

OECD Public Governance Reviews

# Strengthening Oversight of the Court of Auditors for Effective Public Procurement in Portugal

DIGITAL TRANSFORMATION AND DATA-DRIVEN RISK  
ASSESSMENTS



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# Foreword

Supreme Audit Institutions (SAIs) are key actors in the public procurement system, safeguarding it from threats and ensuring its efficiency and integrity. This is particularly relevant given that public procurement is a key pillar of public service delivery, representing on average approximately 12% of GDP across OECD countries. Threats and risks affecting the public procurement function can have significant consequences on the quality and quantity of public services that governments can provide.

In recent years, SAIs and other oversight bodies have increasingly explored the use of data to enhance their oversight activities. In the public procurement sphere, this has been enabled by the digital transformation of public procurement system. This transformation goes beyond traditional e-procurement systems and adopts a more holistic perspective, including greater integration with public financial management systems and alignment with digital government strategies.

In Portugal, the Court of Auditors (*Tribunal de Contas, TdC*) is the Supreme Audit Institution of the country. To fulfil its mission, the TdC conducts many audits related to public procurement processes (*ex ante, concomitant and ex post*) every year, requiring extensive human and financial resources. Furthermore, the dynamics of how governments manage and oversee public procurement are changing, including a greater focus on financial and non-financial outcomes. This change requires the TdC to keep pace and enhance its audit selection to ensure its approach is both efficient and effective, investing its finite audit resources in areas that pose the greatest risks in public procurement.

Recognising the need to adapt and innovate, the TdC embarked on a broad digital transformation, illustrated most recently in its 2023-2025 Strategic Plan for Digital Transformation (Digital Strategy). The plan underscores the TdC's ambitions and needs to strengthen risk assessment in public procurement and embrace the opportunities and challenges posed by digitalisation and artificial intelligence. This exercise is not just a one-off technological upgrade, but a strategic shift towards a risk-based and data-driven approach to targeting audit resources, focusing on strengthening the control framework to enhance the efficiency and transparency of public procurement spending in Portugal.

This digital transformation agenda relies also on the collaboration with key public entities and data owners in the country, including the Institute of Public Procurement, Real Estate and Construction (IMPIC).

This report explores opportunities and challenges concerning an initiative of the TdC to strengthen its use of data and advanced analytics for assessing risks in public procurement. It offers insights into financial and non-financial risks that are relevant for the TdC's oversight of the public procurement system in Portugal, as well as data sources it can leverage to enhance its data-driven risk assessments.

The action was funded by the European Union via the Technical Support Instrument, and implemented by the OECD, in co-operation with the Directorate-General for Structural Reform Support of the European Commission.

The report was approved by the Public Governance Committee on 27 June 2024 and prepared for publication by the Secretariat.

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# Abbreviations and acronyms

AT	Tax and Customs Authority ( <i>Autoridade Tributária e Aduaneira</i> )
CITM	Centre of Innovation, Technology and Methodologies ( <i>Centro de Inovação, Tecnologia e Metodologias</i> )
DIST	Directorate of Information Systems and Technology
IMPIC	Institute of Public Procurement, Real Estate and Construction ( <i>Instituto dos Mercados Públicos, do Imobiliário e da Construção</i> )
IRN	Institute of Registries and Notaries ( <i>Instituto dos Registos e do Notariado</i> )
LOPTC	Law of organisation and processes of TdC ( <i>Lei de organização e processo</i> )
OECD	Organisation for Economic Co-operation and Development
SAI	Supreme Audit Institution
TdC	Court of Auditors ( <i>Tribunal de Contas</i> )

# Executive summary

The Court of Auditors of Portugal (*Tribunal de Contas*, TdC), as the Supreme Audit Institution of the country, plays a crucial role in safeguarding the legality, regularity, cost-effectiveness and efficiency of public procurement, which represents a significant share of Portugal's GDP (10.3% of in 2021). To fulfil its mission, every year the TdC conducts a significant number of audits related to public procurement processes (*ex ante*, *concomitant* and *ex post*), requiring extensive human and financial resources.

To enhance its audit activities, the Organisation for Economic Co-operation and Development (OECD) and partners at NOVA University supported the TdC in developing a risk assessment methodology for its audit selection for public procurement that relies on data, advanced analytics and artificial intelligence. At the core of this initiative, was the need to map risks and data sources, examine the digital maturity of the TdC to conduct such work, and assess the quality of potential databases that could be used for building a new risk methodology. This report describes this work, which was a precursor to the next phase of the project of developing a proof-of-concept for a data-driven model for the TdC to assess risks in public procurement. The report looks at the key role of the TdC in promoting a risk-based approach in public procurement, at key aspects of the TdC's data ecosystem and, at key variables from stakeholders' databases that can be employed to assess risks and irregularities in public procurement,

## Key findings and recommendations

- The public procurement regulatory framework of Portugal has undergone multiple amendments that may impact TdC audit activities. The TdC must align its audits with the updated regulatory framework, and contracting authorities may face challenges in ensuring the compliance of their procurement procedures, which may be audited or controlled.
- The public procurement system in Portugal faces key challenges that could inform the TdC's risk-based approach to public procurement. These challenges include a low level of competition and potential transparency and integrity issues. In addition, the TdC's risk-based approach should consider different categories of risks, beyond those having a financial implication and including environmental ones.
- Public procurement risks are considered as part of the strategic plan of the TdCt. The teams in charge of concomitant and *ex post* control implement some kind of risk-based approach which would benefit from being formalised. Implementing a risk-based approach is not seen as a priority by the a priori audit team, given that all tenders and contracts falling under the scope defined by law should be audited. However, such an approach would enable this department to identify red flags (irregularities and specific issues) in contracts.
- The implementation of a data-driven risk-based approach to public procurement activities requires identifying and working with the relevant databases. The following external databases could be considered: BASE, managed by Institute of Public Procurement, Real Estate and Construction (Instituto dos Mercados Públicos, do Imobiliário e da Construção, IMPIC), the registry of beneficial ownership, managed by the Portuguese Institute of Registries and Notaries (Instituto dos Registos

e do Notariado, IRN); and databases managed by the Tax and Customs Authority (Autoridade Tributária e Aduaneira, AT). TdC access to external databases can represent a challenge given data protection requirements. TdC has been granted access to IMPIC data. However, access to IRN and AT databases, which would enable TdC to identify additional risks, is more challenging, as it requires the signing of protocols between each of these institutions and TdC.

- In Portugal, there is no dedicated strategy on risk management in public procurement covering different categories of risks. To infuse a risk management culture in public procurement, the government of Portugal could consider developing a dedicated and comprehensive public procurement risk management strategy encompassing all categories of risks.
- TdC established the Department for Innovation, Technology and Methodologies (CITM), a central entity to lead its digital transformation. Good governance processes are in place to drive greater coherence between TdC's digital initiatives. The TdC's Digital strategy benefited from external self-assessments as well as internal collaboration and analysis.
- A framework for monitoring and evaluating TdC's digital initiative for data-driven risk assessments in public procurement would help strengthen its goal of moving towards a more automated, AI-driven form of risk assessment. Another important consideration is for TdC to evaluate the return on investment in the development of digital tools.
- TdC's digital initiatives and digital transformation depend on change management and continuous learning to ensure the planning, execution and sustainability of digital transformations, such as data-driven risk assessments. There is scope to strengthen the data literacy and digital skills of TdC staff assessing public procurement risks, and this can be achieved and sustained through targeted training and internal knowledge-sharing.
- The TdC has implemented many improvements to IT infrastructure, such as the creation of the "ModInAudit" application. However, there is scope to develop and implement other improvements to achieve interoperability with other public administration organisations, better automation of internal verifications, and improve data quality.
- To create a robust data-driven risk assessment tool, the main challenge relates to data preprocessing to overcome data quality issues. Three analytical requirement categories – rule-based, inference-based and model-based were examined in context of the TdC's audit activities and needs. Key challenges were identified in relation to optimising the processes to extract the best value from semi-structured and structured information.
- To develop a data-driven risk-based model will require the identification of all relevant risk indicators. A thorough assessment of the quality of each indicator will need to be undertaken before inclusion in the risk model.

# 1 The Court of Auditors: A key actor for enhancing the risk-based approach in public procurement

## 1.1. Introduction

Public Procurement accounted for 10.3% of Gross domestic product (GDP) in Portugal in 2021, below the OECD-EU average of 12.9%, but still making it a key economic activity in the country (OECD, 2023<sup>[1]</sup>). The share of public procurement in terms of GDP increased since 2019 by 0.4 points of GDP. This increase is mainly due to the Recovery and Resilience Facility (RRF), the centrepiece of Europe's recovery plan, boosting public investment. Efficient and effective procurement is critical to the fulfilment of the basic functions of public administration, including the delivery of public services, to establish citizens' trust and to ensure sustainable and inclusive economic growth. Well-designed public procurement systems also contribute to achieving pressing policy goals such as environmental protection, innovation, job creation and the development of small and medium enterprises. The COVID-19 pandemic highlighted further the critical role of public procurement and related risks. Public procurement was at the forefront of government's responses to the crisis as governments required urgent access to emergency response materials or so-called "essential goods" such as protective personal equipment (PPE) to ensure the of public services and the operation of infrastructure.

Public procurement can be impacted by a wide range of risks that can affect the procurement process itself, as well as broader risks to projects or service delivery. Initially focusing on integrity threats, in recent years countries have paid increasing attention to other risks to public procurement outcomes, including information technology (IT), financial, reputational, social and environmental risks. All these risks are relevant to consider as they impact the fundamental purpose of procurement, ensuring that goods, services or works are delivered to the right place at the right time. Figure 1.1 provides an example of classification of public procurement risks.

**Figure 1.1. Examples of categorisation of risks impacting public procurement outcomes**

Regulatory and Compliance	Sustainability	Operational	Economic and contextual
<ul style="list-style-type: none"> <li>• Compliance with public procurement regulatory framework</li> <li>• Compliance with relevant regulatory frameworks</li> <li>• Integrity risks (fraud, corruption, collusion, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental risks (e.g. procured goods have negative environmental impacts)</li> <li>• Social risks (e.g. labour rights abuses in supply chains)</li> <li>• Resilience risks (e.g. inadequate specifications lead to infrastructure failures over the asset lifecycle)</li> </ul>	<ul style="list-style-type: none"> <li>• Digital risks (e.g. failure of e-procurement system)</li> <li>• Capacity risks (e.g. lack of procurement staff with necessary technical skills)</li> <li>• Supplier risks (e.g. disrupted supply chains)</li> </ul>	<ul style="list-style-type: none"> <li>• Budgetary risks (e.g. insufficient funding allocation)</li> <li>• Market risks (e.g. low number of bidders)</li> </ul>

Source: (OECD, 2023<sup>[2]</sup>).

To safeguard public money and to ensure the delivery of public services, the OECD Recommendation on public procurement advises that countries integrate strategies for the mapping, detection and mitigation of risk throughout the public procurement cycle (OECD, 2015<sup>[3]</sup>). In other words, public buyers should take a structured and systematic approach to address public procurement risks. This recommendation also calls countries to apply oversight and control mechanisms to support accountability throughout the public procurement cycle. In particular, it recommends them to establish clear lines of oversight of the public procurement cycle (OECD, 2015<sup>[3]</sup>).

The Court of Auditors (*Tribunal de Contas*, TdC), the national Supreme Audit Institution in Portugal is a key player of the public procurement system safeguarding it from different threats and ensuring its efficiency. Indeed, the TdC oversees the legality, regularity, economy, efficiency, and effectiveness of public procurement activity through different types of audits (a priori, concomitant and *ex post* audits). To fulfil its mission, a large number of audits of public procurement processes are carried out every year, a time-consuming activity requiring a significant commitment of human and financial resources that could be allocated more efficiently through a proper risk-based approach. Furthermore, it is anticipated that Portugal's Recovery and Resilience Plan (RRP) will lead to an increase in the number of public contracts, as well as in the value of contracts to be executed by central and local governments which will also impact TdC activity.

Aware of the need to change working methods, TdC identified in its 2020-22 Strategic Plan, the necessity to strengthen the use of risk analysis techniques at various levels of its audit activity, including strategy and priority setting as well as the planning of audits and other control actions. The Strategic Plan also recognised the need to innovate and adapt to the opportunities and challenges posed by digitalisation and the use of artificial intelligence (Tribunal de Contas, 2019<sup>[4]</sup>). Advancing the risk-based approach of the court will contribute to enhance the efficiency of the public procurement system in Portugal.

This chapter presents the key role of TdC in the public procurement system, it also provides an overview of challenges faced by the public procurement system and discusses the need to strengthen a risk-based approach in public procurement activities of the court. Given the strong data component of a risk-based approach this chapter also discusses the legal framework for the collection and use of data in Portugal.

## 1.2. The key role of the Court of Auditors in the public procurement system of Portugal

The mandate and primary purpose of Supreme Audit Institutions (SAIs) is to fulfil the independent public sector external audit function for the national public sector and to oversee and hold the public sector to account for its use of public resources. SAIs promote good governance and provide the supreme law-making body (such as the parliament or the legislature) with independent assessments of selected areas of public administration and assurance about public sector financial reporting, administration, performance and accountability (OECD, 2018<sup>[5]</sup>).

Supreme audit institutions are traditionally known for their oversight of public expenditure, which remains a core part of the audit portfolio. SAIs undertake i) financial audits to assess the reliability and accuracy of public entities' financial reporting, ii) compliance audits to assess a public entities' compliance with its governing authorities, and iii) performance audits. As mentioned in the introduction, the TdC has a key function in the public procurement system in the country which represents 21.6% of the total government expenditure in 2021 in Portugal (OECD, 2023<sup>[11]</sup>). Aware of the strategic importance of public procurement, the TdC considers public procurement a key area for its work. To understand further the key role of TdC in the public procurement system, it is pivotal to have a clear picture of the public procurement regulatory and institutional framework.

### 1.2.1. TdC in the public procurement landscape

#### *Multiple amendments of the public procurement regulatory framework impacting TdC activities*

Having in place a coherent and stable institutional, legal and regulatory framework are key starting points to assure sustainable and efficient public procurement systems (OECD, 2015<sup>[3]</sup>), including for the activities of TdC. The regulatory framework in Portugal is regulated by the Public Contracts Code (PCC) approved by Decree-Law 18/2008, of 19 January 2008. Since then, the PCC has been amended 20 times, the last one taking place in July 2023. The last significant amendment to the PCC was introduced by Decree-Law 78/2022, of 7 November 2022. This decree also amended Law 30/2021 that included special procurement measures in the context of the COVID-19 crisis (Government of Portugal, 2022<sup>[6]</sup>). The numerous changes to the PCC impact TdC in two ways. First, the TdC must align its audits with the updated regulatory framework and second contracting authorities may face issues in ensuring the compliance of their procurement procedures that may be audited with the updated regulatory framework.

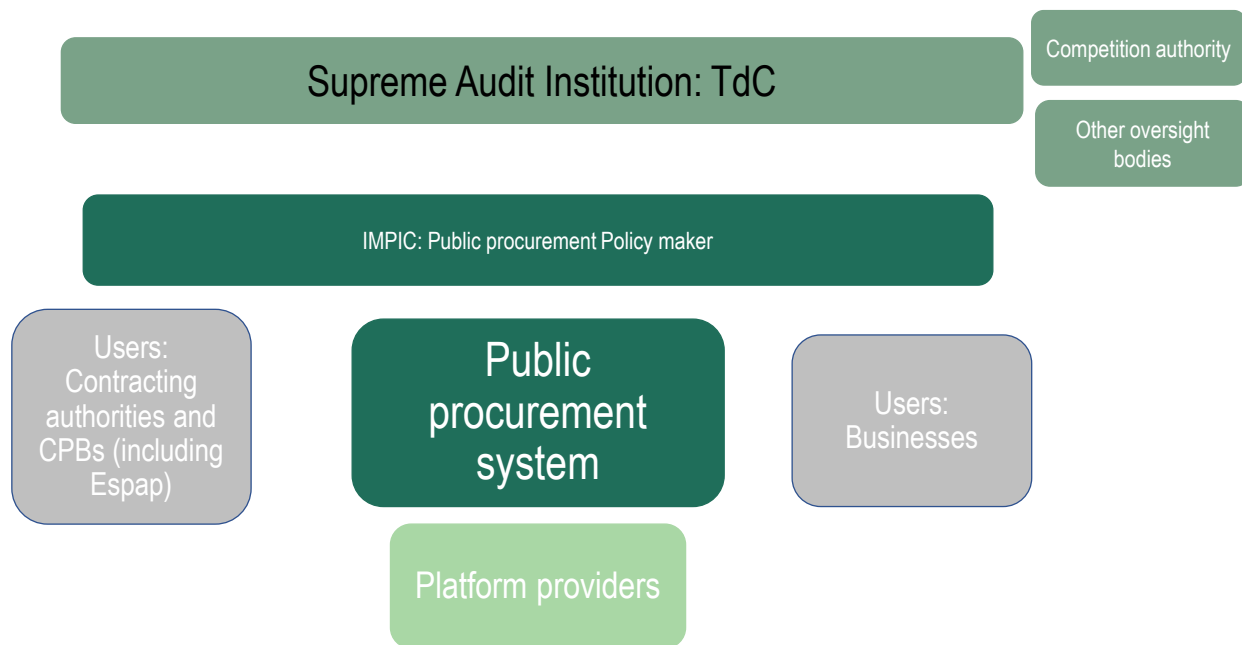
In addition to the PCC, contracting authorities must comply with relevant national strategies on public procurement or those impacting public procurement activities. TdC, through its different audits plays a role in ensuring the proper implementation of the strategies by contracting authorities. In terms of relevant strategies to the public procurement areas, Portugal has a National Strategy for Green Procurement 2020, which defines 21 priority categories of goods and services for Green Public Procurement (GPP) (OECD, 2020<sup>[7]</sup>). Furthermore, a Council of Ministers Resolution introducing mandatory green criteria has been published in September 2023 (Council of Ministers Portugal, 2023<sup>[8]</sup>).

On the digital area, under Portugal's action plan for digital transition, one measure that is led by the agency for modernising the administration is dedicated to the simplification of public procurement for ICT services (Republica Portuguesa, 2020<sup>[9]</sup>).

*Understanding the public procurement institutional framework in Portugal*

A well-functioning public procurement system requires the establishment of effective institutions fulfilling different functions. In Portugal, different entities listed in Figure 1.2 play a key role in the public procurement system.

**Figure 1.2. Key public procurement stakeholders in Portugal**



As previously mentioned, the TdC oversees the legality, regularity, economy, efficiency, and effectiveness of public procurement activity. In carrying out this mission, the TdC contributes to the sustainability of public finances and the efficiency of public administration. The TdC is organised into three Chambers in mainland Portugal, and two Regional Chambers (for the Azores and Madeira respectively). The TdC approves a Strategic Plan every three years, following a participatory process that culminates in a swot analysis (key weaknesses, strengths, opportunities, challenges and threats) and in a risk analysis outlining the goals and priorities (Tribunal de Contas, n.d.<sup>[10]</sup>). In terms of controls and audits carried out by TdC, they cover all entities that are listed in Box 1.1.

