working hours * Specify the type of working hours you are most interested in.</p> <p>Select an item on the list <input type="text"/></p>
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OTHER RELEVANT INFORMATION ^

<p>Driving licence * Select the type of driving licence available.</p> <p>Select an item on the list <input type="text"/></p> <p><small>You can select multiple options</small></p>	<p>Languages * Please indicate which languages you speak</p> <p>Select an item on the list <input type="text"/></p> <p><small>Please indicate which languages you speak besides Slovenian.</small></p>
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RESET FORM

APPLY

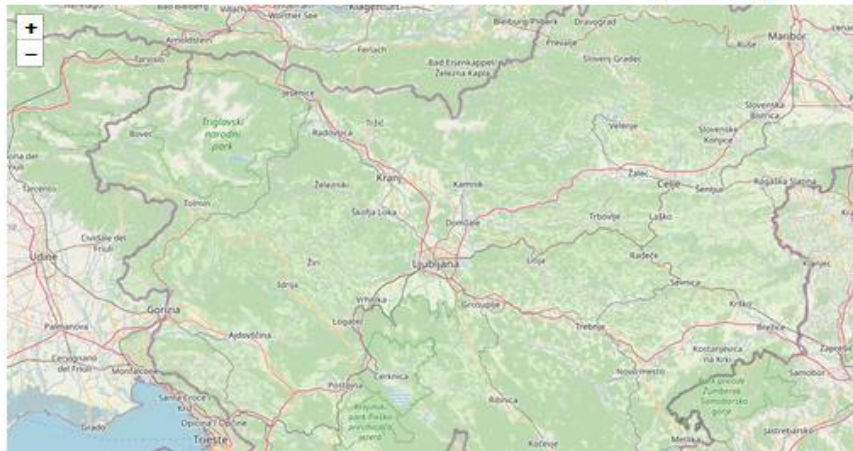


Figure 9 HECAT Quality-led job search

4. Lessons learned: a model for developing pathways for disruptive technologies into public services

Emerging Challenges

Throughout the 3.5 years of the HECAT project a number of challenges emerged in relation to interdisciplinary research. While many of these are to be expected when working with cross-cultural teams, additional interesting situations arose which call for further reflection and can add to future interdisciplinary consortium research.

COVID-19 Pandemic

An initial challenge which could not be predicted was the emergence of the COVID-19 pandemic. This happened at the outset of the project and following the in-person kick-off meeting in March 2020 (Month 2), the consortium did not meet in person again until May 2022 (Month 28). Following some adjustment to travel restrictions and working from home, the consortium made use of Zoom (online web conferencing platform) to conduct all meetings during this time, including scheduled monthly Work Package Lead meetings and six-month consortium meetings. At the six-month consortium meetings we held themed events and invited guest speakers, as would have happened in a standard in-person meeting. This form of communication was largely successful for meeting purposes and exchanging ideas. The downside of remote working was the inability to form good connections and share ideas in a less formal setting, during breaks or after the formal meetings had ended- as would happen in an in-person meeting. This led us to form the task force groups and the working groups, noted in Section 3, that teased out particular research and design challenges. The pandemic and travel restrictions slowed much of the work of HECAT and required new working methods beyond that which we had envisioned at the outset of the project.

Legacy and Responsibility

As the project advanced and the platform and tools were developed, tested and piloted to Technology Readiness Level (TRL) 7, discussions turned to legacy and responsibility. Two levels of responsibility emerged in these discussions. The first is the responsibility for the research to meet the goals, targets and outcomes that we set out in the proposal and grant agreement with the EC. The second was a moral and ethical responsibility to the users of the platform and the tools- those who helped us create and design a working platform. As the research and development of the platform progressed there was hope that we could go beyond the stated outcomes of TRL7 and develop an enterprise level platform that could be easily rolled out. From a technological perspective, the platform and the user interface were judged to be worthwhile

and effective by many of the pilot users and at a level that could be considered commensurate with TRL7. From a user-centred perspective, a moral dilemma arose where consortium members felt that we had a responsibility to the users to ensure that we created tools that could improve their experiences of job search and career planning. This is a natural reaction of researchers who have been studying the subject area for many years and will keep researching it after the life of the project. It raises interesting questions about the perceived success of research that is limited to a specific time period but is a challenge that will ensure that the research does not end here but continues after the life of the project.

