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Hacia una mejor protección de los derechos humanos mediante el uso de la IA y tecnologías conexas en la presupuestación y control del gasto público

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Abstract: The full potential of many human rights cannot be reached due to the economic costs in their development. The use of artificial intelligence and related technologies in budgetary and audit processes could help in a better allocation of scarce public resources and deliver savings due to better targeting in programming and execution, avoiding irregularities and corruption. When public and corporate organizations automate processes, monitoring should ensure their compliance with regulation or voluntary

commitments affecting environmental, social, and governance criteria. Many funds are granted to support digitalization processes if safeguards related to human rights are respected. The provision of goods and services like health and education is often subject to additional technological requirements. In both cases, an efficient supervision is crucial for fairness, in terms of accessibility and the effective protection of human rights.

Key words: human rights, public expenditure, control, artificial intelligence.

Resumen: El pleno potencial de muchos derechos humanos no puede alcanzarse debido a los costes económicos que conlleva su desarrollo. El uso de inteligencia artificial y tecnologías conexas en los procesos presupuestarios y de auditoría podría ayudar a una mejor asignación de los escasos recursos públicos y suponer ahorros por una mejor orientación en la programación y ejecución, evitando irregularidades y corrupción. Cuando las organizaciones públicas y empresariales automatizan procesos, la supervisión debe garantizar su conformidad con la normativa o los compromisos voluntarios que afectan a criterios medioambientales, sociales y de gobernanza. Muchos fondos se conceden para apoyar procesos de digitalización si se respetan las salvaguardias relacionadas con los derechos humanos. La provisión de bienes y servicios como la sanidad y la educación está sujeta, a menudo, a requisitos tecnológicos adicionales. En ambos casos, un control eficaz es crucial para la equidad, en términos de accesibilidad y protección efectiva de los derechos humanos.

Palabras clave: derechos humanos, gasto público, control, inteligencia artificial.

1. Human rights and their economic cost: could digitalization (to allow greater financial efficiency) improve their effectiveness?[1]

The current international trends link human rights to Sustainable Development Goals in the framework of the United Nations 2030 Agenda, whose implementation was supported with the Addis Ababa Action Agenda approved at the Third International Conference on Financing for Development in 2015. In 2025 Spain will host the Fourth International Conference on Financing for Development and it will address new issues, discussing the reform of the international financial architecture. A recent Resolution adopted by the General Assembly on 22 September 2024 (A/RES/79/1), the Pact for the Future, makes clear the connection among human rights, sustainable development, technological innovation and their financing. It comprises several actions and decisions. Action 7 reaffirms the need to build peaceful just and inclusive societies that provide equal access to justice and that are based on respect for human rights, on rule of law and good governance at all levels and on transparent and effective and accountable institutions. States decide to "promote and protect human rights and the implementation of the 2030 Agenda for Sustainable Development as interrelated and mutually reinforcing". Action 46 stresses: "We will ensure the effective enjoyment by all of all human rights and respond to new and emerging challenges", recalling that "the Sustainable Development Goals seek to realize the human rights of all". Action 30 is entitled: "We will ensure that science, technology and innovation contribute to the full enjoyment of human rights by all". In paragraph 50 is added: "We will deepen our partnerships with relevant stakeholders, especially the international financial institutions, the private sector, the technical and academic communities and civil society, and we will ensure that science, technology and innovation is a catalyst for a more inclusive, equitable, sustainable and prosperous world for all, in which all human rights are fully respected". A Global Digital Compact has been included as Annex I in the Pact for the Future. First, it mentions that "digital technologies are dramatically transforming our world. They offer immense potential benefits for the well-being and advancement of people and societies and for our planet. They hold out the promise of accelerating the achievement of

[1] This work has been carried out as PI in the framework of the research project: "Developing SustAI'nAbility" (FEI-EU-23-02). The author thanks Cassandra Bouzi for her help in searching some useful materials.

the Sustainable Development Goals". The States recognize "the need to identify and mitigate risks and to ensure human oversight of technology in ways that advance sustainable development and the full enjoyment of human rights". Objective number 3 is to "foster an inclusive, open, safe and secure digital space that respects, protects and promote human rights". Regarding principles, the Compact "is anchored in international law, including international human rights law. All human rights, including civil, political, economic, social and cultural rights, and fundamental freedoms, must be respected, protected and promoted online and offline. Our cooperation will harness digital technologies to advance all human rights".

Despite the aim of promoting, protecting and fulfilling all human rights, the full potential of many basic human rights often cannot be reached because of the economic costs in their development (Grau 2020, 175). The classic design and implementation of budgetary policies should be improved for a fairer allocation of resources, and digitalization could offer a chance to introduce sound changes in both areas. Exponential progress in technological developments like big data analytics, artificial intelligence (AI), digital platforms, robotic process automation, distributed ledger technologies and satellite imagery could lead to greater efficiency and respect of fundamental rights in policy, law making and implementation of law. There are consequences of actions or omissions resulting from the poor quality of policies and legislation (e.g. billions of euros are lost annually due to missed or delayed policies and legal reforms). Policy, law making, and regulation can lead to regulatory failure causing inefficient allocation of resources or unintended redistribution, among other effects (Maciejewski 2024, 38, 53-54). Thus, an ex-post quantified evaluation of legislation (and budgetary choices) needs to be applied consistently. An 'intelligent' performance-based policy and law making could be implemented, in addition to compliance control to avoid losses of budgetary resources (Grau 2023, 72-91).

In the European Union (EU), the European Parliament acts as a co-legislator with the Council and adopts laws for over 350 million European citizens, but it also acts as budgetary authority. It has been frequently caring about a sound financial management of EU funds. Silos approach to goals and lack of coordination of instruments, lack of addressing efficacy of regulation and biases of actors with recurring concerns as to their objectivity and the role of pressure groups, have been present in the discussion on EU policy, law making and regulation since decades. Nowadays there are isolated ICT tools aimed at addressing these concerns (Maciejewski 2024, 37, 41).

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Worldwide many governments have opportunities to deliver substantial productivity gains and transform public services to deliver better outcomes for the taxpayers, but public and civil servants should have the tools, information and skills they need to use AI, so that the public trusts the government's responsible use of AI (National Audit Office 2024, 1). Recently, algorithmic approaches have emerged. They can focus on how specific expenditures (budget inputs) are processed to generate economic, political, and social outcomes (outputs). This could serve in the planning stage of the expenditure allocation process and the distribution of public spending to increase GDP, decrease inflation and reduce inequalities. By offering criteria to leverage multiple or conflicting objectives, this type of approach could complement or substitute other analytical techniques used to make decisions about budget allocations. It could even bring some degree of rationality to the budgetary process with evidence to support best practices and understanding of the data used for specific government programs (through simulations). An analysis of all available data (regardless of its distribution, size, or format) makes it easier to detect which expenditure allocation strategies have been (or not) successful in the past and helps dynamic allocation. Therefore, public servants —required to use and account for every dollar— should be always on the lookout for new capabilities and tools to help them make better decisions. AI can make more decisions more cheaply and faster, nevertheless one cannot overlook other aspects like the necessary computational capacity, and the lack of algorithmic transparency —that might result in bias, omissions, and errors (a quite sensitive issue where there are many self-interested actors involved) (Valle-Cruz et al. 2022, 13)[2].