### Box 1.1. Entities subject to the TdC's mandate and controls

The following entities all within the TdC's jurisdiction of oversight and control:

- the State and its services
- the autonomous regions of Azores and Madeira and their services
- local authorities and their associations or federations, including metropolitan areas
- public institutes
- social security institutions
- public associations, associations of public entities or associations of mixed public and private entities which are mostly funded by public entities or subject to their management control
- state-owned companies
- regional companies
- inter-municipal and municipal companies
- any entities with involvement of public funds, whether they receive a grant or are partly state-owned
- companies with concessions to manage state-owned companies, or companies with a share of public capital or mixed private and public companies controlled by the public sector, companies with concessions or which manage public services, and companies with public works concessions
- other entities benefiting from or managing public funds.

Source: (Tribunal de Contas, n.d.<sup>[10]</sup>).

In Portugal, the Institute of Public Procurement, Real Estate and Construction - IMPIC (*Instituto dos Mercados Públicos, do Imobiliário e da Construção*), a public institute belonging to the indirect administration of the State, is the national public procurement regulator with several attributions related to regulatory, monitoring and professionalisation functions (see Box 1.2). In terms of monitoring, IMPIC is managing the public procurement portal "BASE" that includes key public procurement information that the court is using for its control activities (see Section 1.4.3).

### Box 1.2. Attributions of IMPIC on public procurement

IMPIC's roles and responsibilities concerning public procurement include the following:

1. formulating legislative and regulatory proposals to the Government
2. participating in national technical representation teams in matters of public procurement at the relevant European and international bodies
3. supporting the Government in defining the national electronic public procurement model, in conjunction with the other competent authorities on the matter
4. ensuring the licensing, monitoring and inspection of electronic public procurement platforms
5. producing good practice manuals on public contracts for the acquisition of works, goods and services
6. managing the public procurement portal, known as the «Base Portal»



7. producing statistical reports on public contracts in the construction and real estate sector
8. analysing complaints and denouncements from citizens and companies, as well as participations from public entities about the application of rules for awarding public contracts in the construction and real estate sector.

Source: (IMPIC, n.d.<sup>[11]</sup>).

Another relevant oversight body is the Inspectorate General of Finance (*Inspeção-Geral de Finanças – Autoridade de Auditoria - IGF*). Under the terms of the Organic Law of the Ministry of Finance (Decree-Law No. 117/2011, of December 15), the IGF is a service of the Ministry of Finance integrated into the direct administration of the State, endowed with administrative autonomy (IGF, n.d.<sup>[12]</sup>). Among the relevant tasks of the IGF are:

- Carrying out, within the scope of the State's financial administration, auditing and control in the budgetary, economic, financial and asset domains, in accordance with the principles of legality, regularity and sound financial management, contributing to economy, efficiency and efficiency in obtaining public revenue and carrying out public, national and European expenditure.
- Carrying out systematic financial audit actions, including the budgetary audit with the collaboration of the Directorate-General for the Budget, control and evaluation of services and bodies, activities and programmes of the State's financial administration.
- Carrying out financial, system and performance audits, inspections, economic and financial analyses, tax examinations and other control actions on public and private entities covered by its intervention.

The mission of the Portuguese Competition Authority (*Autoridade de Concorrência, AdC*) is to ensure the application of rules to promote and defend competition in public and private, co-operative and social sectors, respecting the market economy and free competition, for the benefit of people (Autoridade da Concorrência, 2023<sup>[13]</sup>). AdC has sanctioning, supervisory and regulatory powers. Given that public procurement is a key economic activity, the entity plays an important role in investigating and sanctioning anti-competitive practices in public procurement. Since 2016, AdC launched an initiative to raise awareness regarding bid rigging in public procurement and promoting competition in this area (OECD, 2022<sup>[14]</sup>). This initiative has been also clearly mentioned in the strategic priorities of the authority for 2023 (Autoridade da Concorrência, 2023<sup>[15]</sup>). AdC and other bodies such as IMPIC, IGF, Espap and AdC are part of an informal working group on public procurement sharing relevant information and discussing emerging challenges.

Espap, the Entity of Shared Services of the Public Administration, is a public institute of special regime, integrated in the indirect administration of the State. It has a responsibility in several areas including in public procurement. Indeed, Espap has the status of a central purchasing body (CPB) managing several framework agreements on different procurement categories. The list of goods and/or services available for contract, information on suppliers of goods and qualified service providers, as well as the conditions and minimum requirements defined for each framework agreement can be consulted in the National Public Procurement Catalogue (CNCP). The CNCP is one of the tools used by entities and suppliers that are part of the National Public Procurement System (SNCP) (Espap, 2023<sup>[16]</sup>). Espap also manages the national e-invoicing portal “FE-AP”. All “direct” state bodies and public entities must use this portal to receive e-invoices. However, other public entities such as Autonomous Regions, independent administrative bodies, Bank of Portugal, and public foundations are free to use any portal other than FE-AP (European Commission, 2023<sup>[17]</sup>). Another relevant CPB to consider is SPMS that procures goods and services in the health sector. This sector alone represented 37% of procurement spending in 2021 (OECD, 2023<sup>[1]</sup>).

The PCC, in its article 2 and 7 clearly defines entities considered as “contracting authorities”. In total, Portugal accounts for around 5 000 contracting authorities (CAs). However, not all contracting authorities are registered in the BASE portal. In 2021, 4 169 entities were registered in the BASE portal with 29% of them being regional and local entities and 25% entities at the national level (IMPIC, 2021<sup>[18]</sup>). All CAs are responsible for the proper implementation of their public procurement procedure from planning to contract management, in line with the PCC.

E-procurement solutions can be provided through a single e-procurement platform with a single business model serving all contracting entities in the country or several platforms, certified and with standardised business processes prescribed in public procurement legislation (EBRD, 2015<sup>[19]</sup>). Portugal opted for a multi-platform model provided by five main private providers with the following market shares in terms of number of contracts (in 2021): Vortal (46.1%), Acingov (35.3%), Saphetygov (13.1%), Anogov ( 5%) and Compraspt (0.4%). (IMPIC, 2021<sup>[18]</sup>)

According to the BASE portal, there were 178 364 economic operators that were awarded a public contract in 2021, the vast majority Portuguese companies (98.25%).

### **1.2.2. The different types of controls performed by TdC**

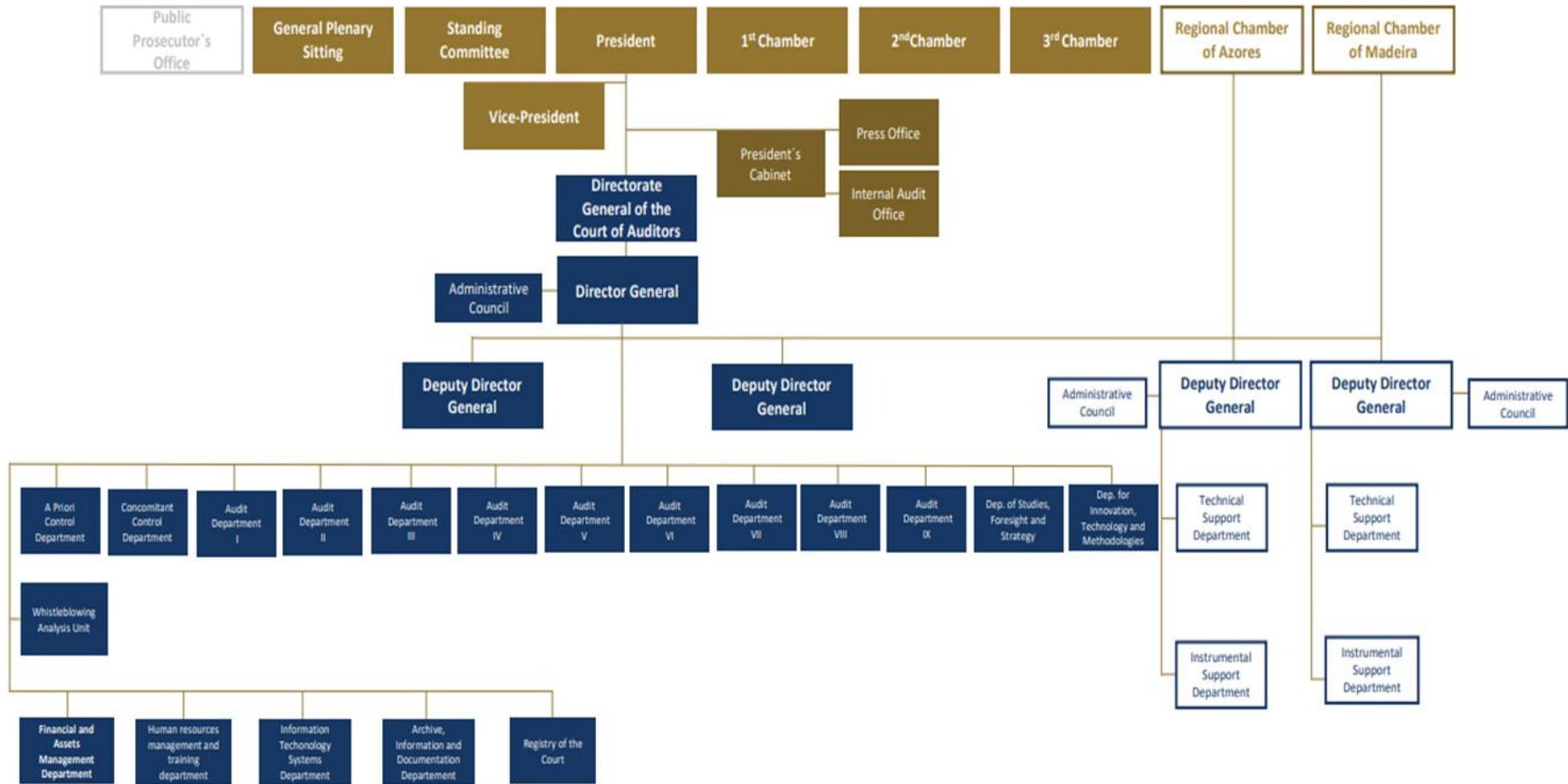
As part of its mandate, the TdC exercises three types of controls: i) a priori controls; ii) concomitant controls; and iii) *ex post* controls. The concomitant controls have been reinforced with Law 30/2021 on special procurement measures in the context of the COVID-19 pandemic. Indeed, article 17 of the law includes provisions in relation to the role of the TdC.

The TdC includes 3 chambers in its headquarters:

- The first chamber is in charge of assessing and deciding on cases referred for a priori control and performing some concomitant controls;
- The second chamber is in charge of concomitant and *ex post* control, issuing the Opinion on then General Account of the State and Social Security and carrying out audits and verifications of accounts and identifying responsibilities;
- The third chamber is in charge of financial liability.

In addition to these chambers in its headquarters, there are two regional chambers of the court in the Autonomous Regions of the Azores and Madeira that perform all types of audits. Figure 1.3 provides the organisation chart of the TdC.

Figure 1.3. The organisational chart of the Court of Auditors



### *A priori controls*

Many SAIs (particularly in the EU) moved away from a priori audits, focusing more their efforts on *ex post* controls. However, in Portugal the TdC performs a priori or *ex ante* controls for some procurement processes. The purpose of a priori controls is to verify whether the acts, contracts or other instruments generating expenses or representing direct or indirect financial expenditure or liability are in accordance with the laws in force and whether the respective charges have a place in the appropriate budgetary allocation (Tribunal de Contas, 2022<sup>[20]</sup>).

More specifically, the TdC performs a priori controls in specific cases described in article 46 of the Law of organisation and processes of TdC (*Lei de organização e processo – LOPTC*) (see Table 1.1). The court may approve (give a visa) or refuse the procurement acts or contracts. It is important to note that in most cases contracts can be enforced before the approval of the TdC except if the amount is above EUR 950 000 (Tribunal de Contas, 2022<sup>[20]</sup>). TdC has 30 days to approve or refuse a contract or an act in the context of a priori control. After this deadline, the contract or act is considered as approved. At the TdC, a team of 40 auditors are part of the a priori control department.

**Table 1.1. Cases where TdC performs a priori control**

Cases	Threshold for the control
All acts resulting in an increase of the funded public debt of the services and funds of the State and autonomous regions with administrative and financial autonomy, and of the other entities as well as the acts modifying the general conditions of the prior approved loans	N/A
Contracts for public works, acquisition of goods and services, as well as other purchases implying expenditure under the provisions of article 48 of LOPTC, when put in writing according to the law	Equal or above EUR 750 000
Draft contracts with a value equal or greater than the ones established in the budgetary laws (according to article 48 of LOPTC), where expenditures, or part of them, have to be paid at the date of their signature	Equal or above EUR 750 000
Acts or contracts that involve objective amendments to contracts previously approved by the TdC and imply an increase in the financial costs or financial liabilities	N/A
Acts or contracts that involve objective amendments to contracts not previously approved by the TdC, and imply an increase in the financial costs or financial liabilities above the thresholds provided for in article 48 of LOPTC.	Equal or above EUR 950 000

Note: The acts, contracts, and other instruments subject to a prior control of the Court of Auditors whose value exceeds EUR 950 000 are not effective before the prior approval or the compliance declaration. Article 49 of the LOPC provides for some exceptions.

Source: (Tribunal de Contas, 2022<sup>[20]</sup>).

In 2022, TdC performed 1805 a priori controls of procurement processes for a total amount of EU 6.834 million. In terms of procurement volume, nearly half (48.9%) of audit concerned the central administration, 26.4% local authorities, and 17.8%, State and Regional owned enterprises. The share of visas following a-priori audit is high. For instance, between January and September 2023, less than 1% of a priori audits led to a refusal.

According to the annual report of the court, these audits led to a significant reduction of expenditures (Tribunal de Contas, 2023<sup>[21]</sup>). The main issues identified in a priori controls are the following:

- **Execution and Financing of Expenditure:** Inadequacy of commitments, etc.
- **Indebtedness:** Insufficient specification of purposes; inconsistencies in the amounts and applications provided for; exceeding of indebtedness limits; establishment of illegal or disproportionate guarantees, etc.

- **Procurement process:** Lack of competence for decisions; absence of cost/benefit analysis; absence of a justification for the choice of the procurement procedure; the non-division into lots, the choice of specific award criteria; declarations of absence of conflicts of interest, etc.
- **Contractual clauses:** Omission of mandatory mentions; blank clauses; discrepancy with the tender documents; non-identification of the contract manager; etc

A priori audits are conducted using the court's platform dedicated to these controls called e-contas "Fiscalização Prévia".

### *Concomitant control*

In several countries such as Colombia, Peru, Brazil and Spain, SAIs are performing concomitant control as part of their mandate (OECD, 2021<sup>[22]</sup>).

The first Chamber of the Court may carry out concomitant control to i) the procedures and administrative acts involving staff expenses and ii) to contracts which were not subject to a priori control according to the law. In addition, this Chamber may also decide to audit the execution of specific contracts that have been subject to its a priori audit.

The second chamber carries out all sorts of concomitant control through audits on the financial activities exercised before their closing, including to public contracts before their termination (e.g. infrastructure projects).

In the first Chamber, concomitant audit concerns more particularly "additional works", which must be submitted to the Court within 60 days of the beginning of their execution. As regards these contracts, the court conducts an in-depth analysis of the justification and legality of such extra works, and identifies any financial liabilities, which are then reported to the Public Prosecutor Service.

In 2022, 1 109 contracts were registered in the TdC platform (e-contas), representing an increase of 3% compared to the previous year. The overall value of these additional contracts amounted to 112 million euros, an increase of 11.7% compared with the previous year. In terms of number of audits, the TdC conducted two concomitant audits in 2022 with a procurement value of EU 2.8 million, it also conducted two audits, one in relation to special procurement measures and the other in the context of the COVID-19 crisis. At the TdC a team of eight auditors are part of the concomitant audit division.

The recommendations addressed to contracting authorities, IMPIC and the government provided through these audits are key to improve the public procurement system. For instance, these audits recommend contracting authorities to comply with all legal regulations relating to the award of complementary works and public procurement (audits within the scope of the contractual modifications), and fill the forms for communicating contracts to the BASE Portal with greater rigor (audits within the scope of the special public procurement measures).

It also recommends the Government to consider clarifying, through legislation, what are the requirements for publishing on the BASE Portal of contracts awarded by simplified direct award and what are the consequences of the respective non-compliance in terms the effectiveness of these contracts. In addition, it recommends providing for more transparency in relation to the Central Register of Effective Beneficiaries for the purposes of scrutiny in the context of public procurement, as provided for in the National Action Plan for Open Administration (2021-23).

The concomitant audits recommended IMPIC to create a specific section on the BASE Portal dedicated to the procedures and contracts covered by the special public contracting measures approved by Law 30/2021. This recommendation has already been implemented during 2023.

### Ex post controls

The Court verifies the accounts of the entities under its jurisdiction, examines their internal control systems, assesses the legality, economy, efficiency and effectiveness of their financial management and ensures the examination of the national co-partnership to the resources for the European Union, and the application of financial resources provided by the European Union (Tribunal de Contas, 2022<sup>[20]</sup>).

Procurement processes of entities subject to the Court's controls (the State and its services, autonomous regions, local authorities, public institutes, social security institutions, public companies, etc.) are usually addressed as part of their financial management. However, specific audits can also concern specifically public procurement activities.

In 2022, 67 audits and verifications of accounts were launched and 50 were completed for a total amount of EUR 31.2 million; these audits were conducted on different topics and areas such as financial adjustment plans for local authorities, cases of risk identified through complaints in the area of public procurement, response to the COVID-19 pandemic, financing of regulatory activity, airport infrastructures, recovery and resilience plan and European funds (Tribunal de Contas, 2023<sup>[21]</sup>).

In the TdC nine departments are in charge of concomitant and *ex post* controls, dealing mainly with the following issues:

- Department I: Opinion on the General State Account (*Parecer sobre a Conta Geral do Estado*)
- Department II: Certification of the *General State Account* (*Certificação da Conta Geral do Estado*)
- Department III: Rendering and verification of entities' accounts (*Prestação de Contas*)
- Department IV: Functions of sovereignty and Infrastructures (*Funções de Soberania e Infraestruturas*)
- Department V: Social sector (*Setor Social*)
- Department VI: Education and teaching (*Educação e Ensino*)
- Department VII: Economic functions (*Funções Económicas*)
- Department VIII: European funds, environment and natural resources (*Fundos Europeus, Ambiente e Recursos Naturais*)
- Department IX: Local government and local business sector (*Administração Local e Setor Empresarial local*)

Regarding public procurement, through those audits, TdC issues recommendations addressed to three types of stakeholders: i) the government, ii) IMPIC and iii) contracting authorities. These recommendations are key to enhance the public procurement system. Box 1.3 provides examples of recommendations issued by TdC.

### Box 1.3. Examples of recommendations issued by the TdC through concomitant and *ex post* audits

#### Recommendations to the government

- Consider changing the legal regime applicable to public procurement in order to cover a greater number of procedures to be carried out compulsorily through electronic platforms, especially with regard to awards and prior consultation procedures.
- Refine criteria to reinforce green procurement and develop objectives and indicators to measure its environmental and economic impacts.

#### Recommendations to IMPIC

- Promoting the completeness, correctness and coherence of the information published on the BASE portal and data.gov.pt.
- Consider proposing the amendment of Ordinance No. 57/2018, with a view to improving information on environmental criteria, to be included in the BASE Portal.