Learning from the inside

An important element of HECAT's philosophy has been to work with the unemployed and stakeholders within this space and not simply 'on' an identified problem. Here, lived experiences of PES case-workers have been massively important in developing the MLM tool. Uniquely, we have also worked with a PES, ESS, who have become an integral component of our consortium from the offset. As partners the ESS team were co-creators in designing and deploying the platform and tools. A minor challenge arose in their position as partners or clients. In bringing ESS into the consortium, we had hoped to avoid producing something for a 'client' and thereby being remote from the site of work. Some negotiation occurred to balance the needs and desires of ESS to make their services better with the goals of the HECAT project and the ethical standpoint of the research- to ensure we produced ethical technologies that work with and not on unemployed people. This relationship turned out to be successful and a balance between the academic partners and practice partners was respectful and seamless. With this, we hope that further cycles of DT in PES will take the lived experience and personal histories of individuals as the starting point for development, embracing approaches to growing human capability and flourishing. We also aspire to see PES engaged in such projects.

Gamification

One of the primary aims of the HECAT project has been to design a tool for improving employability of the unemployed based on visible data insights drawn from AI tools. In this, the tools functionalities themselves and the ability to visualise the labour market via previously gatekept data should be a motivator of use. In order to increase user experiences and the capabilities of the tool, gamification potential was explored across development. Within this, possibilities for gamification implementation via this platform to enhance experiences and usability were explored. Here, integrated gamification features were seen as highly important in capturing end-user's engagement. From a user's perspective, the entire act of engaging the tools functionalities provide a gamified experience, wherein users can explore and re-explore the labour market

via their own inputs to the tool. Prospective challenges here lie in the potentiality for advanced gamification in tools of this kind. Considered is the possibility for adopting challenge-link scenarios wherein users can reach different statuses and subsequent knowledge points based on advanced and continued interaction. Also suggested is a points system for users who take part in various activities within such tools, reinforcing the gamification of sites of this kind.

Naming Conventions

Naming conventions in classifying jobs and skills presented some challenges within this project. Overall, in presenting commonality, ESCO³ terms are deployed. However, across piloting and engagement with the unemployed, there was often confusion where self-labelling using such terms were concerned. In providing a simple rectification, future tools should consider semantic-based or natural language processing (NLP) as a means of providing more standard, vernacular terms.

Generative AI

Another future challenge coming from the DT is the appearance of generative AI tools. As the HECAT project ends, generative AI has become a keen talking point globally. Taking into account all ethical considerations about this emerging technology (including the emerging EU Artificial Intelligence Act⁴) there is no doubt that the generative AI offers some potential for further study in this space, with additional research to assess how they may be used.

³ ESCO is the multilingual classification of European Skills, Competences, and Occupations. The ESCO classification identifies and categorises skills, competencies, and occupations relevant for the EU labour market and education and training. More details at: <https://esco.ec.europa.eu/en>

⁴ European Parliament (2023) EU AI Act: first regulation on artificial intelligence. Available at: <https://www.europarl.europa.eu/news/en/headlines/society/20230601STO93804/eu-ai-act-first-regulation-on-artificial-intelligence>



Figure 10 HECAT Framework for next generation DTs in PES

5. Conclusion

The aspiration of the HECAT project was to develop a digital, algorithm based system to support unemployed people to see the labour market and to return to the labour market in a fair, sustainable and needs based way. Our goal was to develop technologies led by sociological perspectives and be inclusive of user experience and needs. In bringing together a broad consortium of sociologists, social scientists, technologists and users we were able to achieve our goals. The interdisciplinarity of the consortium was key to this success, but brought many challenges in finding agile and respectful ways of working.

As with any multi-stakeholder research, the working arrangements developed organically as we faced decisions and challenges around developing the MLM platform. Through embedding the whole consortium in the landscape of social welfare, Public Employment Services and international labour markets we each developed a better understanding of the perspectives and technical work that each partner brought to the consortium. The working practices of the consortium have contributed to developing a framework for interdisciplinary work. Discipline-specific task forces feed desirable and possible outcomes across a structured format, feeding in evidence-based information and knowledge to the decision-making process. Memos from the sociological taskforce to the technological development team narrowed down the possible functionalities of the platform. Following both technical and usability piloting, interdisciplinary working groups used evidence from piloting to address each functional aspect of the platform and eventually

produced the final beta platform with 3 tools for unemployed people and case workers to use both independently and together.

The pathway for integrating disruptive technologies into PES required novel and agile working practices across the interdisciplinary consortium, but was greatly enhanced by the bottom-up approach of co-creating the platform with users and having ESS as the host PES, integrated into the consortium and the decision making around development of the technology. The HECAT Framework for Next Generation DTs in PES (see Figure 10) is a significant output of this research and will guide continued development and deployment of disruptive technologies in PES and other public services.

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