Obviously, any technological innovation and development at the expense of human rights is counterproductive. A right-based approach is essential to assess AI progress. It is said that the right to development will be breached if there is lack of effective and meaningful participation through which individuals and peoples contribute to, and enjoy economic, social, cultural, and political development, in which all human rights and fundamental freedoms can be fully realized (Mahmutaj

[2] They explain that "despite the black box inherent in AI algorithms, such techniques can bring some degree of rationality to the budget process, which is not only technical, but also political in nature", recognizing that "an automated AI system that makes technical decisions to be accepted by politicians or other decision-makers is still far from being technically possible and politically feasible". Bias may exist in the datasets too and some policies may be effective for certain nations and contexts but may lead to failure or harmful biases for others.

forthcoming). However, government officials can use different tools and resources (like the OPSI Toolkit Navigator) to help identify and engage with users and individuals who may be affected by an AI system in order to better understand their point of view (Berryhill et al. 2019, 108).

2. **Overview of the current use of AI in the legal-financial field**

2.1. *Room for AI progress in the expenditure side*

When adopting new technologies, governments need to determine the appropriate trade-off between strong controls and experimentation and risk, based on the relative costs and benefits, as it happens in the revenue side of the public financial activity (Grau 2022a, 325; Martín López 2023, 44). Accordingly, the public sector leaders should assess the nature of interactions in the AI systems for which they are responsible and determine whether they are appropriate. It is worth noting that algorithms need to be trained to provide a viable service, and there is always a chance that an AI will not perform as intended —even with an unbiased algorithm— and controls will not reduce risk to zero. Nonetheless, postponing AI deployment will delay the realization of the benefits it can bring. Similarly, existing decision-making processes are unlikely to be completely accurate and unbiased (Berryhill et al. 2019, 109).

Eventually, in the digital age, it is not a question if AI will proliferate, but when, how, and by whom. It can impact agencies' immediate annual spending, but also the government's long-term capacity to serve the people. For example, in the US federal agencies are harnessing AI, workflow automation, and other advanced technologies for budget forecasting and planning. Workflow automation can integrate diverse data sources by linking and pulling information from different systems, updating them all in real time. AI capabilities can improve this process with gap analysis and automated recommendations in line with the agency's mission. Applied at scale, they can reduce decision time and increase transparency, discovery, and traceability of data across programs. These agencies aim at improving strategic alignment, accelerating mission success, and preserving — and potentially expanding — their budgets (Fedeli 2024, 1)[3].

[3] "Federal managers must pore through mountains of data across thousands of programs. They must make sound decisions despite persistent challenges: potentially duplicative projects, unseen dependencies, time-consuming data calls, stove piped data

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2.2. *Complementarity of technological developments in the private sector*

Government agencies can exploit external sources of information to better achieve their missions. In fact, many industries produce amounts of data, regularly in machine-readable formats (Berryhill et al. 2019, 117). The collection and generation of data by the private sector provide opportunities for the use of AI. This phenomenon is reinforced when financial and sustainability reporting is demanded (Grau 2022b, 61).

Some tools developed in the context of companies, can be valuable for the authorities in charge of the public budget. Thus, enterprise decision management platforms with AI-augmented workflow automation help visualize data in new ways, revealing how money flows through complex organizations and leads to on-the-ground results (Fedeli 2024, 1)[4]. This may be relevant for budget planning. In the same vein, the use of digital twins —virtual representations of people, places and things— is emerging. They can take advantage of major advancements in machine learning, analytics, AI and augmented reality/virtual reality (Preut et al. 2022, 1).

As it happens with the real costs of most regulatory programs —that are borne, not by the regulators but by the firms and individuals who have to comply with the regulation (Maciejewski 2024, 37)—, the budgetary authorities many times can freely enjoy certain economic savings due to previous technological advancements in the private sector.

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sources, legacy tools and formats, and low visibility into outcomes" [...] Program managers can streamline data calls about cost, schedule, and performance. All three can link funding, project, portfolio, and capability data for visualizing alignment mapping of budget flows, from resource sponsors down to the minutiae of project execution". [...] "Empowering managers to make better decisions faster not only improves federal agencies' immediate annual spending, but also the government's long-term capacity to serve the American people. Many federal leaders seek predictive tools for divestment decisions —figuring out what stays and what goes to achieve optimal return on taxpayer money. As a few simple clicks reveal duplicative or deprioritized efforts, users can chart new pathways to free up resources, illuminate modernization pathways, and scale up innovation".

[4] The following features are useful: similarity analysis and contextual search (because it can reveal hidden relationships across thousands of programs); command view (single interface that integrates all systems and data); machine learning (through AI suggestion and user interaction, while keeping the historical "why" behind every decision); fast setup (new capabilities need to work with existing systems without rip and replace).

3. The potential of budgetary digitalization for sustainable development

Successful risk-informed Sustainable Development Goals (SDG)-financing solutions depend on prudent public financial planning and management, and budget execution. Finite public funds explicitly contend with diverse SDG priorities, and sometimes funds spent to advance an SDG implicitly negatively impacts outcomes on others. Policymakers should determine how these risks interact and how the expenditures affect SDG performance. They can use 'Budgeting for the SDGs' (B4SDGs) for budget planning, delivery, execution, and evaluation cycles. This tool supports the development of evidence-based medium-term revenue and expenditure strategies with a view to optimize public spending efficiency, reduce opportunity costs and wastefulness, and enhance the effective use of domestic public resources (United Nations 2022, 1).

The iBiT is an artificial budget intelligence powered toolkit. It has been developed by ESCWA to amplify the returns on public spending and optimize public expenditure efficiency. This toolkit aims at maximizing SDG performance across national targets, it overcomes fiscal space (Navarra et al. 2024, 30)[5] limitations, and captures SDG-budget synergies and trade-offs in different country contexts (United Nations 2023, 1). The iBiT provides insights on the cumulative contribution of public spending on SDG performance, the budget lines advancing or regressing the SDGs, how optimal a change in allocation is, how impactful the budget spending is, how to optimize it and meet constitutional thresholds, how much more could the SDGs progress if additional financing was optimized, etc.

However, to ensure the efficiency of programs and policies it is necessary to integrate a systematic and consistent data collection phase in order to monitor and evaluate the commitment and the impact of a certain issue, for example, regarding gender equality. 'Gender-sensitive budgeting' or 'gender budgeting' means gender mainstreaming of the entire budgetary process with a view to incorporating a gender equality perspective to all decisions on revenue and expenditure. This has a fundamental impact on inclusive

[5] "While there is no commonly agreed definition, fiscal space relates to 'the financing of policies conducive to the development of a country […] both in its narrow sense, as a redefinition of the fiscal rules to which sensible fiscal policy has always been subject, or in broader term as a full-blown set of policy actions for development' (Aguzzoni, 2011; Roy et al., 2009)".