#### Recommendations to contracting authorities

- Applying the PCC regulation to contracts held by entities not clearly included in the Public Administration sector.
- Implementation of mechanisms for integrity, internal and operational control of the administrative procedures for the procurement of goods and services and budgetary control of expenditure, to reduce the risk of irregularities.
- Implement internal control mechanisms aimed at compliance with legislation on public procurement, particularly with regard to the prohibition of splitting expenses.
- Reinforce internal control procedures in the area of acquisition of goods and services, namely ensuring that no payments are made before the contracts are published on the BASE Portal.
- Develop a public procurement manual/regulation containing a description of the administrative procedures to be observed in contracting works and the responsibilities of those involved in the respective procedures.
- Produce reports of receipt and verification of goods and services, showing the start and end date of the supply and/or provision, as well as their conformity in quantitative and qualitative terms.

Source: Responses of TdC to the OECD questionnaire.

## 1.3. Key challenges of the public procurement system relevant to TdC activities

Despite notable advancements, the public procurement system in Portugal continues to encounter challenges that hinder its effectiveness. These challenges can affect directly or indirectly the activities of TdC in the public procurement area as some of them could represent a risk or contribute to the materialisation of risks or irregularities. These include the lack of competition, transparency and integrity breaches such as conflict of interest fraud and corruption., capability issues of the procurement workforce.



Some of these issues are also identified by key stakeholders in Portugal including the TdC (see sections below). Therefore, it is key to consider them when developing risk-based approaches for contracting authorities but also for oversight bodies, and more specifically for the TdC.

### **1.3.1. The low level of competition in the public procurement market**

Competition in the public procurement market is key to achieving value for money. In Portugal, some challenges exist in relation to the relatively high numbers of tenders with a single bidder, and the existence of bid-rigging practices, as recent numbers revealed. Indeed, the share of contracts awarded where there was only a single bidder is relatively high in Portugal (20%) (European Commission, 2022<sup>[23]</sup>). Having more bidders would improve competition, as this means public buyers could have more options, and eventually get better value for money. Moreover, oversight bodies, such as the Supreme Audit Institution TdC and AdC have raised concerns about contract fragmentation in public procurement.

Furthermore, according to civil society organisations, approximately 80% of procurement procedures in Portugal are won through direct awards, indicating a limited level of competition (European Commission, 2021<sup>[24]</sup>). According to IMPIC data (which is not comprehensive), direct awards represent alone 53.2% of procedures but only 17.6% of procurement volume (IMPIC, 2021<sup>[18]</sup>). This high percentage of direct awards is followed by opacity because the justification can simply refer to an article in the PCC allowing the use of direct awards without further explanation on the circumstances that determined this choice over an open tender. This decreases the level of trust from citizens and enterprises further creating suspicion and raises the risk of corruption while reducing the benefits of market competition (European Commission, 2021<sup>[24]</sup>). Data also reveals that the use of direct award is widespread among local authorities (51% in terms of contractual amounts) (IMPIC, 2021<sup>[18]</sup>).

The AdC, in its 2021 Report stressed the importance of ensuring that public procurement procedures are efficiently designed, enhancing competition, and combatting bid-rigging, given the sizeable public spending, and especially recommended the Portuguese government to combat bid-rigging and promoting competitive and efficient public tenders (OECD, 2022<sup>[14]</sup>). The AdC issued six sanctioning decisions concerning anticompetitive practices covering different types of behaviours and sectors, including a bid-rigging cartel active in the provision of surveillance and security services in public tenders (Autoridade da Concorrência, 2022<sup>[25]</sup>). The companies involved co-ordinated the participation in public procurement procedures by sharing clients and fixing the price levels of the services to be provided. This behaviour, which is a violation of Competition Law, leads to less favourable conditions for public purchasers than would result from a situation of effective competition. This translates, in turn, into higher prices, lower quality or less innovation (Autoridade da Concorrência, 2022<sup>[25]</sup>).

Competition issues are also impacting the access to small and medium-sized enterprises (SMEs) to public procurement opportunities in Portugal. Recent statistics reveal a significant disparity in their participation. In 2021, SMEs, representing 44% of the contractors, accounted for slightly more than a half of the contracts (55%), which is far below the EU average (73%) (European Commission, 2022<sup>[23]</sup>).

To address these challenges, efforts have already been made, such as the division of contracts into smaller lots that has become a common practice in Portugal, but other barriers remain. Indeed, SMEs struggle to access timely and accurate information about upcoming procurement opportunities (European Commission, 2021<sup>[24]</sup>). Lack of awareness about relevant tenders and contracts can limit SMEs' ability to participate effectively in the public procurement system. Furthermore, additional policy efforts are needed to boost the performance of Portuguese SMEs on internationalisation, and to further protect SMEs against late payments from public and private buyers (European Commission, 2019<sup>[26]</sup>), which are currently calculated around 10 days after due date by Portuguese public authorities, and 57 days by other businesses (European Commission, 2021<sup>[27]</sup>).



Implementing measures such as promoting open tendering procedures, encouraging transparency, and fostering fair competition can create a more level playing field and provide greater opportunities for SMEs to participate in public procurement processes. In particular, the TdC through its audits can ensure or encourage contracting authorities to avoid direct awarding of contracts, ensuring that the contracts are split in lots when relevant and that public entities pay on time their suppliers.

### ***1.3.2. Improving transparency to ensure accountability and fairness in the procurement process***

Despite Portugal being a European leader in publishing information on the tender, award, contract, and implementation of procurement contracts (Open Government Partnership, 2021<sup>[28]</sup>), according to Transparency International, there continues to be no documented or monitorable practice of publishing and making publicly available all procedural documents for all phases of direct awarding (Transparency International Portugal, 2019<sup>[29]</sup>).

Although the BASE Portal, established by the PCC and managed by IMPIC was created to centralise relevant contract data, advertise tender calls and contract modifications or conclusions, the Portal is currently not fulfilling all its goals as a significant number of contracts are still not published, and its monitoring capabilities are limited (European Commission, 2021<sup>[24]</sup>). Many of the issues stem from the fact that the Portal relies on the publication and distribution of public procurement data by the Contracting Authorities and the e-procurement platforms. Consequently, the total number of contracts, as estimated by the European Commission, is three times higher than the number of contracts published in the BASE Portal, despite the legal requirements to publish all contracts in the portal (European Commission, 2021<sup>[24]</sup>). Public contracts are not transparent by default, which means that there is no critical information in the BASE Portal to assess the formulation of contracts, their value for money, and sustainability (European Commission, 2021<sup>[24]</sup>).

Furthermore, the extensive use of direct awards for public contracts (53.2% of contracts (IMPIC, 2021<sup>[18]</sup>)), diminishes the benefits of market competition, further emphasising the need for enhanced transparency and accountability (European Commission, 2016<sup>[30]</sup>).

In addition, e-procurement or the use of electronic means has become mandatory for all institutions in Portugal since 2009, for tenders above a threshold of EUR 5 000. Portugal's e-procurement system operates exclusively on privately owned platforms, which compete against each other to offer e-procurement services to contracting authorities (European Commission, 2021<sup>[24]</sup>). In 2020, they were responsible for processing 49.1% of the procedures initiated that year (IMPIC, 2021<sup>[18]</sup>).

The lack of interoperability between the 5 existing e-procurement platforms in Portugal (ACIN, VORTAL, Saphety level, ANO and MIROMA), poses a significant challenge to the efficiency and transparency of the public procurement process. Indeed, the multiple e-procurement platforms utilised by different entities often operate independently and lack seamless integration (European Commission, 2016<sup>[30]</sup>).

### ***1.3.3. Integrity issues in public procurement are a key concern***

As in many other countries, Portugal faces some corruption risks in its procurement system, exacerbated during the pandemic with conflicts of interest and a high percentage of direct awards (Open Government Partnership, 2021<sup>[28]</sup>). According to Transparency International, Portugal ranked 33 over 180 countries in 2022 with an average score of 62/100, and with 41% of the population considering that corruption increased in the previous 12 months (Transparency International, 2022<sup>[31]</sup>). Furthermore, the special EU Eurobarometer on corruption found that 90% of the population considered corruption as widespread in the country in 2022, which is much higher than the EU27 average of 68% (European Commission, 2022<sup>[32]</sup>). 48% of the population also consider that bribes and abuse of power for personal gain are widespread among officials awarding public tenders (European Commission, 2022<sup>[32]</sup>).

In January 2021, Portugal's parliament approved a resolution that urged the government to take measures to mitigate corruption risks during the pandemic. These risks included conflicts of interest and improper allocation of public funds. The objective was also to enhance the transparency of information regarding public investments related to the 22.2-billion-euro Recovery and Resilience Plan (PRR) (European Commission, 2023<sup>[33]</sup>) through the “*Mais Transparência*” portal (Open Government Partnership, 2021<sup>[28]</sup>). The aim was to integrate this data with other datasets, raise awareness, and develop citizen monitoring tools, such as Integrity Pacts, as a means to prevent corruption.

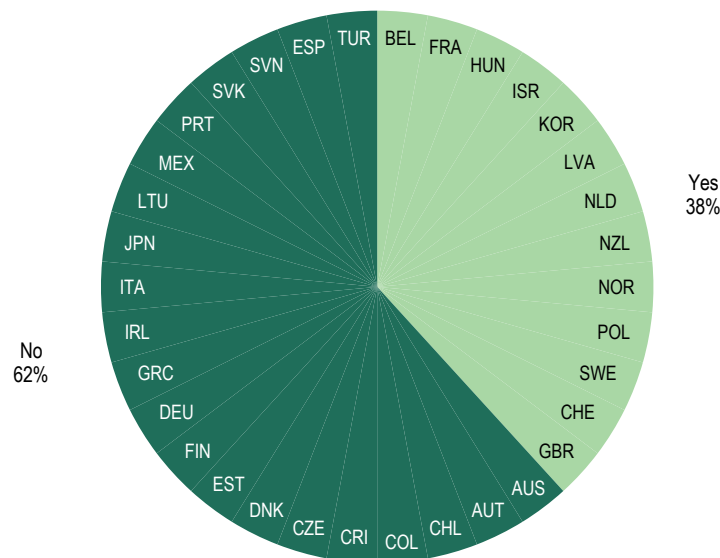
In addition, the Council for the Prevention of Corruption, an administrative entity that functioned by the TdC on preventing corruption and related offences issued a recommendation on the prevention of corruption risks in public procurement. Among the recommendations, the use of competitive procedures instead of prior consultations and direct award, and the adoption of internal control procedures to ensure compliance with the limits on invitations to tender to the same entities in case of direct award (Conselho de Prevenção da Corrupção, 2019<sup>[34]</sup>). The Council was replaced in 2023 by the National Anticorruption Mechanism (*Mecanismo Nacional Anticorrupção* - MENAC) (MENAC, 2023<sup>[35]</sup>).

#### 1.3.4. Capabilities issues hindering the efficiency of the procurement system

The capability of the public procurement workforce is a crucial element of a sound procurement system that delivers efficiency and value for money in the use of public funds. Several risks or irregularities of the public procurement system including those identified by TdC are related to capacity issues.

In Portugal there is a pressing need to advance the capabilities of public buyers to navigate the complexities of procurement and drive better outcomes and value for money. In the country, public procurement is not recognised as a specific function/ standalone profession (OECD, 2019<sup>[36]</sup>). At the central government level, most public procurement professionals are civil servants, but in sub-central bodies, temporary agents with the status of contractual staff also perform some procurement duties. In local contracting authorities, the competency level of procurement professionals and entry requirements are typically lower than at the central level (European Commission, 2020<sup>[37]</sup>).

Figure 1.4. Public procurement recognised as a standalone profession in OECD countries, 2020



Source: (OECD, 2021<sup>[38]</sup>).

In Portugal, there is no competency framework specific to public procurement and there is no mandatory training or certification for public procurement professionals.

Several reports highlighted capacity issues in the public procurement field. For instance, with its recommendation of 2 October 2019, the Council for the Prevention of Corruption suggests, among other measures, the adoption of specific planning instruments for public procurement, the professionalisation of public buyers and the training of contract managers to improve their capability to monitor contracts (European Commission, 2020<sup>[39]</sup>). As mentioned in Table 1.1, one of the commitments of Portugal in terms of Public procurement reform under the RRP operational arrangements is to provide trainings for public administration employees (114 000 officials) through the National Institute of Administration (INA- *Instituto Nacional de Administração*). Among the relevant topics for the professionalisation of the procurement workforce, the use of information systems and e-platforms as well as innovative procurement are highlighted (European Commission, 2020<sup>[39]</sup>).

#### 1.4. Strengthening a risk-based approach to public procurement in the Court of Auditors

Public procurement is a high-risk area where different oversight bodies are playing a key role to safeguard the efficiency and integrity of the procurement system. Public procurement is also an integral part of the audit universe of the SAIs, including TdC. Once the audit universe has been defined and there is a clear overview of all potential areas of audit, the audit entity needs to choose where it will devote its limited time and resources. This is where risk assessment can be incorporated to assist an audit entity with making the best use of its resources to have the greatest impact and to most effectively achieve its purpose and objectives (OECD, 2018<sup>[5]</sup>). Several oversight bodies, including the Brazilian Court of Accounts (TCU) and the Office of the Comptroller General (CGU) are increasingly developing a risk-based approach supported by emerging technologies to identify relevant risks (see Box 1.4).

##### Box 1.4. Using Artificial Intelligence (AI) to identify procurement integrity risks in Brazil

The high volume of procurement processes and bids can present challenges for monitoring integrity risks. In Brazil, an average of over 350 procurement notices are published daily and tenders may only be open for a few days or weeks making it difficult to conduct risk assessments before contracts are signed.

To address this challenge, the Office of the Comptroller General (CGU) implemented the Contracts and Public Notices Analyser, ALICE (*Analisador de Licitações, Contratos e Editais*), which was later transferred to the Federal Court of Accounts (TCU) who further developed it. It is a tool which uses AI to support the continuous auditing of public procurement processes. ALICE accesses the Federal Public Procurement Portal as well as the procurement portal used by the Banco do Brasil, state-owned enterprises and local government agencies. ALICE downloads the bid documents and data and carries out data matching and text analysis to detect misbehaviour and risks in the tendering documents, such as bid rigging, restrictions on competitiveness, over-invoicing on prices and missing information in the public notice.

To detect tender irregularities, ALICE also saves relevant information from the Federal Public Procurement Portal in a machine-readable format to cross-reference with other datasets. Using confidential data and bidders' Taxpayer Identification Number as a unique identifier, ALICE is able to cross-reference entities across databases and detect potential causes for ineligibility during the tendering phase.

The Federal Court of Accounts reports that ALICE has had a significant impact on the identification of public procurement integrity risks, with benefits of the analyses totalling more than EUR 35 million in 2020. Additionally, according to the CGU, in 2021, the system assessed 139 566 bids and sent 35 461 risk notices, while 646 notices were analysed by auditors who opened 70 audit engagements.

Source: (European Commission, 2020<sup>[37]</sup>).

This section discusses the definition of irregularities and risks, the risk-based approach of TdC and identifies relevant data sources for a risk-based approach of the court. It also discussed the need to infuse a risk management in contracting authorities to enhance the efficiency of public procurement spending.

The outline of the audit universe can serve as the initial structure to create the risk map, including the development of risk criteria. The audit entity should consider what data and information is needed to develop the risk map and to identify and assess the risks within its audit universe.

### **1.4.1. Defining public procurement irregularities and risks relevant to the Court of Auditors**

#### *Ensuring a common understanding of the concept of irregularities*

For the identification of irregularities in public procurement, the first step is to ensure a common understanding of the concept of irregularities. The European Union defines irregularities as “any infringement of a provision of Community law resulting from an act or omission by an economic operator, which has, or would have, the effect of prejudicing the general budget of the Communities or budgets managed by them, either by reducing or losing revenue accruing from own resources collected directly on behalf of the Communities, or by an unjustified item of expenditure.” (OECD, 2021<sup>[40]</sup>)

For simplification purposes, we can consider irregularities as infringements of provisions of relevant regulatory frameworks, including the public procurement law and financial rules that have a financial impact on expenditures. However, most infringements may have a direct or indirect financial impact and some practices not being considered as infringements can have considerable financial impacts. For instance, not adopting a life-cycle approach when assessing tenders and awarding contracts only based on price considerations can have significant future financial implications, if the operational or disposal costs of a low cost bid turn out to be cumulatively higher than the equivalent amount of a higher initial cost competitor.

Furthermore, for the identification of irregularities it is important to explore the concept of risks. Risks are defined by the International Organization for Standardization (ISO) as the effect of uncertainty on objectives. It can also be defined as an uncertain future condition or circumstance that could impact the achievement of objectives, and one that is often characterised by reference to potential events or consequences. Public procurement objectives go beyond financial objectives, they can have different aspects such as health and safety, gender inequality, or environmental aspects. Therefore, risks can be understood as the possibility that an event, threat, missed opportunity, action or inaction will materialise and may impact the procurement objectives of a public entity and might lead to irregularities.

Risks can therefore be conceptualised in terms of their component causes, events, and consequences (OECD, 2023<sup>[2]</sup>):

- Risk factors are characteristics of an organisation’s environment, policies, procedures or activities that are associated with risk.
- A cause is a fact or occurrence which alone or in combination has the potential to create risk.
- An event is an occurrence or change in circumstances. Events are usually thought of as something unexpected, but can also be something expected which does not happen.
- Consequences are the outcome of an event affecting objectives and can be certain or uncertain.

Figure 1.5. Conceptualising risks



Irregularities can be considered as consequences of risk factors materialising. Therefore, when considering a risk-based approach and for the purpose of this report and the analysis, this report will focus on the concept of risks at large rather than irregularities.

#### *Considering different categories of risks*

The court is in charge of overseeing the legality, regularity, economy, efficiency, and effectiveness of public procurement activities. These concepts are closely linked to the concept of “value for money” that guides public procurement decisions and actions to focus on the “most advantageous combination of cost, quality and sustainability to meet defined requirements” (OECD, 2020<sup>[7]</sup>) and not only on the economic and financial aspects.

In line with its mandate, the court focuses on “Regulatory/Compliance risks” and “financial” risks. Two surveyed departments mentioned they consider operational risks. In relation to sustainability risks in practice, the “a priori” audit department and the *ex post* audits departments should consider environmental aspects and risks more systematically as part of their controls. In 2020, the TdC published an audit report on the implementation of the National Strategy for Green Procurement (Tribunal de Contas, 2020<sup>[41]</sup>). However, the consideration of environmental risks does not seem to be a recurrent practice.

The resolution 132/2023 of the Council of Ministers introducing mandatory green criteria has been published in October 2023. This resolution will further embed sustainability aspects in TdC audits to align with government priorities and regulatory frameworks.

#### **1.4.2. The risk-based approach of the TdC for auditing public procurement activities focus on public procurement**

##### *Public procurement risks are considered as part of the strategic plan of TdC*

Adopting a risk-based approach to all types of audits is relevant as it helps to prioritise and focus on specific high-risk contracts, procurements and entities, enhancing the efficiency of audits. The activities of the court derive from the three-year strategic plan of audit and control activities of the court, which is approved by the General plenary of the TdC by the 30<sup>th</sup> of October of the year before the plan is entering into force. At the headquarters, the plan shall be drawn up by the standing committee on the basis of the three-year sectoral programmes of the 1<sup>st</sup> and 2<sup>nd</sup> Chambers. The three-year programme of the regional courts is drawn up by the Judge concerned and is annexed to the three-year programme of the Headquarters (Tribunal de Contas, 2022<sup>[20]</sup>).