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and economic growth, fostering employment, reducing poverty, addressing ageing population and increasing GDP (European Parliament 2024, 29-30)[6].

3.1. *The different technologies and their use along budgetary process and its phases: planning, management, and both internal and external control/scrutiny*

In every jurisdiction, each level of government has its own approach to the budgeting process, but most basically follow four steps: prepare, approve, implement, and audit (Johnston 2023c, 1). Transparency in public sector budgeting helps deter corruption and fraudulent use of public funds everywhere. Currently, priority-based budgeting (PBB) practices allow visibility into the budgeting process, which is very useful for accountability, inclusiveness, trust and quality purposes. As the world becomes increasingly technology focused, budgeting processes must adapt to keep up, but without diminishing their transparency.

Cloud budgeting software makes it easier to track metrics that show how well program funding aligns with priorities or adjust it as needed. Asynchronous collaboration capabilities allow team members and decision makers to work simultaneously on a budget and collaborate across departments. This shortens the budget timeline, streamlines processes, and increases productivity (Johnston 2023a, 1).

The detailed analysis of AI techniques as a tool to support government decision-making in the specific function of public budgeting is relatively scarce, despite being one of the most important functions of government. They can provide ideas to classify public

[6] A 2023 briefing on 'Gender budgeting in the Member States', produced by the Policy Department for Budgetary Affairs for the FEMM, BUDG and CONT Committee found that 12 countries have introduced gender budgeting; nine countries do neither practise gender budgeting nor consider introducing it (the reason given is that often the country's gender equality policy is seen as sufficient); three countries have not yet introduced gender budgeting but are discussing its potential usefulness. The Special Report of the European Court of Auditors 'Gender mainstreaming in the EU budget: time to turn words into action' concluded that the EU's budget cycle did not adequately take gender equality into account; the Commission made limited use of sex-disaggregated data and indicators, and published little information on the EU budget's overall impact on gender equality. The Commission has been developing a methodology to track all EU spending programmes' contributions to gender equality. The methodology, a work in progress, was implemented in a pilot in the 2023 Draft Budget (DB2023) and again for the 2024 Draft Budget (DB2024) and it is currently being implemented in reporting exercise for the 2025 Draft Budget (DB 2025).

budgeting allocations to different programs and policies and identify some opportunities and scenarios that ultimately government leaders can assess. For example, AI modeling technology can help move quickly through customized PBB implementation when governments lack the time, internal staff, and resources. The existing departmental budget data —including personnel, non-personnel, and operational line items— are used to create an inventory of the programs, then AI modeling allows to predict how much of the strategic budget is applied to a specific program also helps decision-makers score programs. After analyzing huge datasets and pinpointing where budgetary dollars can be cut or reallocated, AI modeling provides insights by communicating the budget programmatically (rather than departmentally by line item) and adds visibility into what choices are being made to provide services to residents and why. It can also identify ways to create new revenue streams to fund high-priority programs, and show opportunities to outsource programs to private companies, and potential partnerships with other government entities to share resources. Evidently, better understanding of the actual costs of a service helps develop and manage budgets more efficiently and increase their impact on community priorities (Resource X 2023, 1). For example, in North America, The Government Finance Offices Association's (GFOA) Rethinking Budgeting initiative helps state and local government leaders better meet community needs by introducing improvements, like PPB, new technologies and budgeting software, and best practices that support successful community outcomes (Johnston 2023b, 1)[7]. Government budgeting software helps governments switch from limited-visibility line-item decisions to data-backed outcomes that ensure efficient and effective resource allocation aligned with the priorities of their communities. This software offers a level of granularity that allows to see the full impact of every budgeting decision across all departments. With this holistic view decision makers can forecast needs and measure costs versus value more effectively (Johnston 2022b, 1)[8].

[7] GFOA was founded in 1906 to facilitate positive change and advance excellence in public finance. The association, which currently comprises more than 20,000 members, represents federal, state/provincial, and local finance officials across the United States and Canada.

[8] Traditional budgeting takes more of a rigid, all-or-nothing tack and is based on historical budgets, in which past decisions are frozen past the point they are affordable or relevant. The priority-based approach describes the budget in terms of programs. This is more relevant to how residents and elected officials experience government services. The focus of priority-based budgeting is on accountability for the results that formed the basis of a program's budget allocation, not whether the program stayed

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Any allocation of funds has a direct impact on the level of satisfaction of human rights, so technological improvements in the tools to trace and control their use can positively revert to people, just by assuring that they reach their intended beneficiaries. Besides, it may have an indirect impact if these tools produce an increase in the available funding due to greater efficiencies. A discussion could be opened about the convenience to reinvest any savings made from the use of one technology into other forms of IT investment, as well as reskilling programs, instead of allocating that additional revenue to further develop a specific right. Somehow, a sort of multiplying effect is expected. Here, one could even explore simulating different scenarios with AI models to understand potential relationships between public budget expenses and other social and economic outcomes useful for government decision-making (Valle-Cruz et al. 2022, 12)[9].

The adoption of sophisticated IT tools is also regarded as a possible solution that could improve the efficiency of the assurance process and also the audit quality. Digitization allows easier and quicker access to important documents of an operation or intervention during verifications and thus, reduction of the number of controls. Therefore, the audit bodies could more easily use the results of the first level controls (if existing) and retrieve from the IT system any relevant document that is needed to consolidate the audit results. Patterns or structural issues would be much easier to be detected (Malan and Dimauro 2022, 71, Grau 2023, 72).

3.2. *Trends in the EU*

Budgetary authorities have increasingly used new digital technologies to protect the EU budget, because the misuse of EU funds

within spending limits regardless of the outcome. Rather than across-the-board cuts, this approach reduces funding based on the value of the program or service.

[9] "The findings suggest enhancing the allocation of public spending, improving public debt and public expenditure, fostering the investment in agriculture, education, and public health, and implementing strategies to address the problem of unemployment to boost economic growth, decrease income inequality and reduce inflation". These authors use the multilayer perceptron and a multi objective genetic algorithm to analyze World Bank Open Data from 1960 to 2019, including 217 countries. They also propose a hybrid AI approach based on the learning capacity of artificial neural networks. They recognize some limitations in their approach because it does not consider aspects inherent to the budgeting process, such as political, economic, and even corruption-related factors.

remains a serious problem (European Parliament 2021, 22)[10]. However, there has not been a broad and consistent deployment of data-driven technologies in budgetary control across the EU due to differences in national control strategies and systems, regulatory frameworks, investment capacity, digital competences and political priorities between Member States. In the end, consistent adoption of data-driven technologies might support the harmonization of control practices and standardization of reporting methods.

Many of the national recovery and resilience plans have included reforms and investments aimed at introducing or improving e-government services (Collovà et al. 2024, 2)[11]. An initial analysis (in six Member States) of measures relating to digital public services in the national recovery and resilience plans shows that the top two categories in terms of budget allocated are the general 'IT solutions, e-services and interoperability' categories, including at regional level (ranging from 33 % in Italy and France to 89 % in Spain), followed by health (ranging from 6 % in Spain to 66 % in France) (Lilyanova 2024, 9-11)[12]. However, this general category encompasses several policy areas, including health and justice. Conversely, interoperability[13] and

[10] Member States reporting a total of 12,455 irregularities, amounting to EUR 1.77 billion, in 2022. For example, Arachne is a risk-scoring tool used by managing authorities on a voluntary basis to detect risks of fraud and irregularities in the use of European Structural and Investment Funds. However, Arachne is limited by low awareness of the tool, privacy concerns, a high administrative burden, limited accessibility, inaccurate risk scores, and a high number of false positives. The Early Detection and Exclusion System is a database allowing EU bodies to flag financial risks posed by (potential) recipients of EU funds. It does not apply to funds under shared management, but a targeted extension to all management modes from 2028 is expected. The Irregularity Management System is a database within which Member States report irregularities in the management of EU funds, however, its utility is limited by the substantial variation in reporting practices across Member States. The future of digitalisation in budgetary control Executive Summary, Study for the CONT Committee, 1-6. Data-mining tools can indeed make monitoring system more efficient and able to detect fraud and mismanagement of public funds. Arachne processes and analyses data of two million beneficiaries and crosses it with information from external databases that contains information on more than 210 million companies and 120 million people that are behind those companies. Further information on Arachne is available at: https://op.europa.eu/en/publication-detail/-/publication/71c53825-fbb9-11e5-b713-01aa75ed71a1/language-en.

[11] The Commission has created the Innovative Public Services Observatory, which analyses trends, identifies good and bad practices and assesses the impact of new technologies, such as AI, on the public sector.

[12] EPRS initial analysis of measures relating to digital public services in the national recovery and resilience plans of Italy, Germany, Spain, France, Greece and Slovenia.

[13] The level of interoperability of network and information systems supporting digital public services in the EU is still insufficient. This leads to limited digital public

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the regional dimension are often a key feature of other policy areas, including education and health. The third category is transport. Justice and digital identity are allocated less funds, and are, for instance, absent in Germany and Spain.

3.2.1. The adoption of different technologies to improve budgetary processes

Nowadays, big data analytics, AI, machine learning (ML), natural language processing, deep learning, large language models (LLM), robotic process automation (RPA), blockchain, and satellite imagery are being used by EU Member States to improve budgetary control practices (Rampton et al. 2024, 29-48, 56-64). They are mainly applied to information management of large volumes of data and risk-scoring. Of course, developing AI-powered tools is costly and takes time, requiring constant updates (e.g. they may not be able to capture new indicators of fraud that have not been defined based on auditors' experience, and may generate false positives).

Big data analytics and data mining can facilitate access to data, risk-scoring, interoperability between institutions and harmonized data collection, verification and analysis. Generative AI/LLMs can allow for the summarizing of large datasets, automatically correct, standardize and organize data, allow cross-referencing against other sources, and generate written reports. Platforms using LLMs allow to process large bodies of complex data and text and to retrieve relevant information instantly. However, there is a risk of high levels of inaccuracy in the output of LLMs, high energy consumption and limited scalability.

NLP applications can help those managing and auditing funds 'chat with their docs' with custom-built chatbots. Internal chatbots are currently piloted in a few audit institutions in the US and in Europe (e.g. Cequence for public procurement officials in Czechia and Slovakia). Public-facing chatbots are not yet used in the field of

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services and causes a number of problems for citizens, organisations and businesses, as well as for public authorities themselves. The interoperable Europe act introduces an obligation to share certain interoperability solutions (such as open-source software) and data between public sector bodies, institutions, bodies and agencies of the Union, with a focus on removing unnecessary burdens (such as legal, organisational, semantic and technical obstacles). The aim is to save citizens, businesses, and the public sector itself, money and time. Public sector bodies and institutions, as well as EU agencies or bodies, would have to evaluate the impact of changes in information technology systems on EU cross-border interoperability.

budgetary control, they could help those managing and auditing public funds communicate with citizens in the future (LLM-powered chatbots could bridge information gaps about EU funds, like Bürokratt, Estonia's 'one-stop-shop' chatbot to ease the burden of applying for small organizations with lower budgets. It could also save managing and paying authorities time as clear instructions will help beneficiaries submit all relevant pieces of information in a timely manner). NLP is used in combination with machine learning techniques to detect signs of irregularities, or patterns that indicate risks of fraud in audit files.

RPA automates repetitive or time-consuming, rule-based tasks that require a high degree of accuracy. This allows the audit teams to focus on higher-value or more complex tasks. It can help to make rapid and effective improvements and to meet strict deadlines and respond quickly. Its constant operation enhances productivity. It can enable web-scraping for data extraction, verification and reporting.

In the context of budgetary control, RPA technology is used to automate data extraction from various sources and consolidation into a central system, reconciliation processes by matching data to ensure accuracy, report generation (budget summaries through formatting data into predefined report templates), audit-trail creation by tracking and recording changes made to financial documents, compliance checks, and budget monitoring to issue an alert when there are deviations from the planned budget.

The use of RPA in budgetary control is limited by its inability to automate complex tasks that require advanced decision-making as well as the necessary shift in organizational culture. RPA cannot learn from past experiences or adapt to new situations without human intervention. AI can help RPA automate tasks more fully, handle more complex data, and find patterns or extract meaning from images, text or speech. In turn, RPA can enable AI insights to be actioned faster without having to wait for manual implementations. The newly combined concepts of Intelligent Automation (IA) and hyperautomation are capable of streamlining numerous procedures, including procurement and payment processes[14]. They can contribute

[14] IA describes the combination of RPA, AI and other related automation technologies. IA technology can analyse data, learn from patterns, make decisions based on historical data, and perform tasks that traditionally required some level of human judgment or intervention. One example of the application of IA technologies in practice is the Intelligent Document Processing, which uses IA to extract, process and validate data from images and other files where data often appears in an unstructured format. [...] The term 'hyperautomation' describes the evolution or extension of IA across a wider range of organizational processes with the aim of creating an

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to a more effective, efficient management and control of EU funds (especially those under the shared management mode), better resource utilization, reduced administrative burden and enhanced service delivery. Gravitation towards low-code/no-code tools such as RPA is likely in audit institutions, as these solutions empower non-technical users to implement process improvements swiftly.

ML can enhance risk-scoring, strengthen prevention and detection of irregularities, identify weaknesses in control systems and increase understanding of factors causing anomalies. In the last ten years, both NGOs, CSOs, and government agencies have started using machine learning technologies to build 'red flagging' tools. Most of them use manually defined indicators. Researchers, auditors or NGOs examine past cases and identify patterns of fraud in subsidies and/or public procurement contracts. New approaches use unsupervised machine learning algorithms to learn which patterns are associated with higher risks of fraud and corruption. ML algorithms could include an internal chatbot allowing auditors to ask questions about any audit files and be pointed to the relevant file, enabling them to quickly fact-check its answer. Auditors in Belgium, Norway, Portugal, Spain and Sweden are developing tools that will use ML technology to find indications of fraud in large documents of audit data and explore ways to potentially move away from a sample-based auditing process to a 100% AI check. In Massachusetts and New York AI-powered risk-scoring tools are already in use. EU and national-level risk-scoring tools using ML will be key components of the fraud prevention and detection strategy in the future. They have proven their potential to improve fraud detection rates, to recover costs, and to protect national and EU budgets. Challenges in developing national-level risk-scoring tools will depend on the situation in the Member States especially regarding data availability and data interoperability. One source of information on irregularities is the EU-wide dataset of irregularities stored in the Irregularity and Management System (IMS). Any red flagging tool using machine learning in any Member State could be then trained using the IMS data. The more this tool is used, and the more information it contains, the more valuable it will be as a source of data for EU-wide risk-scoring tools.