TdC has approved its strategic plan for 2023-2025 following an inclusive and participatory process within the court. This strategic plan includes a SWOT analysis and a risk analysis that guides its activities (see

Chapter 2). “Non-compliance, fraud, shortcomings and misuse in public procurement” has been identified as one of the 13 external risks guiding the activities of the court and was assessed as being a very critical risk. Therefore, public procurement is reflected in the strategic objectives and priority axes of actions of the court (see Table 1.2).

**Table 1.2. Example of strategic objectives and priority axes of the TdC in relation to public procurement**

Strategic Objectives	Priority axes for action
<b>SO1 - Management Control</b> Fostering rigorous, efficient, sustainable and results-oriented management of public resources	<ul style="list-style-type: none"> <li>Intensify monitoring in areas of higher risk and financial dimension.</li> </ul>
<b>SO2 - Rigour and Accountability</b> Promote the responsibility and accountability of public resource managers, ensuring their timely and systematic control	<ul style="list-style-type: none"> <li>Strengthen the control of legality and compliance of public procurement and financial management acts and operations generating expenditure or representing public charges and liabilities.</li> <li>Strengthen the audit and verification of accounts of entities subject to our jurisdiction and control, including those covering contracts and acts requiring legality and compliance checks</li> </ul>
<b>SO3 - Value and Impact</b> Strengthen our quality, timeliness and relevance to public finances	<ul style="list-style-type: none"> <li>Simplify and harmonise internal procedures to increase the efficiency, effectiveness, timeliness and speed of the Court.</li> </ul>

Source: strategic plan for 2023-2025 of the TdC.

### *Implementing and strengthening a risk-based approach for a priori and concomitant audits*

A risk-based approach in public procurement could be assessed at two different levels: i) the selection of the audit universe (e.g. audited entities, contracts); and ii) the prioritisation of audits within the defined universe.

The first Chamber of the TdC is in charge of assessing and deciding on cases referred for a priori control and performing concomitant controls. According to the Law of organisation and processes of TdC (*Lei de Organização e Processo*, LOPTC), this chamber approves by the 15<sup>th</sup> of December of each year its annual plan which includes: i) the list of bodies or departments exempted, in whole or in part, from a priori controls in the next year. This decision is based on the reliability of the internal decision-making and control system verified by audits carried out by the TdC and, ii) the list of bodies or departments that will be subject to a concomitant audit in the next year (Tribunal de Contas, 2022<sup>[20]</sup>).

Furthermore, some audits could be based on complaints submitted to the TdC. Indeed, Article 143 of the TdC’s internal regulation mentions that complaints received by the TdC with relevant facts and elements are assessed by a Judge counsellor who may decide to conduct an audit of financial responsibility, or to consider the complaint for the planning of audit activities (concomitant and *ex post* audit) (Tribunal de Contas, 2022<sup>[20]</sup>). However, complaints were also considered for the a priori controls in the process of delivering the visa.

In 2022, TdC received 347 complaints and allegations and for 39% of them (198) the assessment was finalised (Tribunal de Contas, 2023<sup>[21]</sup>). The most common issues identified in complaints are linked to public procurement:

- failure to adopt legally applicable pre-contractual procedures
- violation of the legal limits of successive award of contracts preceded by direct award or prior consultation with the same economic operators
- participation in procurement procedures of economic operators belonging to local elected representatives or their family members

- contract splitting
- expenditures in the framework of public procurement without the prior authorisation.

Regarding a priori audits, the LOPTC highlights a risk-based approach when selecting the list of bodies or activities exempted (fully or partially) from these audits based on the reliability of the internal decision-making and control system verified by audits carried out by the TdC. However, discussions during the fact-finding mission stressed that this approach has not been formally implemented in the last years. Furthermore, the implementation of this approach could be challenging given the availability of the required data. In this context, for a priori audits, the TdC could benefit from implementing a risk-based approach to support the team in identifying red flags (irregularities and specific issues) in contracts.

In addition, regarding the use of a risk-based approach for contracts submitted to a priori audits, discussions with the department in charge of these audits show a lack of awareness on the potential benefits of this approach. Indeed, this department mentioned that a risk-based approach won't bring any added value to the work of the department with the main argument that all tenders and contracts falling under the scope defined by law should be audited (see Section 1.2.2). However, a risk-based approach does not prevent the a priori audit team from controlling all tenders and contracts in line with the regulatory framework. Indeed, such approach could help to focus efforts, allocate resources by supporting the team in charge of this type of audits to identify some red flags in contracts. The a priori audit department should seize the opportunity of the project aiming at implementing a risk-based approach in the court to test the relevance of adopting such approach.

Regarding the first Chamber concomitant audit activity, the three-year strategic plan includes the number of audits to be completed each year and the topic of the audit. For instance, TdC is planning to complete in the area of personnel management and public procurement 10 audits in 2023 (which includes 4 carried over), 8 in 2024 and 7 in 2025.

Discussions with the team in charge of the first Chamber concomitant audit highlighted that their audits follow a risk-based approach that is not formalised in all cases. Indeed, they take into account several criteria including the contract value, the indication of illegality, the adoption of recent legal regimes, the use of non-competitive procedures, amendments to contracts during their execution. This department welcomed an enhanced and formalised risk-based selection of procurement tenders or opportunities/contracts to audit, in particular in relation to the identification of contractual prices, the type of public procurement procedure used, the exclusion of bidders and the reason behind, the identification and cross-referencing of partners and managers of the awarded companies bidders.

#### *A risk-based approach to enhance ex post audits*

Subject to its three years strategic plan, according to the article 40.<sup>o</sup> of LOPTC, the second chamber should adopt by the 15<sup>th</sup> of December of each year, its annual programme which includes:

1. The list of entities which are exempted from submission of accounts on the basis of previously defined criteria of auditing principles and current practices.<sup>1</sup>
2. The list of entities whose accounts are subject to external verification.
3. The list of entities whose accounts will be returned with or without internal examination by the support services, based on previously defined criteria.
4. The value of the revenue or expenditure below which the entities subject to provision of accounts will be exempted from submitting accounts to the Court.
5. Audits to be carried out independently of the verification of accounts cases.
6. The actions to be carried out in the context of the preparation of the report and opinion on the General State Account (Tribunal de Contas, 2022<sub>[20]</sub>).



List of entities exempted from rendering accounts were initially introduced when the Court used to receive hard copies of documents. However, with e-contas and the automatism of the process to render accounts led the Court to strategically decide not to exempt any entity from rendering them. Additionally, the electronic rendering of accounts also allows to automatically make verifications in all accounts that previously were only possible for some of them. The mentioned criteria are now used to select, from the rendered accounts, those that will be extensively verified.

Discussions with different teams in charge of *ex post* audit highlighted that their audits do not follow a formal risk-based approach, but they consider several criteria including the value of contracts, the previous performance of an a priori audit, past audits (including a priori and concomitant) and implementation of recommendations, complaints submitted to TdC, information from media and other sources, etc.

Responses from *ex post* audit teams to the OECD questionnaire also highlighted that the implementation of a risk-based approach could increase the efficiency of their work and optimise resources, which could be allocated primarily to audits of entities and contracts that present greater risk, in accordance with predefined criteria.

### *Developing a data driven risk-based model to audit public procurement in TdC*

Public procurement can be subject to multiple risks throughout the public procurement cycle (OECD, 2023<sup>[2]</sup>). Aware of the benefits to have a comprehensive approach to risks impacting the public procurement system, the TdC with the support of the OECD will develop a data-driven risk model; including the development and testing of data pipelines and machine learning models, for the identification of “red flags” focusing on risks and irregularities in public procurement processes.

The first step for the implementation of the data driven risk model is the identification of potential risks that may impact the public procurement system. A careful attention should be paid to this step as it should guide the development of the formulas and the implementation of the model. For instance, ANAC, the Italian anti-corruption authority has developed a set of 17 indicators to help identifying potential integrity risks impacting the public procurement system (see Box 1.5).

#### **Box 1.5. The indicators developed by ANAC to identify integrity risks in public procurement (Italy)**

As part of the project “Measuring the Risk of Corruption at Territorial Level and Promoting Transparency”, which is funded by the European Union, Italy’s National Anti-Corruption Authority (*Autorita’ Nazionale Anticorruzione, or ANAC*) has developed **17 indicators** to measure corruption risks in public procurement and promotes integrity and transparency.

The indicators are applied to the purchases of contracting authorities at the provincial level, and they can be divided according to the object of the contract, the sector of relevance, and the year of publication of the public tender. Moreover, the indicators serve as a sort of “red flags” or “alerts” that lights up to signal any anomaly in public tendering.

#### **The 17 indicators to measure corruption risks in public procurement**

1. The most economically advantageous offer: the indicator measures the number of procedures awarded using the criterion of the “most economically advantageous offer” over the total.
2. Number of “non-open” procedure: the indicator measures the number of “non-open” procedures (e.g. negotiated procedures with or without prior publication of contract notice, direct awards, piecemeal contracts, etc.) over the total.



3. Economic value of “non-open” procedures: this indicator is similar to the previous one, but it measures the economic value (rather the number) of “non-open” procedure out of the total value of procurement procedures.
4. Contracts awarded and modified due to at least one amendment: the indicator measures the number of contracts that were affected by at least one amendment during the execution phase compared to the total number of procedures.
5. Variation of execution costs: the indicator measures the difference between the real and budgeted cost.
6. Variation of time execution: the indicator measures how different the time for the execution of the contract is compared to what was initially planned.
7. Failure of award notice: the indicator measures the number of procedures for which the communication of the award notice by the contracting authority did not take place compared to the total number of procedures.
8. Failure to communicate the end of works: the indicator measures the number of procedures for which the communication of the end of works by the contracting authority did not take place compared to the total number of procedures.
9. Single bid: the indicator measures the number of procedures for which only one bid was submitted compared to the total number of procedures awarded by the contracting authority.
10. Proportion of excluded bids: the indicator measures the number of bids that were excluded over the total number of bids that were submitted for each procedure.
11. Exclusion of all bids but one: the indicator measures the number of procedures for which all bids, but one was excluded compared to the total number of procedures with only one bid submitted and admitted.
12. Proportion of excluded bids in procedures with all but one excluded bid: this indicator measures the number of bids that were excluded over the number of procedures where all bids were excluded but one.
13. Proportion of contracts awarded to the same bidder: the indicator evaluates the recurrence and/or frequency by which a contracting authority awards contracts to the same contractors.
14. Time submission: the indicator measures the time lag between the date of publication of the contract notice and the deadline for the submission of tenders.
15. Duration of the tender evaluation period: the indicator measures the time lag between the submission deadline and the date of award of the contract by the contracting authority.
16. Below threshold “densification” v1: the indicator measures the number of contracts with a value between EUR 37 500 and EUR 40 000 compared to the number of contracts with a value comprised between EUR 30 000 and EUR 37 500.
17. Below threshold “densification” v2: the indicator measures the number of contracts with a value between EUR 20 000 and EUR 40 000 compared to the number of contracts with a value above EUR 40 000.

Source: (Autoridade Tributária e Aduaneira, n.d.<sup>[42]</sup>).

In Portugal, the Centre of Innovation, Technology and Methodologies (*Centro de Inovação, Tecnologia e Metodologias*, CITM) within the TdC has been leading the development of a public procurement risk matrix using an inclusive approach by involving the different teams in charge of different types of audits within the court. Risks that were included in this matrix are those for which there could be a possibility to access the variables to calculate and track them (potentially with the signature of protocol of agreements

with the data owners). However, it is worth mentioning that additional risks could be relevant for a comprehensive risk-based approach but due data access and availability they were not considered within this list. In addition, this list does not consider data quality and reliability, meaning that some of the risks may not be considered due their lack of accuracy.

The risk matrix includes 35 risks classified by 8 indicator groups with 6 of them following the procurement cycle: Financing (1), Procurement procedure (9), Contracting requirements (1) Evaluation of bidders, tenders and award procedure (7), Contract award and execution (10), Payment and financial obligation (1), Conflict of interest, fraud and corruption (3), Intervening parties (issues with suppliers or contracting authorities (3). According to the TdC the detailed risks should not be presented in this report to avoid the misuse of this information by audited entities. For a greater impact, the TdC could initiate discussions with IMPIC and other relevant bodies to discuss the development of potential mitigation measures that will decrease the materialisation of the risks and irregularities identified.

The TdC is aware that the development of a risk matrix is a dynamic process. The matrix will need to be updated regularly to potentially identify new risks threatening the public procurement system or the that may lead to the identification of new risks or the removal of irrelevant ones. The matrix below reflects the main risks identified by the different audit teams.

**Table 1.3. Main risks identified by some audit departments in TdC**

Department	Trends and emerging risks
Department Concomitant control	<ul style="list-style-type: none"> <li>The legal permission to use non-competitive procedures for high values (e.g., COVID19 legislation and Law no. 30/2021 (MECP), potentiates risks of adjudication to the proposal that may not be the best, etc.)</li> <li>Delivery or contract execution that may not correspond to the contract requirements</li> </ul>
DA III – Prestação de contas	<ul style="list-style-type: none"> <li>Excessive use of direct award</li> <li>Lack of contracts being reduced to writing</li> <li>Lack of designation of contract manager</li> <li>Lack of publication on the base portal of direct awards and prior consultations carried out</li> </ul>
DA V- Setor Social	<ul style="list-style-type: none"> <li>Contract splitting</li> <li>Use of inappropriate contracting procedures</li> <li>Lack of budget or available funds</li> <li>Non-application of contractually fixed penalties</li> <li>Lack of advertising of contracts on the Base Portal</li> </ul>
DA VIII -European funds, environment and natural resources	<ul style="list-style-type: none"> <li>Contract splitting</li> <li>Direct awards where the procedure is carried out after the selection of the supplier</li> <li>Use of direct awards based on material criteria (extreme urgency, artistic reasons, and selection of the same supplier in a previous competitive acquisition procedure), without respect for the conditions provided for by law</li> <li>Lack of publication of contracts in BASE</li> </ul>
DA IX - Local government and local business sector (DA IX – Administração Local e Sector Empresarial Local)	<ul style="list-style-type: none"> <li>Pre-contractual procedures that are legally required were not followed</li> <li>Contract splitting</li> <li>Conclusion of contracts with retroactive effect</li> <li>Conclusion of contracts with the same economic operator beyond the legally permitted limits</li> <li>Signing of contracts without registering the phases of expenditure in the accounts</li> <li>Physical and financial execution of contracts without prior publication on the base portal, despite this being a requisite for contract effectiveness</li> <li>Direct award using as a justification the exceptional measures COVID-19 without the legal requirements being met for that purpose</li> </ul>
DA VII – Funções Económicas	<ul style="list-style-type: none"> <li>Lack of transparency (e.g. lack of timely information on the performance of contracts)</li> <li>Lack of Planning (e.g. cost and deadline slippage)</li> <li>Lack of programmed legislation (e.g. absence of legally foreseen regulation)</li> </ul>

Source: Responses to the OECD Questionnaire.

### 1.4.3. Identifying relevant data sources for the identification of risks and irregularities

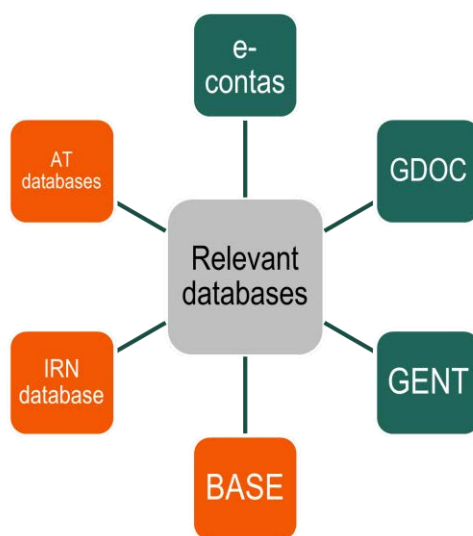
The implementation of a data driven risk-based approach to public procurement activities requires identifying the relevant databases. While different databases could be relevant to public procurement, it is pivotal to focus on those containing information and variables related to the list of risks identified.

Most of the relevant variables to the risk matrix developed by TdC can be found in different databases managed by four different stakeholders. While this section discusses the main databases for the identification of risks, Chapter 3 provides a quality assessment of these databases which is also key for an accurate risk identification.

Regarding the external databases, the following databases are relevant to consider: BASE, the registry of beneficial ownership managed by the Portuguese Institute of Registries and Notaries (*Instituto dos Registos e do Notariado*, IRN), and databases managed by the Tax and Customs Authority (*Autoridade Tributária e Aduaneira*, AT). The other three databases are internal to TdC: i) GENT, the entity management system, ii) GDOC and iii) econtas (see Figure 1.6).

Other databases could be relevant such as the e-invoicing database managed by Espap but the information they include in terms of payments is already available in the TDC databases. In addition, considering information to be available in BASE following the publication of ordinance 318-B regulating the operation and management of the BASE portal in October 2023 (*Portaria n.º318-B/2023*), it is not relevant at this stage to consider data from e-procurement platform providers ( see below the section on BASE).

**Figure 1.6. Relevant databases for risks and irregularities identified by TdC**



The relevance of these databases has been confirmed by the different audit teams who responded to an OECD questionnaire. However, the responses to the questionnaire also highlighted challenges regarding the reliability of data available in these databases. In addition, depending on the scope and type of audits performed, some departments mentioned other specific relevant databases to their activities. For instance, the audit department in charge of local governments mentioned the website of municipalities as being a relevant database.

The sections below provide relevant information on external and internal databases relevant to public procurement risks. Chapter 3 provides a detailed assessment of these databases.

### *External databases relevant to public procurement risks*

As mentioned in Section 1.2.1, BASE is the public procurement portal managed by IMPIC that aims at disseminating public information on public contracts subject to the Public Contracts Code (PCC). The platform serves as a centralised hub, aggregating key public procurement information throughout the public procurement cycle (IMPIC, 2022<sup>[43]</sup>). Box 1.6 provides a detailed description of information available in BASE.

#### **Box 1.6. Key information available in BASE portal**

The BASE Portal provides, in accordance with the regulatory framework information on:

- a. Announcements published in the Diário da República regarding public procurement procedures
- b. Access to parts of the procurement procedure
- c. The establishment of public contracts subject to part II of the CCP and the execution of administrative contracts subject to part III of the CCP, including:
  - i. The precise and complete description of goods, services or works object of the contract
  - ii. The contractual price
  - iii. The number of invitees in the prior consultation procedures
  - iv. Identification of the successful bidder and other bidders
  - v. Identification of objections to the procedure
  - vi. The publication of contracts, including annexes and amendments, with the exception of information relating to secrets of a commercial, industrial or other nature and information concerning personal data
- d. The provision and sale of movable property
- e. The final decisions to apply the sanction for the prohibition of participation
- f. Objective amendments to contracts that represent an accumulated value larger than 10% of the initial contract value, which are made available up to six months after the termination of the contract,

Source: (IMPIC, 2022<sup>[43]</sup>).

Portal BASE offers different type of accesses, including a public view accessible online, showcasing a subset of features and documents. A more detailed information is accessible privately by some stakeholders, specifically auditing entities, such as TdC, IGF, the Public Prosecution Service and the Portuguese Competition Authority (AdC). The law defines what is available in the public and what is available privately to some stakeholders. Concretely, public view includes information on contracts, contracting authorities; bidders and the type of procedure. The privately accessible view includes information on contract managers, bids and all contracts with an amount below EUR 5 000.

The information available in BASE comes from three main data sources.

1. **INCM** – Imprensa Nacional Casa da Moeda [National Printing House and Mint]: This authoritative entity triggers the registration of procedures on the portal upon the publication of the procedure initiation announcement in Diário da República (Portugal's official journal). INCM dutifully transmits the content of these announcements to the portal including procedural objectives, contracting entities, base values, CPV codes, announcement type and models, contract types, web links to the public announcements, procedural IDs, and details regarding National Gazette publication.

2. **Contracting Entities:** Direct input from contracting authorities is a pivotal source. These entities access the portal, contributing essential information that supports the formation and execution of contracts. If the contract is a direct award or prior consultation, then the entities report the information to Portal BASE by filling out the respective forms. Otherwise, they should do it through the contracted e-procurement platform provider. The data reported by contracting entities includes information regarding the entity (Annex I), the procedure (Annex II), technical data (Annex III), reports about the creation, modification, execution and summary of the contract (Annex X – XVII) and reports regarding bids and awarded entities (Annex IV - IX).

**Public Procurement Electronic Platforms:** In alignment with legal provisions (as stipulated in paragraphs c) and d) of article 9 of Order No. 284/2019), electronic platforms relay information to Portal BASE, Specifically, the information from Annex II to Annex XV.

The data that the platform providers must send to BASE is regulated by law. It is therefore not possible for the court to access directly the data provided by the different platform providers (unless protocols are signed with each of the providers). Some issues were identified, including the lack of availability of some structured and unstructured data in BASE that could be relevant to identify and calculate some risks.

For the implementation of e-forms at the national level, ordinance 318-B was published in October 2023 (Portaria n.º318-B/2023). Through this ordinance (in particular in its article 7), platform providers are mandated to send additional data to BASE. This new requirement will have a significant impact on the data available in BASE and its format (structured format) and could support the calculation of additional public procurement risks. For instance, platforms providers will have to send links to the preliminary and final procurement reports. They will also share questions from bidders challenging the ranking of bids, and the NUTS code for the execution of contracts (previously the location was not as accurate). Information regarding questions received from bidders for a specific procedure became available but only in an unstructured format in the evaluation report.

IMPIC is working hard to ensure the integration between the different systems to collect the additional information from the platform providers. The system should be fully operational before the end of 2024.

However, some information that could be relevant in a later stage for a risk-based approach are not available in BASE (as it is not required by law) such as the exact questions asked by bidders at the clarification phase and the justification of the need for the procurement. Therefore, in a later stage, the court could assess the relevance of signing protocols of agreement with each of the platform providers for information that is not available in BASE or propose its inclusion in the next legal review.

The information is stored and gathered by IMPIC, the entity responsible for managing Portal Base. The information is stored in a relational database maintained by the IT team of IMPIC. The database server is managed by the General Secretariat for the Economy (SGE).

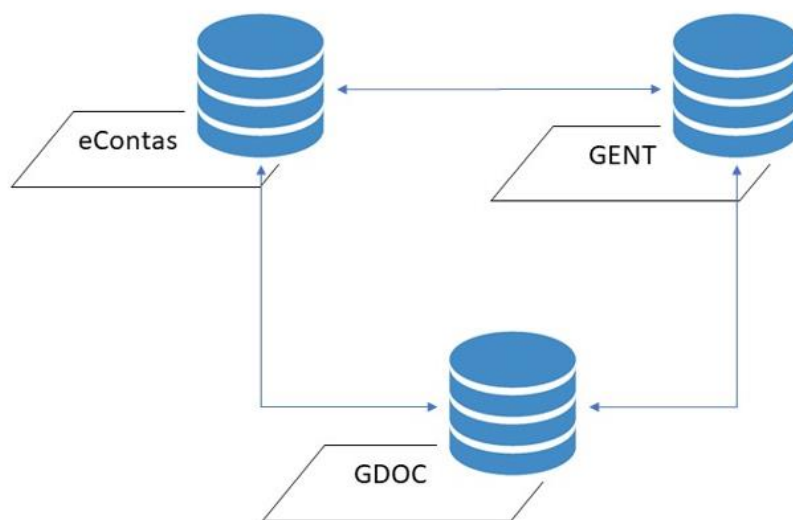
The **registry of beneficial ownership** managed by IRN is a key database with information on individuals who ultimately owns or controls, directly or indirectly, a sufficient percentage of shares or the voting rights or of participation rights in the share capital of a company, and individuals exercising control by any other means over the company. The Registry was created to transpose into the internal legal order chapter III of Directive (EU) 2015/849 of the European Parliament and of the Council, of 20 May 2015, on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing (European Parliament, 2015<sup>[44]</sup>). This registry has been implemented in Portugal since November 2019, and by January 2021, around 490 500 entities complied with this registration. (Open contracting partnership, 2023<sup>[45]</sup>). This database is key to identify different integrity risks in public procurement. IRN responds to any request of information from TdC. However, granting access to its database is more challenging (see Section 1.5).

AT is in charge of collecting taxes but also undertaking tax inspections to prevent and combat tax fraud and evasions (AMA, 2023<sup>[46]</sup>). It manages different **databases** with relevant information including on the tax and financial situation of potential suppliers and payments. Data managed by AT can contribute to the identification of different risks including the non-compliance with payment of taxes. Furthermore, the tax number allocated to companies is key for cross linking different databases with information on economic operators or suppliers.

*Internal databases of TdC relevant to public procurement risks*

Within the Court, two main databases are important to consider: GENT and Public Contracting Files (eContas). Both of these databases are a part of (and interact with) the GDoc System (see Figure below). GDoc is the internal document management system within the Court and also includes the TCJURE (legal information system)

**Figure 1.7. Link between GDOC, acontias and GENT**



Source: Tribunal de Contas.

**GDOC** (*Sistema de Gestão Documental e Processual*) is the internal system of TdC for managing documents and processes that was developed by TdC. It is also the oldest of TdC's IT systems. The user who accesses the system represents a supervised entity and is already pre-registered, with an assigned profile and username.

GDOC cuts across TdC's activity and is integrated with other relevant systems, both GENT and eContas are a part of this system. All of these databases interact with each other and this interaction process is used for risk assessment;

Specifically, after the submission of a reporting map (through eContas *Prestação de Contas*), internal validation begins at the TdC, in which a report is produced indicating deviations from the validation rules to the information collection structures, which could contribute to the identification of "risks" that each account can hold.



This system is used for the purposes of analysing a priori audits, complaints received, and reports from internal control bodies, consisting of several modules, including:

- "A priori control" module, which allows extracting information on the number of contracts, objects, values, type of procedure used, the meaning of the decision, recommendations, follow-up, etc.
- Entry, validation, and registration module for opening and reopening visa/approval processes. "Prior control" processes are required to obtain a visa (i.e., permission of the Court), to materialise the contract. A visa could be approved or rejected by TdC according to the characteristics of the contract.
- Denunciation process module.

**GENT** serves as the comprehensive database of entities under the jurisdiction and control of TdC (the universe of public entities that report to TdC).

Data included from this database comes from different sources: data from other information systems managed by the court such as TCJURE (legal information system), GESPRO (process management system), but also unstructured data filled manually by a dedicated team based on unstructured data from regular analysis/profiling of the Official Government Gazette of the Portuguese Republic.

This database is key to provide information on entities when performing different types of audits and enables to identify entities through an identification number common to different sources. This relational database encompasses 99 original tables. According to TdC 53 of them are relevant for a risk-based approach in public procurement.

**eContas** is the platform used by public entities to submit their public procurement files as an integral part of their Annual Financial and Budgeting Reporting to TdC, but the platform is also used to obtain visas from TdC. One of its objectives is to facilitate the relationship and communication between the Court and supervised entities in the fulfilment of their obligations, providing greater rationalisation and efficiency in communication, particularly in the provision of management accounts. The eContas platform also allows the submission of the contracts for prior audit through econtas "Fiscalização Prévia".), additional contracts through econtas "Prestação de Contas") and contracts within the scope of the special measures for public procurement through eContas-MECP for concomitant audit.

The reports submitted through eContas "Prestação de Contas" serve to complement the standard financial data, such as income statements and balance sheets. These reports are standardised into reporting maps, which are then stored in eContas.

This portal is integrated to the wider GDOC platform and aims to facilitate the relationship and communication between the Court and the entities subject to its control, namely in the fulfilment of their obligations, including on public procurement. Access to the eContas platform is exclusively granted to registered users within the IT support system for TdC activities, ensuring a controlled and secure environment.

Entities have to report a wide range of information to the Court, some of which is defined by the Court itself (either from the point of view of the reporting process: scope of the information, content, periodicity, etc., or from the point of view of the structure of the map/files to be reported), but some other information is used from other reports to other entities such as information provided to the Ministry of Finance.

The reporting and provision of information by entities under the jurisdiction and control of the TdC is defined based on the entity's "Accounting Regime" and also (as a sub-grouping within each Regime) by form of Delivery. There are different accounting regimes, which bring together more than 520 information sheets defined by the Court. Approximately 6 500 entities present their annual reports with accounting standards tailored to their characteristics. Figure 1.8 provides an overview of eContas data flow.

Figure 1.8. eContas data flow



Source: based on information provided by TdC.

The information contained within this database play a key role in identifying risks and irregularities in public procurement. It provides essential insights into various aspects of public contracts, including payments period of execution.

#### 1.4.4. Infusing a culture of risk management in public procurement activities in Portugal

To support the efficiency of the public procurement system, it is key to infuse a risk management culture in public entities undertaking procurement activities. This culture could contribute to reducing irregularities identified by oversight bodies. Indeed, many of the recommendations of the TdC aim at strengthening a risk-based approach in contracting authorities by for instance implementing adequate internal control mechanisms to mitigate a number of risks.

In Portugal, there is no dedicated strategy on risk management in public procurement covering different categories of risks. However, the country has developed relevant tools in relation to corruption risks. In 2009, the Council for the Prevention of Corruption that has been replaced by the National Anticorruption Mechanism (*Mecanismo Nacional Anticorrupção* - MENAC) deliberated, by Recommendation No. 1/2009, of July 1, that all entities engaged in the management and administration of public funds, securities and assets should draw up plans for the prevention of risks of corruption and related violations (PPRCIC). (OHCR, n.d.<sup>[47]</sup>). Those plans should include:

- Identification of risks of corruption and related infractions in each area
- Identification of the measures adopted to prevent risks
- Identification of those responsible for managing the risk management plan
- Drawing up an annual execution report; and that the PPRCIC and the annual execution reports should be submitted to MENAC, as well as to the oversight, supervisory and control bodies.

For the implementation of the adoption of the National Anti-Corruption Strategy for 2020-2024, Decree-Law 109-E/2021 mandated entities subject to it to implement a General Regime of Prevention of Corruption (*Regime Geral de Prevenção da Corrupção*- RGPC). Entities subject to the RGPC are: i) All private legal persons having their head office or branch in Portugal who employ 50 or more workers; ii) All public services of the Direct, Indirect and Autonomous Administration of the State, including the public corporate sector, municipal councils, parish councils, and other entities that employ 50 or more workers; and iii) Independent administrative entities. The RGPC sets obligations for these entities, including the development of risk prevention plans (PPR) as part of their Regulatory Compliance Programme (PCN). Given that public procurement is a high-risk area in terms of corruption and other integrity breaches, PPRs should also cover this area (Council of Ministers - Portugal, 2021<sup>[48]</sup>).

To infuse a risk management culture in public procurement, the government of Portugal should consider developing a dedicated and comprehensive public procurement risk management strategy considering all categories of risks.

In their responses to OECD questionnaires, several stakeholders mentioned some traditional or emerging risks identified in public procurement in the last 3 years. For instance IMPIC mentioned i) the incorrect



choice of procedures, often by the use without due grounds of the material criteria, or by the fractioning of the expense; ii) the invitation to present an offer in direct award or in prior consultations by economic operators that should not be invited under the provisions of paragraphs 2 and 6 of Article 113 and paragraph 2 of Article 114 of the CCP; and iii) the excessive use of the award methodology based on the lowest price, even in procedures of complex services. A part of its mandate, the PCA identified the following risks: agreements between competitors aimed at sharing geographic markets, allocating customers or agreeing on prices or other trading conditions, and practices involving the abuse of a dominant position.

AdC, as part of its mandate, mentions the risk of agreements between competitors aimed at sharing geographic markets, allocating customers or agreeing on prices or other trading conditions. It also mentioned the risk of practices involving the abuse of a dominant position.

IGF has published in 2021 a detailed report on risk management in public procurement where it highlights key aspects to introduce in the regulatory framework, organisational risks of public procurement (procurement plans, conflict of interest, capacity of the procurement workforce; segregation of duties, turnover of officials and economic operators to be invited) public procurement risks by type of stakeholders (Leader, Jury, suppliers, auditors and contract manager (IGF, 2021<sup>[49]</sup>)).

### 1.5. Legal framework for the collection and use of data in Portugal

The identification of public procurement risks and irregularities requires information located in different databases such as procurement databases, invoicing, tax and social security or beneficial ownership databases. However, the access to relevant databases can represent a challenge. The OECD Recommendation of the Council on Enhancing Access to and Sharing of Data highlights the need to “*adopt a strategic whole-of-government approach to data access and sharing to ensure that data access and sharing arrangements help effectively and efficiently meet specific societal, policy, and legal objectives that are in the public interest*” (OECD, 2021<sup>[50]</sup>).

In Portugal the legal framework regarding data access, collection and use are governed by different laws, including the data protection law (Law no. 58/2019). While different data/ information can be shared upon request, it is relevant for the TdC to have a regular access to relevant data for collection and use.

Regarding the access to the public procurement database, article 454-C of the public procurement code mentions that all contracting authorities and IMPIC must guarantee direct access to the public procurement information databases and presenting the requested documents or records to the Public Prosecutor's Office, the Competition Authority and the auditing and supervisory entities (including the TdC), for the performance of their respective missions (Government of Portugal, 2022<sup>[51]</sup>). This article was added in 2018. Therefore, the access to TdC to BASE is granted by law since then. In practice, protocols of co-operation were signed with these different entities to access data in the “reserved area”. Entities can only access data in consultation mode, they are not allowed to edit or alter the data. In addition given that the database includes personal information such as “the identification of the natural person”, “the tax identification number” and “the nationality of suppliers”, entities having access to the database should also comply with the legal provisions in force on the protection of personal data.

IRN manages the central register of beneficial ownership (CRBO). The regular access of TdC to the CRBO database is particularly relevant to assess specific procurement risks in relation to compliance and competition. However, IRN have a special data reserve and data protection obligations under the General Data Protection Regulation which prevents them from sharing information.

For the tax authority AT, sharing information on tax activities is also subject to Article 64 of the General tax law on “confidentiality”. This law mentions that all people working for the tax authority have to keep confidential the data collected on the tax situation of the taxpayers and all elements of a personal nature that have been obtained. However, the law also mentions that these obligations are waived in several

cases including in case of “ *Legal co-operation of the tax administration with other public entities, to the extent of its powers* (Autoridade Tributária e Aduaneira, n.d.<sup>[42]</sup>).

To overcome the challenge to access data on a regular way, TdC held discussions with IRN and AT to sign protocols. Discussions with AT were fruitful and led to the signature of a protocol and discussions at the technical level. However, the signature of the protocol with IRN is more challenging. The signature of these protocols could enable TdC to identify additional risks, further enriching the risk model it is developing.

## 1.6. Conclusions

This chapter focuses on the key role of TdC in the Portuguese public procurement system which represents a significant share of GDP. The court is in charge of overseeing the legality, regularity, economy, efficiency, and effectiveness of public procurement activities through the different types of controls it performs (*ex ante*, concomitant and *ex post*).

Implementing a risk-based approach for an audit body when dealing with public procurement activities is key to make the best use of its resources, to have the greatest impact and to most effectively achieve its purpose and objectives. A risk-based approach should consider i) the challenges of the public procurement system (competition, transparency, integrity, etc.) and different categories of risks or irregularities including environmental ones.

While some control department of the TdC (concomitant and *ex post*) implement some kind of risk-based approach, this approach is not formalised. The teams in charge of these audits identified the implementation of a risk-based approach as a great opportunity to increase the efficiency of their work and optimise resources, which could be allocated primarily to audits of entities and contracts that present greater risk, in accordance with predefined criteria. As a priori audit department considers that it needs to look at all submitted requests, the risk-based approach was not identified as an immediate priority. Nevertheless, this department should also seize the opportunity provided by this project to test the relevance of adopting such approach.

The implementation of a risk-based approach to public procurement activities requires identifying relevant databases as input. While different databases could be relevant to public procurement, it is pivotal to focus on those containing information and variables related to the list of risks identified (internal databased to the TdC and external ones). In parallel to the work of the TdC in implementing a risk-based approach, it is essential to also infuse a risk-based approach in contracting authorities by developing of a dedicated and comprehensive public procurement risk management strategy considering all categories of risks.

Finally, a data driven risk-based approach for public procurement can be further enriched if multiple data sources are used. In this context, it is pivotal to assess the legal framework for collecting and using data from different databases While different data/ information can be shared with TdC upon request, it is relevant for the TdC to have a regular access to relevant data for collection and use which requires the signature of protocols with different data owners. Increasing the number of databases accessed on a regular basis (through the signature of protocols) increases the number of risks identified risks and reinforces the data driven risk-based model.

## Note

<sup>1</sup> The list would aim at achieving a suitable balance between financial risk and disclosure; prioritising the control of accounts which are more recent or involve higher sums and financial risk; and providing a guarantee that all services and organisation will be inspected at least once every four year.

# 2 Portuguese Court of Auditors: Innovating with data-driven assessments of public procurement risks

## 2.1. Introduction

Supreme Audit Institutions (SAIs) are standard bearers of transparency, accountability and public trust. As such, for the Court of Auditors of Portugal (*Tribunal de Contas*, TdC), keeping pace with technological advancements is both a strategic objective and a duty to citizens. The transformative potential of data and new technology-driven methodologies for conducting audits have brought about an imperative for the TdC to advance an ambitious digital transformation agenda.