Digital platforms can facilitate information and knowledge sharing, development of joint initiatives with verification of results between

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interconnected and automated workflow across the organisation. Hyperautomation of complex business processes that involve both structured and unstructured data has emerged as a significant trend in recent years.

authorities, and harmonized approaches to auditing and control. This can enhance the efficiency, speed, accuracy, and quality of budgetary control, as well as fraud detection activities.

In the context of budgetary, digital platforms are instrumental in enhancing the efficiency, transparency, and effectiveness of budgetary control practices. These tools act as centralized budgetary information and data repositories, making the data readily available to relevant stakeholders Control audit team members can feel more motivated as they actively participate in decision-making and problem solving. All parties involved in budgetary control have access to the most up-to-date financial data and work with the same data, reducing discrepancies. Transparency and access to real-time data is crucial for accurate budget tracking and forecasting. By incorporating new AI based technologies and/or Robotic Process Automation, the platforms can enable automation of manual tasks. However, they also bring issues related to data security, privacy, and interoperability, especially in a multilingual and multi-jurisdictional context like the EU. Strategic implementation and continuous development of both technology and human resources as well as the standardization of data formats and language play are fundamental in order to reap the benefits of digital platforms in budgetary control.

Blockchain can enable the traceability and identification of transactions, streamline data collection and storage, and support efforts to combat fraud. All blockchain transactions are permanently recorded, visible to everyone in the network, and almost impossible to tamper with. By eliminating intermediaries, blockchain technology offers the potential to eliminate opportunities for corruption. It is not yet widely used in budgetary control, there are pilot projects to curb corruption in public procurement, e.g. in Brazil, Columbia, Nigeria, Peru, Rwanda and South Africa. The EU already introduced the European Blockchain Services Infrastructure. In the future, the network could be used to track and record payments in any EU fund and reduce opportunities for intermediaries to divert payments or for beneficiaries to use payments in in ways that are not intended. The EU could also develop a private and permissioned grant management and/or public procurement system based on blockchain technology. But there are challenges like high set-up costs, data protection concerns and high energy consumption.

Satellite imagery is being used for budgetary control, mainly in the Common Agricultural Policy. A new 'checks by monitoring' approach combines satellite data with the information provided by farmers. The EU's Copernicus Sentinel satellites provide frequent and

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high-resolution images and data to paying agencies. The paying agencies use big data analytics and machine learning algorithms to assess the type of crop and the activities on each declared parcel for each aid scheme. Then, they visualize compliance on digital maps of the respective fields, divided into small parcels. Any parcels the machine learning algorithm assesses as compliant are colored in green. Any parcels it assesses as non-compliant are colored in red. Parcels that require further processing (for instance, because there are indications of potential non-compliance or because results are inconclusive) are colored in yellow. The new checks are automated and continuous: paying agencies monitor agricultural activity throughout the year and check them against the information they receive from the farmers. The new system allows paying agencies to monitor all agricultural parcels in the respective region, they only carry out field visits if the satellite-based monitoring process is inconclusive and if the financial impact of non-compliance exceeds a certain threshold. Paying agencies have more leeway to warn farmers in the case of non-compliance. Farmers also receive useful data to increase the productivity of their farm. However, the overall take-up by paying agencies is still low. Imaging and AI could transform multiple EU monitoring and budgetary control systems in the future.

The main benefits of all the above-mentioned technologies are summarized in table 1.

Table 1.

Benefits of new technologies in budgetary control

Technologies	Benefits of new technologies in budgetary control
Big data analytics and data mining	— Easier and quicker access to important data during verifications. — Enhanced risk-scoring and thus detection of irregularities / fraud. — Cross-border organisation/institutional interoperability. — Harmonisation of data collection, verification and analysis. — Streamlining the audit process and improvement of the audit trail.
Machine learning	— Enhanced risk-scoring, accuracy of red flags and identification of patterns. — Stronger prevention and detection of irregularities/fraud/ corruption in the EU expenditure. — Identification of weaknesses in the national control systems for EU funded programmes. — Better understanding of the explanatory factors leading to a situation/anomalies.

Technologies	Benefits of new technologies in budgetary control
Generative AI/LLMs	— Possibility to summarise large amount of data and information. — LLMs can be used to automatically correct spelling errors, standardise formats, and organise data into structured formats like tables or spreadsheets. — LLMs can be used to cross-reference data against other sources to verify accuracy and reliability. — LLMs excel in generating written content - can automate the creation of reports, summaries, and documentation by structuring collected data into coherent narratives, following specified templates or guidelines.
Robotic process automation	— Web-scraping tools or external APIs can be used for data extraction, verification and reporting thereby streamlining the entire control and assurance process. — Automate repetitive and time-consuming tasks to allow authorities to focus on strategic tasks.
Digital platforms	— Sharing of knowledge by Member States in the use of effective IT tools. — More effective sharing of management verification results. — Reduce gold-plating due to the introduction of unnecessary national / regional rules.
Blockchain	— Traceability and identification of operations and transactions. — Capacity to streamline data collection and to store immutable and reliable data. — Facilitate tax administrations' efforts to deter and combat tax fraud (including cross-border).
Satellite imaginery	— Deep learning image classification algorithms on high-definition satellite imagery to monitor the quantity as well as the quality of crop yield and to check applications for EU funds. — Can be leveraged for budgetary control purposes to verify the quantity and quality of agricultural output funded by the CAP funds and detect anomalies.

Source: Rampton et al. (2024)[15].

Rampton et al. (2024) have stated: "leveraging the strengths of both new and existing technologies can lead to synergies that address a wider range of challenges and requirements within budget management and control processes. The aim is to connect disparate tools and platforms to create a unified ecosystem that supports the

[15] From the same source, there are additional tables 2, 3 and 4 in the annex synthetizing respectively benefits and limitations of risk-scoring tools, digital platforms and RPA.

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entire lifecycle of budget management, from planning and allocation to execution and reporting". Their report contains recommendations: continue to enhance existing EU tools for budgetary control[16]; promote awareness of and training in their use; discuss their compulsory use; consider pilot projects developed on a transnational basis to explore the possibilities for applying new data-driven technologies to budgetary control; support mutual learning, good practice might inspire budgetary authorities to adopt new tools; consider defining common standards for the use of new technologies in budgetary control accompanied by a code of conduct for their proper and fair deployment; assess the costs and benefits before deploying new technologies; carry out regular horizon scanning to identify potential new technological developments suited for application to budgetary control and share information about such developments with budgetary authorities at EU level and in the Member States.