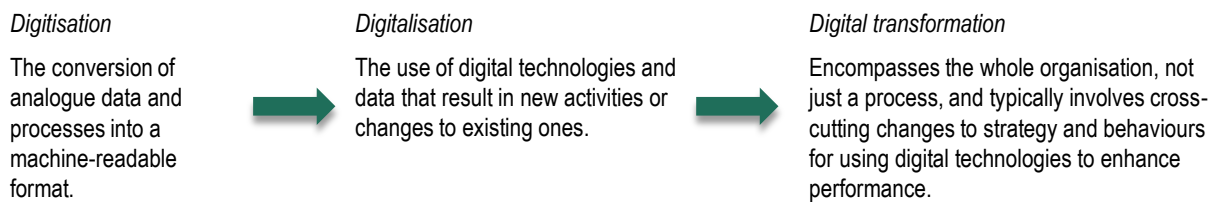
This chapter explores the TdC's digital transformation journey in a number of strategic and operational areas that are critical for the TdC's data-driven assessments of public procurement risks. This includes a discussion about the current state and areas for improvement concerning the TdC's 1) strategy and organisation; 2) people and culture; 3) technology and process; and 4) environment and partnerships. The following sections use these domains as a framework for assessing the TdC maturity to undertake data-driven risk assessments of public procurement. Specifically, the chapter focuses on the following issues:

- **Strategy and organisation.** The section provides an overview of the TdC's Digital Strategy and the extensive efforts to develop it. It also delves into the TdC's organisational structure for strategy implementation and highlights the need for greater coherence among the TdC's 12 digital initiatives. The chapter also highlights the importance of monitoring and evaluating these initiatives, including suggestions for the TdC when monitoring and evaluating its data-driven risk assessments in public procurement.
- **People and culture.** This section underscores the necessity of a strategic approach to change management, crucial for both the broader Digital Strategy and the success of the data-driven risk assessment initiative. It examines challenges and priorities in enhancing data literacy and digital skills, particularly for assessing risks in public procurement. The chapter also emphasises the need for auditors to be knowledgeable about data ethics and privacy.
- **Technology and process.** This section addresses various IT, digital tool, and data integration challenges faced by the TdC. These challenges have wider implications for the TdC's Digital Strategy and overall audit work, but the chapter highlights specific issues for the TdC to address in terms of data integration, interoperability and tools for assessing risks in public procurement.
- **Environment and partnerships.** This section highlights several opportunities for the TdC to enhance its digital maturity, with a specific focus on the relevance and sustainability of its initiative for data-driven risk assessments. These include the formalisation of data-sharing protocols and collaboration with data owners to improve the TdC's training programmes.

## 2.2. A framework for understanding the Court of Auditor’s ambitions for digital transformation

Digitisation, digitalisation and digital transformation are concepts that are often used interchangeably. Nonetheless, the distinctions between these concepts are critical for understanding the TdC’s priorities for data-driven risk assessments, key challenges and its future priorities. Definitions of these concepts vary. For instance, many definitions of digital transformation focus on the economic and societal benefits of digitisation and digitalisation. At the institutional level, digital transformation strategy involves organisational change, innovation and addressing cross-cutting management or operational challenges concerning the use of digital technologies and data (Bumann, 2019<sup>[52]</sup>; Otia, 2022<sup>[53]</sup>). Digitisation and digitalisation have a more narrow focus, as illustrated in Figure 2.1.

**Figure 2.1. Progression towards digital transformation**



Source: (OECD, 2019<sup>[54]</sup>; Bumann, 2019<sup>[52]</sup>).

The TdC’s initiative to strengthen its assessment of risks in public procurement through better use of data and advanced analytics is primarily an exercise in digitalisation. But as described in later sections, several parallel initiatives complement and feed into this effort, including changes to procedures and IT systems, which will have a disruptive effect on traditional approaches. This includes changes to the TdC’s data management and governance, as well as changes in work processes for auditors given the introduction of new tools. In general, the dimensions commonly seen in frameworks for understanding what drives digital transformation are similar to those for digitalisation and specifically, assessing “digital maturity” for leveraging data and advanced analytics on a project level.

**Figure 2.2. Key dimensions of digital transformation and maturity**



Source: Adapted from (Otia, 2022<sup>[53]</sup>).

1. **Strategy and organisation.** This dimension involves leadership's direction for digital transformation, targeting enhanced use of technology and data. The digital strategy, whether independent or merged with organisational plans, should align with broader organisational priorities and IT strategies (Bumann, 2019<sup>[52]</sup>). It is critical that organisations clearly define roles and responsibilities for initiatives that advance the digital transformation strategy. Policies, procedures and activities surrounding data management and data governance are critical elements of this dimension, including those that focus on data privacy, quality, and consistency.
2. **People and culture.** The success of digital maturity in organisations relies heavily on the expertise, skills, and commitment of employees. This includes digital and data literacy, and sometimes advanced programming skills. Equally important is understanding the ethical use of data, along with sector-specific knowledge and legal expertise for managing data-related issues like privacy and security (OECD, 2020<sup>[55]</sup>). Beyond skills, a digital-ready culture involves leadership and employees uniting around digital objectives, which may involve policies supporting technological experimentation or training to enhance digital skills (OECD, 2022<sup>[56]</sup>).
3. **Technology and processes:** Technology, including IT systems, tools, and software, is crucial for digital maturity, but should not be the main focus. The broader vision for digital transformation should guide technological choices, emphasising the need to tailor technology to specific needs. The term "state-of-the-art" is contextual. Digital services, IT systems and analytical tools differ in their complexity, resource needs, functionality and alignment with various organisational goals. Therefore, a pragmatic approach with cost-benefit analysis is essential for making responsible technological investment decisions.
4. **Environment and partnerships.** National laws and directives significantly impact institutional digital transformation. A country's legal and policy framework sets the basis for digital governance and data management, influencing the success of digital projects by either limiting or advancing technology adoption. Within organisations, robust data management and governance is key for data sharing and accessibility, as noted. However, the essence of data sharing extends beyond just infrastructure or processes; fostering collaborative relationships between entities is crucial for achieving digital maturity.

This chapter does not aim to assess the TdC's broader digital transformation strategy or its implementation. The TdC is still in the first year of its 3-year Digital Strategy, and at the time of writing it is too early to evaluate implementation challenges (and it is beyond the scope of the project). Moreover, to its credit, the TdC itself has conducted several self-assessments recently to develop the current strategy, as described below. Nonetheless, these dimensions and the key practices associated with them (see Annex II) offer a useful framework for understanding some of the opportunities and challenges for the TdC's initiative to enhance data-driven risk assessments in public procurement as part of its broader pursuit of digital transformation.

### 2.3. Strategy and organisation

This dimension focuses on leadership's guidance for digital transformation, emphasising the integration of technology and data into organisational strategy. It's essential to define roles and responsibilities clearly and prioritise data management policies, including privacy, quality, and consistency, as key elements of this process. This section provides an overview of the TdC's Digital strategy and the extensive work carried out to develop it. In addition, it provides insights concerning the TdC's organisational structure for implementing the strategy and raises the need to strengthen coherence between the TdC's 12 digital initiatives. The section also explores the importance of monitoring and evaluating the TdC's digital initiatives, with suggestions for its data-driven risk assessments in public procurement.

### **2.3.1. The development of the Court of Auditor's Digital Strategy benefited from extensive self-assessments and internal collaboration**

The TdC's 2023-2025 Strategic Plan for Digital Transformation (i.e., the "Digital Strategy") outlines its commitment to embracing the challenges posed by the accelerated pace of digital transformation. The TdC's Digital Strategy builds on the broader Strategic Plan and encompasses the Strategic Development Plan for Information Systems (PDESI), which the TdC developed previously and aims to align information systems with the TdC's organisational strategy. At nearly 50 pages, the Digital Strategy outlines the Court's vision, priorities and activities, supported by in-depth analyses of challenges. It emphasises *digital transformation* as the goal—the adoption of new technologies and approaches that require fundamental changes to how the TdC operates. The Digital Strategy includes initiatives in the PDESI that were ongoing at the time of its development, and it focuses on the following core objectives (Tribunal de Contas, 2023<sup>[57]</sup>):

1. Promote a data-driven TdC with more effective and efficient use of digital technologies to achieve its strategic objectives.
2. Undertake the digital transformation of the TdC, prioritising innovation and rapid adaptation to emerging risks, and promoting greater efficiency and effectiveness of its activity.
3. Adapt activities to new technologies across all dimensions of the TdC's work.
4. Strengthen the internal governance and management of the TdC, aiming to reinforce decisions and increase the institution's efficiency by improving digital skills.

The TdC arrived at these objectives through an internal collaborative process, led by the Auditing Standards Committee and by the IT Committee with technical support from the Centre of Innovation, Technology and Methodologies (CITM) (Tribunal de Contas, 2021<sup>[58]</sup>), as well as a series of assessments. The assessments included an IT Audit Self-Assessment (ITSA), sponsored by the European Organization of Supreme Audit Institutions (EUROSAI) and involving Spain's Court of Auditors as independent facilitators of the review. The shaping of the TdC's Digital Strategy also relied on internal self-assessments, such as an analysis of strengths, weaknesses, opportunities, and threats (i.e., a SWOT analysis), as well as an assessment of its digital maturity using a questionnaire of a private company (i.e., Gartner's Digital Government Urgency, Maturity and Maturity Assessment). The TdC also engaged an external consultant in 2021 to independently assess the IT architecture and infrastructures in specific Chambers of the TdC, focusing on functionalities of the document management (GDOC) and entity management (GENT) systems, detailed below.

The shaping of the TdC's Digital Strategy also relied on an internal analysis involving TdC employees that focused on strengths, weaknesses, opportunities and threats (i.e., a SWOT analysis). The SWOT analysis is depicted in the figure below and further demonstrates the extensive diagnostic analysis that contributed to the TdC's current Digital Strategy and was a driver of the initiative to strengthen its data-driven analysis of irregularities in public procurement.



**Figure 2.3. The TdC’s SWOT analysis for digital transformation**

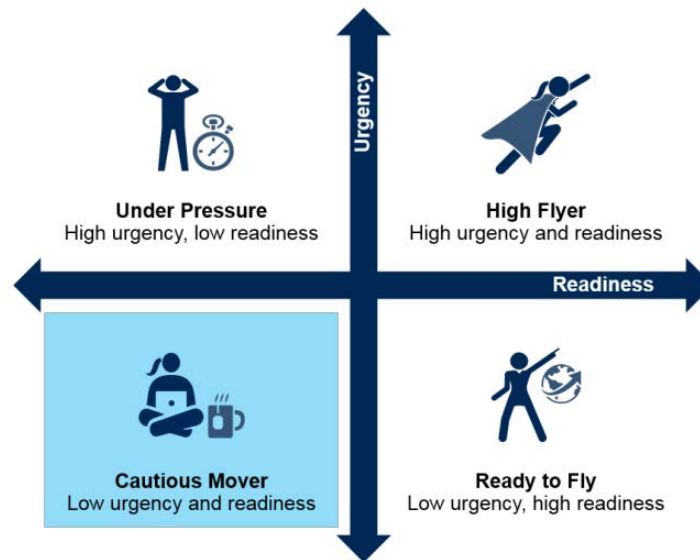
	Strengths	Weaknesses
Internal	<ul style="list-style-type: none"> <li>Committed support at court level, especially from the top leadership;</li> <li>Organisational strategy with some focus on the use of digital technologies to support the mission (e.g. automated analysis, validation and reporting on the eContas platform, platform for sending cases for prior review);</li> <li>Existence of a team dedicated to digital transformation;</li> <li>Operational capacity (procedural and technological);</li> <li>Space / budgetary capacity for investment in digital transformation.</li> </ul>	<ul style="list-style-type: none"> <li>Reduced maturity and scope of culture geared towards analysing and digitally processing data and information management;</li> <li>Maturity to be improved in collaborative and interdisciplinary work methodologies in terms of high volumes of data.</li> <li>Existence of functional silos;</li> <li>Need to update organisational architecture (including business, data, application and technological architecture) in relation to the current ecosystem;</li> <li>Lack of indicators for monitoring strategy and reporting;</li> <li>HR with limited skills in new technological tools and applications;</li> <li>Resistance to change.</li> </ul>
	Opportunities	Threats
External	<ul style="list-style-type: none"> <li>Data-based audit approach provided by the ability of auditors to gather and deeply analyse huge amounts of data (universes rather than restricted samples, which provides more comprehensive audit evidence), which will enable audits with greater added value and in real time;</li> <li>New sources of information that will feed the audit process (financial and non-financial information, enabling better identification of risks);</li> <li>Boosting digital transformation to make external control activity even more efficient and effective;</li> <li>Promoting innovation: Big Data Analysis, AI, ML, RPA;</li> <li>Audit processes integrated into technological solutions, optimised and automated;</li> <li>Functional evolution of systems;</li> <li>Training of Human Resources in specific skills;</li> <li>Developing the activity in a high-tech digital ecosystem;</li> <li>Potential for discovering and deepening new areas and spheres of external control, based on new digital paradigms. -</li> </ul>	<ul style="list-style-type: none"> <li>Complex and constantly evolving digital ecosystem, at a challenging speed;</li> <li>External environment characterised by significant uncertainties arising from the disruption caused by new technologies;</li> <li>Need for major technological investments;</li> <li>Risks of cybersecurity, reputation, data protection (GDPR), legal, ethical, bias and lack of data quality, transparency due to the inexplicability of AI models;</li> <li>Asymmetry in the levels of maturity and technological sophistication of auditees;</li> <li>Interoperability with other AP IS;</li> <li>Difficulties in recruiting new skills (e.g., high demand in the market for profiles such as data scientists, which makes it difficult to retain them);</li> <li>Inherent internal complexity of the new data analysis models based on ML and AI techniques, which makes them difficult to explain.</li> </ul>

Source: The TdC’s 2023-2025 Strategic Plan for Digital Transformation.

In addition to the SWOT analysis, in August 2022, the TdC conducted another self-assessment using a tool developed by a private company to assess its digital maturity and maturity, and the urgency of specific needs. This tool offered further insights for the TdC to identify key areas for improvement and set priorities in relation to its digital transformation. The assessment is organised into seven key areas: vision and strategy, delivery and quality of services, the organisation, the organisation and its context, digital projects and investments, data and analytics, and the functions of the Chief Information Officer. The self-assessment includes a maturity model, which classified the TdC as a “cautious mover organisation, acting under low urgency and maturity.” The TdC scored the highest on aspects related to leadership and focusing on value, while other elements like metrics, its data ecosystem, platforms, service model and technology had lower levels of maturity.



**Figure 2.4. Matrix for digital transformation based on urgency and readiness**



Source: TdC's report from Gartner's Digital Government Urgency, Maturity and Maturity Assessment.

These assessments led to the launching of twelve different initiatives, including the TdC's project to advance data-driven risk assessments in public procurement. A key recommendation from the TdC's internal assessments was that it could identify projects to achieve "quick wins" that demonstrate positive improvements to leadership. In this context, the TdC's initiative to strengthen its data-driven risk assessments in public procurement is a follow-up to this recommendation and is an approach that aligns with leading practices. Overall, the TdC's approach to developing its Digital Strategy checks the box on many of the leading practices for strategy development and aligns with guidance for SAIs that focus on this process.<sup>1</sup> Nonetheless, it could take additional steps to ensure the coherence between these initiatives, as discussed in the following section.

### **2.3.2. The TdC established a central entity to lead its digital transformation, but more efforts are needed to ensure coherence across digital initiatives**

The Department for Innovation, Technology and Methodologies (CITM) is a central entity the TdC established to lead the development of the Digital Strategy. Prior to the creation of the CITM, the TdC had a longstanding IT function, the Directorate of Information Systems and Technology (DSTI). Together, the CITM and DSTI are driving the TdC's spearheading the implementation of the Digital Strategy and its initiatives, including enhancing data-driven risk assessments. The specific aim of the CITM is to "monitor, adapt, promote and support" the use of technology, methodologies and tools for auditors" (Tribunal de Contas, 2021<sup>[59]</sup>). The CITM (with the DSTI) has a formal mandate to drive technological change, which comes with responsibilities that span the aforementioned dimensions of the digital maturity framework. The DSTI is responsible for aligning IT processes with the TdC's strategy and ensuring the integration of business areas in applications. It also maintains the global data model, reduces information redundancy, and develops, acquires and maintains integrated applications for technical and administrative functions.

The CITM is an operational unit within the Directorate General of the TdC and it has two main areas of focus, as shown in Figure 2.5. This model is similar to other SAIs. For instance, the Centre for Data Management and Analytics Office within the Comptroller and Auditor General of India provides guidance to field offices on analytics and pioneers research and development on future directions for using data and analytics. In some SAIs, like those in the U.S., U.K., and Norway, a combination of Innovation Labs and methodological specialists fulfils these roles.

Figure 2.5. CITM's core areas of work

### Innovation and Technology

- Research and develop new solutions applicable to control activities, namely in the fields of digital transformation, data science, interoperability, dematerialisation and transparency.
- Support the court's control areas within the scope of competences and skills related to statistical data processing.
- Prepare and propose the adoption of instruments and tools to improve, control and guarantee the quality of processes, procedures and products, with a view to demanding the integrated and articulated quality management system provided for in article 21 of the Court's Regulations.
- Study and propose, in conjunction with the relevant services, the establishment of policies and the adoption of measures in the areas of innovation and quality of management and internal governance.

### Methodologies

- Anticipate and monitor the evolution of working methods in the Court's various areas of action, maintaining up-to-date knowledge of methodologies and new types of work recognised at national and international level.
- Promote the dissemination and availability of the referred methodologies in the institution.
- Propose the adoption of audit and control methodologies, globally or sectorial, as appropriate, and support the respective implementation.
- Ensure the functions of Technical Secretariat of the Auditing Standards Committee.

Source: The TdC.

Defining roles and responsibilities internally, including the designation of an entity to implement the Digital Strategy with an organisation-wide mandate and access to leadership, is a key practice for driving digitalisation and digital transformation. For instance, INTOSAI's guide for SAIs on Managing Information Communications Technology (ICT) highlights both the critical importance of having an ICT function as well as the consideration for its level of visibility within the SAI and whether it has senior representation. The same could be said of other functions within an SAI that serve cross-cutting roles, such as Innovation Labs or teams that offer support in advanced analytics or statistical methodologies, such as the CITM (INTOSAI, 2015<sup>[60]</sup>). Within the TdC, this role is critical given the breadth of initiatives that fall under the Digital Strategy. These initiatives have action plans, but interviews with the TdC official demonstrated that efforts remain siloed and there is a risk of incoherence and inefficiencies when implementing the broader strategy.

Having established the CITM, and together with the DSTI, the TdC has in place the governance structure to drive greater coherence between digital initiatives. The CITM and the DSTI can continue to facilitate regular communication, decision-making and alignment of goals across the 12 digital initiatives. The sections below that emphasise monitoring and evaluation, change management and strengthening of digital skills can also serve as mechanisms for breaking down siloes across digital initiatives and ensuring that different digital initiatives do not just coexist but actively complement and enhance each other.

#### **2.3.3. The TdC could strengthen the focus on monitoring and evaluation to ensure successful outcomes of its data-driven risk assessment for public procurement**

In 2022, EUROSAI evaluated 20 European SAIs to understand how they use technology and identify challenges. The survey results revealed a unanimous belief among SAIs that digital transformation enhances the effectiveness and efficiency of audits, and they identified the adoption of digital technologies as a crucial strategy for improving SAI performance. However, the survey also highlighted a monitoring shortfall, with only 30% of SAIs evaluating the impact of digital technologies on audit outputs (EUROSAI,

2023<sup>[61]</sup>). Continuous monitoring and evaluation of the performance of digital initiatives, based on objectives and metrics, are critical for understanding the effectiveness of activities and adapting them, as needed.

In its handbook, the Strategic Management Handbook for Supreme Audit Institutions, the INTOSAI Development Initiatives outlines key learning points for monitoring an SAI's strategy. The points reflect many of the basics of performance monitoring, including developing a monitoring framework that not only focuses on the broader strategy, but also accounts for the operational level and specific initiatives. This involves developing a framework that has:

- Indicators: A quantitative or qualitative measure that shows the level of achievement of envisaged change, most notably at the outcome and output level and for some crucial capacities.
- Baselines: The status of the indicator at the beginning of the strategic period.
- Milestones and Targets: On what level the indicator should be, or to what extent activities should be implemented at a given time (INTOSAI Development Initiative, 2020<sup>[62]</sup>).

The TdC's Digital Strategy has a section on the implementation and monitoring of the strategy that recognises the need for monitoring the strategy, including general references to the use of indicators for assessing digital initiatives. Future iterations of the Digital Strategy could develop the indicators further. At the onset of the project with the OECD, the TdC defined several indicators to measure the impact of the initiative. These can serve as a starting point. Table 2.1 explores possible indicators to build on these with a more operational context in mind, taking inspiration from indicators in the IDI's Handbook for monitoring the performance of SAIs, the quality assurance models of the UK National Audit Office (NAO),<sup>2</sup> the US Government Accountability Office's (GAO) AI Accountability Framework (see Box 2.1), and the cost-benefit analysis methodology of the Comptroller General of Peru (CGR).

The indicators in the table reflect the TdC's goals to move toward a more automated, AI-driven form of risk assessment. They focus on the use of such tools in the context of public procurement but could be applied to other areas as well. There are two types of indicators presented in the table. The first four focus on the effectiveness of the risk assessment tool itself, while the last four focus on data literacy and capacity more broadly. It is also important that a target value is established for each indicator to maximise their effectiveness. This table is not meant to be an exhaustive list but instead to provide a starting point for TdC to establish a framework for monitoring and evaluating its digital initiative for data-driven risk assessments in public procurement.

**Table 2.1. Indicators for monitoring the performance of TdC's data-driven risk assessment**

Intended results	Indicators	Observations and data sources	Notes
Increased reliability in detection of risks in public procurement.	Rate of increase in detection of risks in public procurement procedures.	Comparison of rate of identification of risks between different iterations of the risk assessment methodology, ideally applied to the same systems, audit areas and time periods.	Since there is currently no risk assessment tool in place in this area, there will be no baseline for comparison. However, as methodologies improve over time they should be compared to previous methodologies. This reduces the risk of confounding variables leading to flawed conclusions about a model's effectiveness. The same applies to subsequent indicators referring to a "new methodology."
Increased reliability in detection of risks in public procurement.	Rate of decrease in false positives and false negatives.	Rate of false positives and false negatives under new methodology compared to rates of false positives and false negatives under old methodology, with both applied to the same systems over the same time period.	This indicator is primarily relevant if the TdC employs a classification model, which according to the TdC's internal processes, would itself require verification by auditors to ensure risks the accuracy of classifications. One useful tool for model optimisation to reduce false positives is the receiver operating characteristic (ROC) curve, which plots the true positive and false positive rates of models when they rely on different thresholds to make a binary choice. The model that most consistently maximises true positive rates while minimising false positive rates should be used.

Intended results	Indicators	Observations and data sources	Notes
Increased efficiency in public procurement risk assessment.	Rate of decrease in average time to conduct the data-driven risk assessment.	Comparison of the average risk assessment time between different iterations of the data-driven risk assessment methodology, ideally applied to the same systems, audit areas and time periods.	This indicator could be inclusive of the entire risk assessment process (i.e., not solely data processing times), or assessed within the broader context of planning and executing an audit engagement, with the expectation that a more efficient risk assessment will lead to a more efficient process overall.
Increased efficiency in public procurement risk assessment.	Percentage of risks detected via data-driven risk assessment tool.	Number of risks identified with a data-driven risk assessment tool out of total number of risks identified conceptually.	Risks identified during a conceptual mapping exercise are often greater than those that can be assessed in practice due to various challenges, such as data access issues or poor data quality.
Increased efficiency in public procurement risk assessment	Return on investment for implementing data-driven risk assessment	Estimated decrease in state public procurement losses as a result of new tool minus cost to TdC of developing and implementing tool (cost-benefit analysis)	The rate of increase in risk identification listed previously can be used to estimate the financial benefit of the new tool, while costs could include those for hardware, software, hiring staff, training staff, the opportunity cost of time staff is not spending on other tasks, etc. This indicator could also be expanded to include non-financial benefits (e.g., enhanced reputation or improved deterrence) and costs (e.g., the potential of incentivising more sophisticated fraud schemes).
More effective direct use of public procurement data and other data sources.	Percentage of independent datasets in use at TdC that are subject to data integration in a documented, engineered and governed process.	Percentage of available datasets that are relevant for data-driven risk assessments in public procurement that are integrated into TdC risk assessment systems before and after intervention.	SAIs often rely on open source data to conduct risk assessments of public procurement, in part, due to de jure or de facto data access issues. This indicator refers to access of data directly at the source, which includes the central public procurement body or platform, as well as other data sources that are useful for risk identification.
Increased data literacy of TdC employees.	Percentage of employees having undergone data literacy training.	Number of employees having undergone training as a percentage of number of employees responsible for public procurement risk assessment at the TdC.	Additional indicators that focus on behaviour change and outcomes, as opposed to more output-based indicators of whether employees completed trainings, could complement this indicator.
Increased quality of automated analytical techniques in public procurement risk assessments.	Rate of data drift in AI machine learning models; rate of bias in AI machine learning models.	Average standardised drift as a measure of central tendency across all machine learning models over a period of time; the average standardised difference between all machine learning model's predictions and actual values.	Model drift refers to the decline in a model's predictive ability over time. This can occur because of changes in data quality or structure and, if severe enough, requires models to be retrained.

Source: Author's elaboration.

One challenge facing the TdC is the creation of indicators that go beyond monitoring activities and processes to monitoring outcomes. This typical measurement challenge is amplified by the inherent complexity of measuring the effectiveness and efficiency of data-driven risk assessments for irregularities. The indicators in the table above include some outcome-level indicators that can inform the TdC's development of a more robust monitoring framework for the initiatives, which could focus not only on the impact of the risk assessment process itself but also on the use of AI and advanced analytics. GAO's AI Accountability Framework offers some inspiration for the latter.

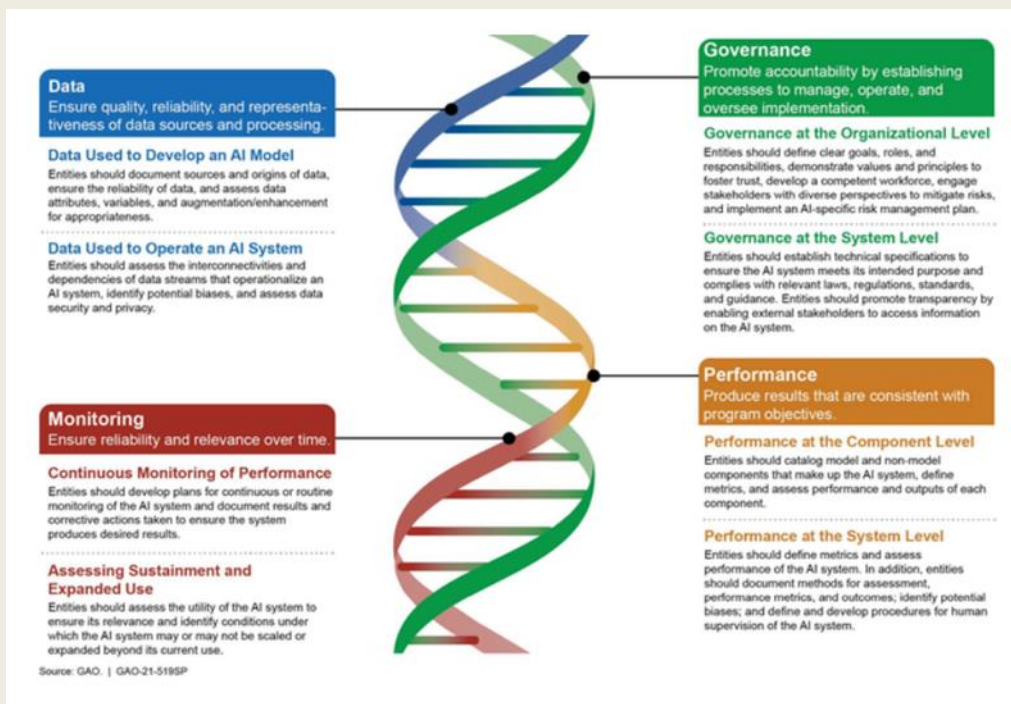
The GAO AI Accountability Framework comprises four key pillars: governance, data, performance, and monitoring. Its aim is to guide managers on responsible AI usage and to foster accountability in government AI initiatives. It delineates key practices across its pillars, focusing on the AI system's lifecycle from design to continuous monitoring. The "Data" pillar, for instance, emphasises documenting and continually monitoring data sources and preparations for data models. The Framework not only facilitates sound AI management but also can provide the TdC with insights for monitoring its own initiatives using AI or advanced analytics. Box 2.1 elaborates on this framework and key practices for monitoring and evaluating

the performance of AI systems. The GAO's is not the only example. For instance, Norway's Office of the Auditor General (OAG) has integrated the auditing of AI as part of its suite of performance audits, and its current 2018-2024 Strategic Plan notes that "problem-solving will become more automated, and the use of [AI] will gradually take over tasks in both the public administration and the OAG."<sup>3</sup> Similarly, at the central level, the TdC can reference Canada's Algorithmic Impact Assessment tool<sup>4</sup> to inform its own assessment of AI performance and risks.

### Box 2.1. The GAO's Artificial Intelligence Accountability Framework

In order to ensure effective use of AI, GAO has developed a framework to evaluate the performance of AI systems to make sure they deliver value and remain fit for purpose over time. Pillars 3 and 4 of the framework on performance and monitoring, respectively, provide examples of best practices for monitoring and evaluation of data-driven tools (see Figure 2.6 below). These procedures for monitoring and evaluation are not only useful in guiding entities in their use of AI, but they could also be applied to other data-driven tools and systems, including those that do not employ AI.

Figure 2.6. GAO's Artificial Intelligence (AI) Accountability Framework



Source: (U.S. Government Accountability Office, 2021<sup>[63]</sup>).

Regarding performance, at both the component level and the system level, AI models should be documented and assessed against predetermined performance metrics that are precise, consistent, and reproducible. Documentation should aim to address the following groups of questions:

- How are components and models solving defined problems? What is their intended use?
- How are the specifications and parameters are selected, evaluated, and optimised?
- How suitable are components and models to available data and operating conditions?
- How are components and models tested and what are the results?



- What ethical considerations exist? What biases and unintended consequences have been identified?
- What degree of human supervision is required and how was this determined?

When it comes to model evaluation, the selected performance metrics should be accurate and useful, and the justification for their selection and the person(s) responsible for their development should also be documented.

Once AI systems are put in place, a plan for continuous or routine monitoring should be developed. This helps ensure that AI models remain reliable and relevant. The plan should define acceptable levels of data and model drift that are based on a risk assessment and require documentation of monitoring activities and any corrective actions taken. As part of the monitoring of AI systems, their continued utility and any potential opportunities for scaling should also be assessed. Any decisions to retire or scale models or systems should be based on predefined performance metrics, and any updates that take place and their impact should be documented. Finally, throughout the process of monitoring and evaluation, it is important that entities keep in mind AI systems' consistency with their objectives and values in order to foster and maintain public trust.

Source: (U.S. Government Accountability Office, 2021<sup>[63]</sup>).

Another important consideration when investing in the development of a digital tool is the return on investment. Data-driven risk assessment models may improve the TdC's ability to identify and respond to risks in public procurement, but this is only worthwhile if these benefits outweigh the costs of creating and perfecting such a tool. The CGR of Peru developed a cost-benefit analysis (CBA) methodology for evaluating its investments in concurrent control of infrastructure that could be informative for the TdC's own assessment of its digital initiatives.<sup>5</sup> The methodology focuses on calculating the net potential benefit of an investment by subtracting the potential financial and non-financial costs from the potential benefits in terms of potential economic damage avoided. Employing a CBA methodology could help the TdC identify whether an investment in data-driven risk assessment is worthwhile, comparing the investment in developing and maintaining an ongoing capacity for data-driven risk assessments with the benefits derived from more targeted and efficient audits.

## 2.4. People and culture

Organisational digital maturity hinges on employee expertise, skills, and commitment, encompassing digital literacy, advanced programming, and understanding ethical data use, along with sector-specific and legal knowledge for data privacy and security. A digital-ready culture also requires leadership and employees to align around digital goals, supported by policies promoting technological experimentation and skill-enhancement training. This section highlights the need for taking a strategic approach to change management, which has implications for both its broader Digital Strategy and the success of its data-driven risk assessment initiative. The section explores challenges and priorities for strengthening data literacy and digital skills, especially in the context of assessing risks in public procurement, as well as the need for auditors to have the knowledge and awareness of core issues concerning data ethics and privacy.

### ***2.4.1. Emphasising change management as a critical element for the success of the TdC's digital initiatives and broader digital transformation***

Of the key practices described in the framework above, developing and implementing a change management and continuous learning plan is one of the most critical in the TdC's context. Interviews with TdC officials, responses to the OECD questionnaire and the TdC's own self-assessments highlight a

reoccurring theme: existing siloes between Departments and audit teams threaten the success of its Digital Strategy. Institutional siloes also pose challenges at the project level, including the TdC's initiative to use data and advanced analytics for assessing public procurement risks.

Strengthening its strategy and approach to change management can help address these siloes and increase the chance of success of the TdC's digital initiatives and, therefore, its broader digital transformation strategy. Change management encompasses both initiating the necessary shifts within an organisation and adeptly navigating the intricacies of change by planning, executing, and sustaining these transformations (European Court of Auditors/U.K National Audit Office/OECD SIGMA, 2007<sup>[64]</sup>). While technology and strategies are important, the people involved are the backbone of any transformation. A change management plan can act as a roadmap, guiding the TdC through the complexities and challenges that arise during its transformative journey.

To sharpen its approach to change management, the TdC can take inspiration from one of the seminal frameworks in this field: the eight Steps to Accelerate Change.<sup>6</sup> This framework represents “steps” that are not necessarily linear and can be carried out simultaneously and iteratively, as the TdC's own experience demonstrates. The steps include:

1. **Create a Sense of Urgency:** Recognise and communicate the need for change. Make the team realise the importance of acting immediately.
2. **Build a Guiding Coalition:** Form a group with the power, influence, and skills needed to lead and support the change effort.
3. **Form a Strategic Vision and Initiatives:** Define a clear vision and align key initiatives with that vision to guide the change process.
4. **Enlist a Volunteer Army:** Mobilise a broad base of people who are committed to driving change and are eager to participate.
5. **Enable Action by Removing Barriers:** Identify and remove obstacles or structures that undermine the change vision. Streamline processes and empower people to act.
6. **Generate Short-Term Wins:** Plan for visible performance improvements. Recognise and celebrate these victories to build momentum.
7. **Sustain Acceleration:** Use increased credibility from early wins to initiate more and bigger change projects. Keep the momentum going.
8. **Institute Change:** Ensure the change is deeply rooted in the organisational culture so that the new approaches continue to drive success (Kotter, 2018<sup>[65]</sup>).

From the perspective of implementing its Digital Strategy, it is notable that CITM has already taken several of these steps, such as formulating a strategic vision and initiatives that can be short-term wins, which includes its data-driven risk assessment in public procurement, according to TdC officials. However, the principles within Kotter's framework can be relevant for specific projects, particularly when the impact of the project crosses teams or requires a change in behaviours and habits. The TdC's project to strengthen its data-driven risk assessments has these characteristics. Table 2.2 explores these steps further with this initiative as a focus, including actions the TdC is already taking as well as additional steps it can consider.



**Table 2.2. Accelerating change of the TdC's digital initiative to assess risks in public procurement**

Steps	Actions
<b>1. Create a Sense of Urgency</b>	<ul style="list-style-type: none"> <li>● TdC's current action: developed a Digital Strategy that promotes the initiative; leadership buy-in and implementation support are strong, including publicising the TdC's digital transformation initiatives and advertising its efforts to produce a data-driven risk assessment for public procurement.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ Analyse and present gaps in current risk assessment methods,</li> <li>○ Highlight emerging risks in public procurement not yet addressed by current models or analytics.</li> <li>○ Develop metrics that will demonstrate the impact of the risk assessment tool, as described (e.g., greater accuracy for assessing risks)</li> <li>○ Facilitate round-table discussions or feedback sessions where auditors can discuss current challenges openly, helping to highlight urgency organically from internal stakeholders' perspectives.</li> </ul> </li> </ul>
<b>2. Build a Guiding Coalition</b>	<ul style="list-style-type: none"> <li>● TdC's current actions: involved relevant audit teams (i.e., real-time and posteriori teams) in the design of the risk assessment tool, including meetings with IMPIC and CITM; enlisted leadership in efforts to advocate for data access from external entities; promoted the value of data-driven risk assessment to key stakeholders, such as data providers.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ Demonstrate value of risk model in the future, not only to auditors, but also to external actors and data providers, building on current actions.</li> <li>○ Consider the diversity of the coalition at a later stage and whether to include other experts or auditors that could benefit from similar risk methodologies or the process of developing them.</li> <li>○ Involve additional external experts or advisors for fresh perspectives on data use and risk analysis.</li> </ul> </li> </ul>
<b>3. Form a Strategic Vision and Initiatives</b>	<ul style="list-style-type: none"> <li>● TdC's current actions: identified a vision, objectives and activities for the risk assessment tool with buy-in from management.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ Further align initiatives with plans for continuous staff training in data literacy and integrating machine learning insights into audit practices.</li> <li>○ Encourage interested staff from across the audit teams to participate in the next iterations of the risk model to help scale and integrate new methodologies.</li> <li>○ Continue to ensure alignment with the TdC's other risk assessment and digital initiatives.</li> </ul> </li> </ul>
<b>4. Enlist a Volunteer Army</b>	<ul style="list-style-type: none"> <li>● Given this table focuses on the project level, this element is less applicable and the TdC can reference the insights for "Build a Guiding Coalition." The TdC could elaborate on this step for accelerating change in relation to its organisation-wide Digital Strategy. Ideas include:               <ul style="list-style-type: none"> <li>○ Develop a recognition programme specifically for this "army," providing badges, certificates, or other forms of acknowledgement within the organisation.</li> <li>○ Consider creating a collaborative online platform where volunteers can share their experiences, challenges, and successes, fostering a supportive community.</li> </ul> </li> </ul>
<b>5. Enable Action by Removing Barriers</b>	<ul style="list-style-type: none"> <li>● TdC's current actions: identified a vision, objectives and activities for the risk assessment tool with buy-in from management.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ Formalise data-sharing access through standing agreements and avoid protracted negotiations in the future.</li> <li>○ Ensure the processes for audit teams to access new tools, provide feedback and receive technical support are simple and clear.</li> </ul> </li> </ul>
<b>6. Generate Short-Term Wins</b>	<ul style="list-style-type: none"> <li>● TdC's current actions: the selection of the risk assessment project is in itself a decision by the TdC to generate a short-term win.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ Identify and communicate quick, tangible successes like the identification of a risk that was previously overlooked, or time saved in the risk assessment process.</li> <li>○ Celebrate teams or individuals who achieve these wins.</li> </ul> </li> </ul>
<b>7. Sustain Acceleration</b>	<ul style="list-style-type: none"> <li>● TdC's current actions: the selection of the risk assessment project is in itself a decision by the TdC to generate a short-term win.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ After initial successes, encourage the sharing of best practices between teams and initiate further enhancements of the risk model.</li> <li>○ Implement additional training or learning resources based on feedback from the audit teams.</li> </ul> </li> </ul>
<b>8. Institute Change</b>	<ul style="list-style-type: none"> <li>● TdC's current actions: the selection of the risk assessment project is in itself a decision by the TdC to generate a short-term win.</li> <li>● Additional actions to consider:               <ul style="list-style-type: none"> <li>○ Solidify the use of the new risk model by embedding it in standard audit processes, including the current risk assessment process, and criteria for success.</li> <li>○ Adjust job descriptions, performance reviews, and training programmes to include competencies related to the analytics model.</li> </ul> </li> </ul>

Source: Author's elaboration.