3.2.2. Possible impact of the new Regulation on AI

The Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonized rules on AI[17] could relatively impact on some of the described tools for improving budgetary processes. Their benefits and challenges should be assessed with the following criteria —extracted from the text of this legal instrument— in mind.

In principle, as stated in its recital (4), "by improving prediction, optimizing operations and resource allocation, and personalizing digital solutions available for individuals and organizations, the use of AI can provide key competitive advantages to undertakings and support socially and environmentally beneficial outcomes". However, recital

[16] This includes expanding Arachne to all management modes, integrating advanced technologies, ensuring interoperability with other tools, addressing privacy concerns, and enabling faster checking of operators against more up-to-date and comprehensive data cases. The IMS could be improved by introducing consistent thresholds for reporting cases of fraud and providing more up-to-date information. For Arachne, training would include how to use all the different functionalities; for the IMS, thresholds for reporting cases of 'suspected' and 'established' fraud.

[17] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on AI and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (AI Act) (Text with EEA relevance), OJ L, 2024/1689, 12.7.2024, https://eur-lex.europa.eu/eli/reg/2024/1689/oj

(58) stresses that the use of AI systems deserves special consideration when it affects "the access to and enjoyment of certain essential private and public services and benefits necessary for people to fully participate in society or to improve one's standard of living. In particular, natural persons applying for or receiving essential public assistance benefits and services from public authorities namely healthcare services, social security benefits, social services providing protection [...] are typically dependent on those benefits and services and in a vulnerable position in relation to the responsible authorities. If AI systems are used for determining whether such benefits and services should be granted, denied, reduced, revoked or reclaimed by authorities, including whether beneficiaries are legitimately entitled to such benefits or services, those systems may have a significant impact on persons' livelihood and may infringe their fundamental rights, such as the right to social protection, non-discrimination, human dignity or an effective remedy and should therefore be classified as high-risk". Still the public administration can benefit from a wider use of compliant and safe AI systems, if they do not entail a high risk to legal and natural persons. Anyway, sandboxes are envisaged in the Regulation and they might be an option to experience new capabilities with limited pilot projects[18].

The recital (20) literally reads: "In order to obtain the greatest benefits from AI systems while protecting fundamental rights, health and safety and to enable democratic control, AI literacy should equip providers, deployers and affected persons with the necessary notions to make informed decisions regarding AI systems. Those notions may vary with regard to the relevant context and can include understanding the correct application of technical elements during the AI system's development phase, the measures to be applied during its use, the suitable ways in which to interpret the AI system's output, and, in the case of affected persons, the knowledge necessary to understand how decisions taken with the assistance of AI will have an impact on them".

Finally, recital (96) adds: "In order to efficiently ensure that fundamental rights are protected, deployers of high-risk AI systems

[18] Article 59.1. In the AI regulatory sandbox, personal data lawfully collected for other purposes may be processed solely for the purpose of developing, training and testing certain AI systems in the sandbox when several conditions are met. They include "(a) AI systems shall be developed for safeguarding substantial public interest by a public authority or another natural or legal person and in one or more of the following areas: [...] (v) efficiency and quality of public administration and public services".

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that are bodies governed by public law [...], should carry out a fundamental rights impact assessment prior to putting it into use. [...] The aim of the fundamental rights impact assessment is for the deployer to identify the specific risks to the rights of individuals or groups of individuals likely to be affected, identify measures to be taken in the case of a materialisation of those risks".

The impact assessment should be performed prior to deploying the high-risk AI system and should be updated when the deployer considers that any of the relevant factors have changed. The impact assessment should identify the deployer's relevant processes in which the high-risk AI system will be used in line with its intended purpose, and should include a description of the period of time and frequency in which the system is intended to be used as well as of specific categories of natural persons and groups who are likely to be affected in the specific context of use. The assessment should also include the identification of specific risks of harm likely to have an impact on the fundamental rights of those persons or groups. [...] deployers should determine measures to be taken in the case of a materialisation of those risks, including "for example governance arrangements in that specific context of use, such as arrangements for human oversight" according to the instructions of use or, complaint handling and redress procedures, as they could be instrumental in mitigating risks to fundamental rights in concrete use-cases. [...] Where appropriate, "to collect relevant information necessary to perform the impact assessment, deployers of high-risk AI system, in particular when AI systems are used in the public sector, could involve relevant stakeholders, including the representatives of groups of persons likely to be affected by the AI system, independent experts, and civil society organisations..."

The detailed provision for Fundamental rights impact assessment for high-risk AI systems is Article 27.

In ANNEX III, pursuant to Article 6 (2), this area is listed considering high-risk AI systems: "5. Access to and enjoyment of essential private services and essential public services and benefits: (a) AI systems intended to be used by public authorities or on behalf of public authorities to evaluate the eligibility of natural persons for essential public assistance benefits and services, including healthcare services, as well as to grant, reduce, revoke, or reclaim such benefits and services". It is important to note that, upon fulfilment of certain conditions, Article 7.1. allows the Commission to adopt delegated acts in accordance with Article 97 to amend Annex III by adding or modifying use-cases of high-risk AI systems.

Article 77.1 clarifies that "National public authorities or bodies which supervise or enforce the respect of obligations under Union law protecting fundamental rights", including the right to non-discrimination, in relation to the use of high-risk AI systems referred to in Annex III "shall have the power to request and access any documentation created or maintained under this Regulation" in accessible language and format when access to that documentation is necessary "for effectively fulfilling their mandates within the limits of their jurisdiction". The relevant public authority or body shall inform the market surveillance authority of the Member State concerned of any such request" [emphasis added]. Where the documentation (subject to confidentiality) is insufficient a reasoned request can be made to the market surveillance authority, to organise testing of the high-risk AI system through technical means.

Finally, according to Article 100.1.(g), Union institutions, bodies, offices and agencies falling within the scope of this Regulation must take into account that the European Data Protection Supervisor may impose administrative fines. In doing so, due regard shall be given to their annual budget, and any funds collected by imposition of fines shall contribute to the general budget of the Union. These fines shall not affect the effective operation of the Union institution, body, office or agency fined, as explained in paragraph 6.

Conclusion

Every technology comes with its own benefits and downsides. Hence, one must always have controls in place to avoid unwanted consequences of using it. The use of new technologies in the budgetary context should be assessed considering the specific needs of different nations with regard to the protection and development of human rights. Intelligent public budgeting should care not only about not doing harm, but also about doing good with savings for better human lives.

Transparency regarding the aimed and achieved level of digitization in every step of the budget process is critical. It should cover information about the implemented technologies and their application to specific fields. The degree of openness should be sufficient to allow experts to judge their effective impact on human rights, beyond data protection.

In cases of decentralization in the allocation and execution of funds, disparity in the adoption of technology may lead to some

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difficulties in their correct control, so more uniform approaches should be enhanced. Now there is an opportunity to guide the behavior of public entities on a large scale as to make their financing actions more respectful of citizens' rights. In practice, technological developments in budgeting and auditing can ensure the effectiveness of conditionality —at least to the extent that compliance with the requirements for the enjoyment of public financial support may be checked in real time. This chance to receive continuous feedback can lead to easily adjust the rules.

The careful use of some tech tools can help to fulfill the mandate of Article 31.2 of the Spanish Constitution, that reads: "Public expenditure shall make an equitable allocation of public resources, and its programming and execution shall respond to the criteria of efficiency and economy". Existing gaps on the public expenditure side could be reduced doubly, for example, in the design and application of benefits. On the one hand, the legislation in force could be optimized to maximize the scope of coverage by including new public needs —that are currently unattended due to lack of resources, and to improve the intensity in the degree of protection of some rights already contemplated. On the other hand, when applying the rules, budgetary execution could avoid irregularities and corruption.

Of course, any conflicting interests must be addressed: the needs of a 'machine' should not be blindly put before the person's needs when it comes to setting priorities in the context of scarce funding. It is essential to weigh up costs and benefits of strategies for the implementation in specific cases and to provide appropriate remedies (e.g. access to affordable power as many public services will require it). For similar reasons, it seems to us somewhat risky to earmark saved funds thanks to digitization only for that purpose.

The main rules that sustain our budgetary system could be gradually revised in order to integrate in a systematic manner new options offered by the evolution of technological tools. As long as they allow a better performance in carrying out the mission entrusted to budgetary and audit authorities, the legislation should be adapted to the social reality and timing in which has to be applied. For instance, one more could expect more flexibility in the regulations affecting budget appropriations. The experience in the digitalization of tax field shows clearly that tools that may modify administrative procedures, often bring with them institutional and regulatory changes as well. The public revenue and expenditure should progress together.

In the EU, the Juncker Commission started the initiative "Collect more, spend better" in the path towards a sustainable Europe by 2030

reinforcing SDG17 on Partnerships for the Goals. As the European Commissioner Neven MIMICA explained: "Collect more focuses on the efficiency, effectiveness, fairness and transparency of the tax systems at the national and international levels. This includes closing tax gaps arising from poor tax policies and from weak tax collection and enforcement under existing policies. Spend better is about improving the effectiveness and efficiency of public spending, with a particular focus on subsidy programmes, public investment, public procurement and debt. Better management in these areas can be as effective in increasing fiscal space as receiving additional resources"[19]. Even if the competent authorities, when implementing new technological means, can spend better in social policies to fulfil some human rights, policy makers and managers should bear in mind the relevance of the principle of proportionality, as these technologies in themselves, by their operation or by their result may negatively affect other human rights as well. For that reason, they should facilitate an internal and external judgment in this regard (*ex ante* rather than *ex post*).

References

Berryhill, Jamie, Kevin K. Heang, Rob Clogher & Keegan McBride. 2019. «Hello, world: Artificial Intelligence and its use in the public sector.» *OECD Working Papers on Public Governance* 36. doi.org/10.1787/726fd39d-en

Collovà, Claudio, Velina Lilyanova & Nele Lüker. 2024. «Digital public services in the National Recovery and Resilience Plans. Mid-term multilevel governance appraisal.» *Briefing European Parliamentary Research Service* PE 762.287.

European Parliament. 2024. «Briefing for the FEMM delegation to UN CSW 68 (18-22 March 2024).» *Briefing Directorate-General for Internal Policies* PE 760.544.

European Parliament. 2021. Proceedings of the workshop on «Use of big data and AI in fighting corruption and misuse of public funds - good practice, ways forward and how to integrate new technology into contemporary control framework.» *Directorate General for Internal Policies of the Union*. PE 691.722.

[19] European Commissioner Neven MIMICA, Side Event on International Support to Domestic Resource Mobilisation, Addis Abeba, 15 July 2015. http://ec.europa.eu/commission/2014-2019/mimica/announcements/side-event-collect-more-spend-better-contribution-2030-agenda-sustainable-development-new-york_en [18 October 2015]; https://www.un.org/en/development/desa/usg/statements/mr-wu/2015/09/a-contribution-to-the-2030-agenda-for-sd.html [24 November 2024]

Fedeli, Mark. 2024. «Power through fiscal year-end budgeting with AI, workflow automation.» Accessed May 22, 2024. https://www.federaltimes.com/opinions/2024/04/22/power-through-fiscal-year-end-budgeting-with-ai-workflow-automation/#:~:text=More%20federal%20agencies%20are%20harnessing,traceability%20of%20data%20across%20programs.

Fernández-Cortez, Vanessa, David Valle-Cruz & José Ramón Gil-García. 2020. «Can Artificial Intelligence help optimize the public budgeting process? Lessons about smartness and public value from the Mexican Federal Government.» *IEEE Xplore* 978-1-7281-5882-2/20.

Grau, Mª Amparo. 2023. «La utilización de la inteligencia artificial en la función de control.» *Revista Española de Control Externo* 74-75: 72-91.

Grau, Mª Amparo. 2022a. «Fiscal transformations due to AI and robotization: where do recent changes in tax administrations, procedures and legal systems lead us?». *Northwestern Journal of Technology and Intellectual Property* 19: 325-363. Accessed: May 24, 2024. https://scholarlycommons.law.northwestern.edu/njtip/vol19/iss4/1

Grau, Mª Amparo. 2022b «The Alignment of Taxation and Sustainability: Might the Digital Controls of Non-Financial Information Become a Universal Panacea?» *Review of European & Comparative Law* 3: 61.

Grau, Mª Amparo. 2020 «Los Derechos Humanos en el siglo XXI: ¿Cómo financiar su coste para salvaguardar su efiacia?» In *Los Derechos Humanos en el siglo XXI,* Tomo III: Los Derechos Humanos desde la perspectiva política y social, edited by José Antonio Pinto and Ángel Sánchez de la Torre, 175-180. Madrid: Edisofer.

Johnston, Liz. 2023a. «What State and Local Governments Should Look for in a Cloud Budgeting Software Solution.» January 19. Accessed: May 24, 2024: https://www.resourcex.net/blog/what-state-and-local-governments-should-look-for-in-a-cloud-budgeting-software-solution

Johnston, Liz. 2023b. «GFOA Budgeting Best Practices for State and Local Governments.» February 16. Accessed: May 24, 2024: https://www.resourcex.net/blog/gfoa-budgeting-best-practices-for-state-and-local-governments

Johnston, Liz. 2023c. *Step-by-Step Guide to the Public Sector Budgeting Process.* April 27. Accessed: May 24, 2024: https://www.resourcex.net/blog/step-by-step-guide-to-the-public-sector-budgeting-process

Johnston, Liz 2022b. «What Is Government Budgeting Software? 3 Basics to Know.» September 8. Accessed: May 24, 2024: https://www.resourcex.net/blog/government-budgeting-software-3-basics-to-know

Lilyanova, Velina. 2024. «Investment in artificial intelligence in the National Recovery and Resilience Plans.» *Briefing European Parliamentary Research Service*. PE 762.288.

Maciejewski, Mariusz. 2024. «Law and ICT, Policy Department for Citizens' Rights and Constitutional Affairs.» *Directorate-General for Internal Policies*. PE 762.738.

Mahmutaj, Klentiana. Forthcoming. «Artificial Intelligence, Regulation, and the Right to Development.» Thematic study by the Expert Mechanism on the Right to Development. Accessed: May 24, 2024: https://www.ohchr.org/en/documents/ongoing-studies/artificial-intelligence-regulation-and-right-development-thematic-study

Malan, Jack and Marta Dimauro. 2022. «Single Audit Approach - Root Causes of the Weaknesses in the Work of the Member States' Managing and Audit Authorities.» *European Parliament STUDY*. PE 732.267.

Martín López, Jorge. 2023. Inteligencia artificial y comprobación tributaria: transparencia y no discriminación, Pamplona: Aranzadi.

Navarra, Cecilia, Aleksandra Heflich and Meenaakshi Fernandes. 2024. «Improving EU action to end poverty in developing countries. Cost of non-Europe report.» *European Parliament STUDY.* PE 747.425.

Preut, Anna, Jan-Philip Kopka and Uwe Clausen. 2021. «Digital twins for the circular economy.» *Sustainability* 13 (18): 10467. Doi 10.3390/su131810467

Rampton, James et al. 2024. «The future of digitalisation in budgetary control.» *Directorate-General for Internal Policies*. PE 759.623.

Resource X. 2023. «Artificial Intelligence for budgeting: maximizing resources with AI modeling.» November 14. Accessed: July 12, 2024. https://www.resourcex.net/blog/artificial-intelligence-for-budgeting-maximizing-resources-with-ai-modeling

United Nations. 2022. *Revolutionizing public financial management with cutting-edge AI-powered tools.* Accessed: may 13, 2024. https://www.unescwa.org/AI-budgeting

United Nations. 2023. «Financing for development gateway: Financing is about transforming lives not just economies.». Accessed: August 21, 2024: https://www.unescwa.org/sites/default/files/inline-files/23-00158-Financing-for-Development-Gateway-Web.pdf

Valle-Cruz, David, Vanessa Fernández-Cortez and Ramón Gil-García. 2022. «From e-budgeting to smart budgeting: Exploring the potential of artificial intelligence in government decision-making for resource allocation.» *Government Information Quarterly* 39: 101644.

Deusto Journal of Human Rights
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Annex

Table 2.

Benefits and limitations of using risk-scoring tools to detect irregularities

Benefits	Limitations
Saving time. Because risk-scoring tools can check almost infinite amounts of data for patterns or indicators of risk they save auditors time. **Allowing a 100% check.** Risk-scoring tools may allow auditors to check not just a random sample, but all cases. **Minimising human errors.** Automating manual searches reduces human errors, and increases the chances of finding any cases of fraud and corruption. **Deterrent effect.** The increased transparency offered, in particular, by public risk-scoring tools could have a deterrent effect.	**Time and cost to develop the system.** Developing indicators, finding appropriate data, and developing risk-scoring tools to mine that data is a time and resource-intensive process. **May not capture new indicators of fraud.** Most risk-scoring tools are based on the indicators auditors defined based on their own experience. New ways to commit fraud may not be detected. This may be an issue in fast-paced environments where types of irregularities change over time. **False positives.** Not every case that is 'flagged' is fraudulent. Working with risk scores requires a level of digital literacy. While risk scores are designed to point auditors to cases to examine in more detail there is a danger that auditors may automatically see them as "fraudulent".

Source: Rampton et al. (2024).

Table 3.

Benefits and limitations of the use of digital platforms for collaboration between institutions in budgetary control

Benefits	Limitations
Enhanced efficiency: digital platforms streamline workflow by allowing effective communication and information sharing between different teams and institutions. This can increase the efficiency of an investigation and prosecution activities, where timely provision of good quality data plays a vital role. The platforms can also enable automation of manual tasks, which saves time and reduces errors. **Real-time collaboration** and interactions among audit teams can be facilitated by digital platforms, regardless of their physical location. Audit team members can also feel more motivated as they actively participate in decision-making and problem solving, which can further encourage innovation. **Single repositories of data** facilitate smoother audits as all parties have access to the same information. This can reduce confusion caused by multiple versions of documents. **Document version control and tracing** can be enabled by digital platforms, including an audit trail of revisions. **Progress tracking:** digital platforms facilitate tracking progress, milestones and tasks within budgetary control. Continuous monitoring of progress can help in ensuring timely completion of the audits.	**Cybersecurity and data privacy concerns:** the uptake in the use of digital platforms raises concerns about data protection and vulnerability to cyber-attacks. Ensuring robust cybersecurity measures is crucial. Furthermore, clear data ownership arrangements between financial institutions should be made before starting the audit process. **Adequate skills and training are necessary** for successful implementation of digital platforms. **Unforeseen technological limitations:** the full range of capabilities and limitations of digital platforms and other digital technologies is not yet fully understood. Moreover. advancements in technology might not always keep pace with the needs of the audit process. **Interoperability challenges** might arise if financial institutions use different digital platforms. Collaboration and seamless data exchange between multiple platforms might be hindered, especially where data formats are inconsistent. Multilingual data collected from various sources must be standardised so that it can be integrated into a single platform. This requires advanced translation software that can handle technical and financial terminology accurately. **Legal and regulatory compliance** with data protection laws and audit standards needs to be ensured; institutions collaborating across borders could face legal complexities. **Resistance to change:** institutions may be accustomed to traditional audit methods and resist implementing digital platforms.

Source: Rampton et al. (2024).

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Table 4.

Benefits and limitations of the use of robotic process automation in budgetary control

Benefits	Limitations
Improved operational efficiency and resource optimisation by reducing the time and effort to complete repetitive tasks, thus allowing the audit teams, to focus on more complex issues related to audit findings. **Reduction of costs** in the long term after the initial investment to implement the technology by reducing the need for human labour or enabling staff to focus on higher-value or more complex tasks. In addition, RPA software can perform the automated tasks round the clock. **Improved compliance and data security:** automation can ensure that processes are carried out in compliance with current regulations and in a consistent manner. In addition, the risk of data breaches or unauthorised access can be reduced through automation of data encryption and access control. **Boosted accuracy** of data entry and processing by reducing the risk of errors. RPA can provide an audit trail, which makes it easier to monitor progress and resolve issues more quickly. **Easy integration** with existing legacy systems within an organization, as well as relatively straightforward implementation process. Moreover, RPA does not necessarily require a developer to configure, which makes it ideal in cases where resources are too scarce to develop deep integrations.	**Shift In organisational culture:** as RPA deployment requires a focus on more complex tasks, the adaptability of staff Is an important factor for successful outcomes in automation and digital transformation projects. Teams can be trained to adapt to the shifts in priorities. **Unable to automate more complex tasks** that require advanced decision-making as only processes with well-defined rules can be automated. **Can be difficult to scale up:**·the limited ability to handle large volumes of data may hinder RPA adoption. **Unable to learn from past experiences** and needs human intervention to learn from data and to adapt to new situations.

Source: Rampton et al. (2024).