The actions described in the table provide the foundation for a more robust change management plan, the primary objective of which would be to facilitate a transition from current processes and mindsets to new, digitally inclined ones. They aim to instil confidence within the TdC, assuring auditors that while changes are forthcoming, they are calculated, beneficial, and supported at every level of the organisation. Involving all layers of the organisation in the change management process will not only help in achieving the goals set out in the Digital Strategy but will also aid in breaking down the existing siloes between Departments and audit teams for the benefit of individual digital initiatives. While the table above focuses on accelerating change of a specific project, the same concepts can apply to bigger plans for digital transformation, helping the TdC to not simply adopt new technologies but evolve as an institution. Box 2.2 provides an example from the U.S. General Services Administration and its *IT Change-Maturity Program: Culture Pre-Assessment Guide*. It offers further support for the TdC that is more focused on technology modernisation than the 8 steps and can assist in troubleshooting key areas.

### Box 2.2. IT Change-Maturity Program: Culture Pre-Assessment Guide

#### Overview of the guide

The “IT Change-Maturity Program: Culture Pre-Assessment Guide” by GSA's Center of Excellence (CoE) is a comprehensive resource designed to prepare organisations for change and Information Technology (IT) modernisation. It emphasises understanding the impact of organisational culture on such transformative efforts. The guide explores the concept of “Innovation Adoption,” an approach that integrates Organizational Change Management (OCM) and behavioural science and intrapreneurial strategies. It introduces the C3 framework (Culture, Conditions, and Capabilities) to identify and address factors within the organisational environment that could affect modernisation initiatives.

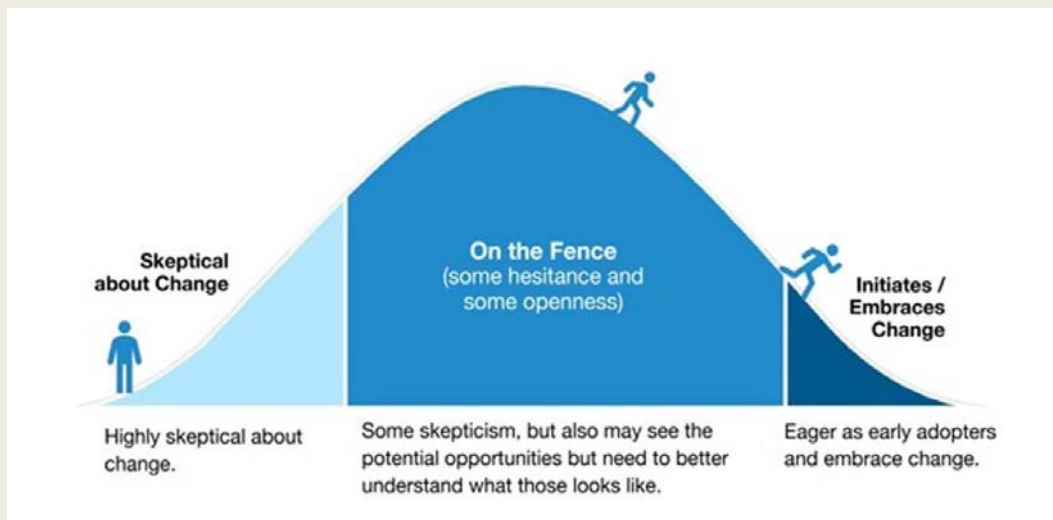
#### Key cultural challenges

The guide highlights several cultural challenges that commonly impact IT modernisation efforts:

- Resistance to change/new ways of working
- Lack of confidence in the IT office by customers/lack of positive customer experience
- Lack of empowerment of staff at all levels
- Reactive vs. proactive responses to modernisation
- Unclear mission/vision for modernisation effort/unclear expectations for staff
- Silos that prevent effective collaboration
- Lack of CIO department/Program Office understanding user needs
- Lack of Change Management strategy and resources aligned to initiative

These challenges underscore the complex dynamics within organisations that can either hinder or facilitate successful change. The guide encourages organisations to first identify where they sit on a change curve (see Figure 2.7), and it offers exercises and templates to assist organisations in assessing their own culture type.

Figure 2.7. The change curve



### Culture types

The guide highlights the following culture types:

- **Highly Skeptical of Change:** Organisations identified as highly skeptical are very resistant to change, with key influencers often disengaging when change initiatives are introduced. Change, when it occurs, is usually partial rather than a complete transformation.
- **On the Fence:** These organisations are not actively pursuing large-scale change efforts. They may be open to experimenting with change in certain areas but generally spend more time in the planning phase than in actual implementation.
- **Initiates/Embraces Change:** These are organisations that are actively investing in new solutions and are quick to adapt their operations. They are not risk-averse and are open to learning from failures, often leading in the implementation of new technologies and methodologies.

Source: (Centers of Excellence, n.d.<sup>[66]</sup>).

### 2.4.2. Strengthening data literacy and digital skills for assessing public procurement risks through targeted training and internal knowledge-sharing

In this context, CITM faces a number of challenges to convince auditors to embrace new ways of working and promoting a data-centric culture. The TdC's Digital Strategy recognises this challenge, highlighting the need for investments in training, development of human resources and equipping staff with knowledge and skills to operate in a digital era. Moreover, for some initiatives, the TdC has adopted a good practice of piloting and experimenting, including its initiative to strengthen data-driven risk assessments in public procurement. These are critical aspects of developing a data-centric culture, but there are ways to further formalise and enhance the TdC's approach, going beyond the current Digital Strategy, starting with digital and data literacy.

Data literacy—the ability to read, interpret, create and communicate data as information—is a key requirement of modern auditors' skillset, evidenced by numerous trainings, workshops and guidance for SAIs. While critical, data literacy is just one component of a broader set of digital skills. These skills reflect a range of abilities to use digital devices, applications, tools and networks to access and manage

information. Specifically, auditors with digital skills are not only data literate, but they are also equipped to ask strategic questions while understanding opportunities and limitations of techniques and tools. Moreover, they are more likely to have realistic expectations about time and resources when planning the use of data and deciding on methodological trade-offs. Having more robust data skills also increases the likelihood that auditors will adopt the tools developed by the CITM and the DSTI, and in the future, facilitate and promote improvements and innovations.

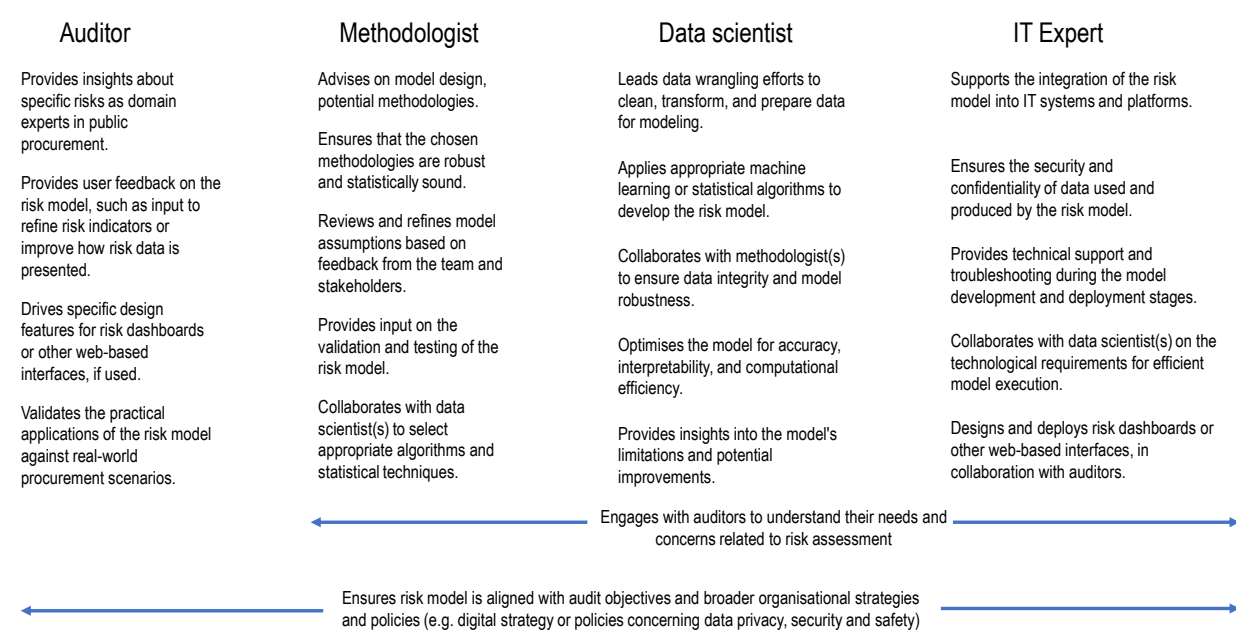
Within the TdC, digital skills are largely consolidated in the CITM and the DSTI. These are small teams with a cross-organisational mandate, as described above. At the time of writing, CITM employed five individuals, including a data scientist, and DSTI's team included 22 IT technicians, among several other roles, with responsibility for ensuring the IT and data needs of the TdC's 9 audit departments are met. According to TdC officials, outside of these teams, auditors' skills with data and tools typically involves Excel-based data processing and analysis.

The TdC carries out an annual diagnosis of training needs, with its current iteration likely to lead to a three-year training plan that envisions a component on data management and analysis. Courses taught in the past and that will be repeated include: "Challenges of digital transformation for auditing", Power BI and Advanced Power BI, Digital Transformation and Data Science, and the Application of Artificial Intelligence in Auditing. In previous years, the TdC also carried out trainings on specific methodologies, including financial auditing standards and planning, identifying, and assessing risks when conducting financial audits.

In the context of this project, which envisions a data-driven risk model for public procurement that is used across audit teams, there are specific digital skills and areas of expertise that the TdC could cover in its training plan. These are focused on this specific activity given the objective of the project with the OECD, but the technological and quantitative skills are applicable for other purposes. For instance, the TdC could develop further its course offering concerning data-driven risk assessments, with a focus on building auditors' skills in quantifying risks, structuring data and ways to monitor the performance of the risks model. In addition, the TdC could consider adding courses to its current offerings on data visualisation, which include the use of Power BI and Microsoft Excel, but that focus more on visualisation of large-scale datasets. The use of AI or advanced analytics for assessing public procurement risks typically relies on the ability to handle large-scale datasets (i.e., 100 thousand or million observations) and implement advanced statistical methods like binary logistic regressions, matching, or principal component analysis. Presenting user-friendly results makes it easier to interpret and respond to risks, and it is helpful for those responsible for creating and using dashboards to have advanced knowledge of data visualisation principles and software (e.g., R Shiny package or Tableau).

In the context of assessing risks in public procurement, cross-functional teams and a domain expert with intimate knowledge of public procurement processes and risks are critical. Auditors may only be periodically exposed to public procurement issues and risks, as their responsibilities and audit engagements constantly change. Therefore, having a domain expert in public procurement ensures the effective design, implementation and updating of a data-driven risk model. In the early stages of its initiative, TdC officials involved experts in public procurement as part of its exercise in identifying risks, a practice that can be formalised in the future. Figure 2.8 below elaborates further on the specific contributions of different roles for using advanced analytics to assess public procurement risks, and it is broadly applicable to other digital initiatives. Some roles may be combined, but it offers the TdC a conceptual description of roles to aid future planning and engagement of cross-cutting teams in its digital initiatives.

**Figure 2.8. Examples of contributions of different roles to developing a data-driven risk assessment in public procurement**



Source: Author’s elaboration.

The European Union’s Digital Competence Framework (DigComp) offers further information for the TdC to ensure its trainings to build digital skills are fit-for-purpose. Box 2.3 below explains DigComp and includes additional competencies from the OECD’s own analysis that can help the TdC to set goals and metrics for each training programmes that draws from a well-defined list of competencies. For the TdC, these competencies are shared across teams, including management, CITM and audit teams working with data. As such, trainings can target the entire organisation, while tailoring modules to specific roles and responsibilities concerning the TdC’s Digital Strategy.

**Box 2.3. Competencies of a data-driven workforce**

The European Union’s Digital Competence Framework (DigComp) is a tool to improve digital competence. The competencies are informative for SAIs and other institutions that can partake in auditing-like activities, such as evaluations and academic research. The competencies below reflect those in the DigComp as well as elements added by the OECD, and they provide a reference point for the development of content and metrics for training programmes—for management and auditors—to enhance an array of digital skills across an organisation.

- Strategy and problem-solving:
  - customising digital environments to personal needs
  - using digital tools to create knowledge and innovate processes
  - identifying digital competency gaps and ideas for improvement, including the use of self-assessment tools
  - Setting goals, priorities and devising digital strategies and action plans

- Information and digital literacy:
  - browsing, searching and filtering data
  - critically evaluating the credibility and reliability of data sources
  - organising and storing data
  - understanding of statistics to help evaluation and analysis of data
  - understanding of requirements for reproducibility
- Digital content creation:
  - creating new, original and relevant content and knowledge
  - understanding copyrights and licenses
  - programming and software development, visualisation of data and information to convey knowledge
- Safety and privacy:
  - protecting personal and sensitive data
  - understanding tools and techniques to safeguard privacy, such as delinking and anonymisation
- Communication and collaboration:
  - Sharing data and understanding data sharing protocols;
  - knowing about referencing and attribution practices;
  - using digital tools and technologies for collaborative processes;

Source: (OECD, 2020<sup>[67]</sup>).

CITM has identified the importance of adopting and utilising technology to shift auditing from a reactive and retrospective exercise to a proactive, predictive, and future-oriented practice. This transformation presents an opportunity to produce audits of higher quality, but it also necessitates a sustained commitment and investment in bridging current capacity gaps. While having a robust training plan is critical, not all skill development and capacity building needs to be formal. One way to be able to keep a consistent pulse on the needs of auditors, while promoting the sharing of practices and knowledge, would be to develop an informal community of practice. This could focus on specific initiatives or themes that are relevant across TdC audit teams. For instance, multiple audit teams will ultimately use the data-driven risk assessment that the TdC is developing, which could be a focal point for a community of practice to aid adoption and collective addressing of challenges.

Other SAIs have developed such communities and resources with a dedicated focus of developing digital competencies, such as the Austrian Court of Audit's (ACA) "R-Community." This community of auditors with skills in data analysis exchange about methodologies and uses of the open-source statistical software "R." The goal of the community is not to make all of the ACA's auditors experts in using R, but rather to generate sufficient knowledge about what data analysis can do and for what purposes it can be used (Mayrbaeur, 2023<sup>[68]</sup>). In Belgium, the Supreme Audit Institution created a discussion group called "DataLab" to help integrate analytics across the organisation through monthly meetings, trainings and expert advice from data scientists.<sup>7</sup> The TdC may also find numerous resources online to bolster data literacy internally without reinventing the wheel, such as the online data and analytics course provided by the Netherlands Court of Audit.<sup>8</sup>

### **2.4.3. Ensuring auditors have sound knowledge about data privacy and ethics**

In the context of accessing and processing public procurement data for purposes of financial inspection, SAIs are obliged to have unrestricted access to pertinent data for conducting their audits, as per INTOSAI

auditing principles and standards. This includes data protected by specific regulations or control protocols, such as those commonly applied in the commercial, banking, medical and national security domains. In Portugal, auditors' use of external data sources is aligned with the stipulations in the RGPD and the TdC Regulation, as well as principles found within the TdC's Audit Manual.

In relation to data use and its ensuing disclosure in the TdC's reports and decisions, there are several noteworthy points. As per Article 13 of the TdC's Regulations, the TdC must devise a "communication strategy, suitable for the fulfilment of its mandate, in compliance with the principles of transparency, accountability and protection of personal data, namely through the dissemination of results in a timely manner." Moreover, the TdC follows the LOPTC, the TdC Regulation, and, in a secondary capacity, the Code of Civil Procedure (CPC), maintaining that data processing is the purview of the presiding judge within the TdC. This principle dictates that case information should be made public, unless it is covered by personal data or secret protection provisions.<sup>9</sup>

Current legislation permits the release of information in circumstances where the public interest outweighs the interests safeguarded by the protection rules. However, this is subject to the principle of minimisation and assessed on a case-by-case basis by the responsible judge. Guidelines in Resolution No. 3/2018-PG provide a roadmap to ensure the TdC does not disclose more personal information than required. For instance, "the publication of judgments, audit reports and other acts of the Court should only contain the personal data that are indispensable for informing society about the use of public financial resources and guaranteeing the accountability of the managers of these resources and those responsible for finances." In cases of ambiguity regarding personal data that may be included in published court acts, the Court's Data Protection Officer should be consulted.

The legal and regulatory framework for the TdC's data protection, as well as its inclusion in internal audit manuals, demonstrates the TdC's adherence and commitment to the protection of privacy and ethical use of data. Nonetheless, the introduction of new tools, particularly a risk model that heavily relies on external data source and possibly additional personally identifiable information, creates incentives for the TdC to revisit existing policies, guidelines and trainings for auditors regarding who may use these tools. The aforementioned trainings could include a module on topics of data ethics and privacy. Going beyond this, even though it is not legally required, the TdC can also consider how it would promote transparency of its activities that involves the use of data for its digital initiatives, particularly those that could be considered sensitive. For instance, the TdC could periodically review (and publish) its code of conduct to ensure it keeps pace with its use of data and AI as its digital initiatives evolve. While a national initiative, the TdC could take inspiration from the United Kingdom's National Fraud Initiative (NFI) Code of Data Matching Practice, which promotes transparency and ethical use of data, while laying out principles and practices for protecting citizens' right to privacy (see Box 2.4).

#### **Box 2.4. The UK National Fraud Initiative's Code of Data Matching Practice**

The Audit Commission's National Fraud Initiative was launched in 1996 as the United Kingdom's largest data-matching exercise in relation to fraud. The Serious Crime Act of 2007 enabled bodies, other than those with a mandatory requirement to provide data for the National Fraud Initiative, to volunteer to participate by providing data to the commission. The National Fraud Initiative has enabled participating organisations to prevent and detect more than GBP 300 million fraud and error in the period from April 2016 to March 2018. Approximately 1 200 public and private sector organisations participate in the initiative, including the public audit agencies in Scotland, Wales and Northern Ireland. Each national audit agency carries out data-matching under its own powers, but uses the National Fraud Initiative's systems, processes and expertise.



To increase transparency around this massive data-matching exercise, the National Fraud Initiative has set out a Code of Data Matching Practice that is followed by all organisations that participate in the Cabinet Office’s data-matching exercises. The code “creates a balance between the important public policy objective of preventing and detecting fraud, and the need to pay due regard to the rights of those whose data are matched for this purpose.” To achieve this goal, the code was informed by the consultation of a range of stakeholders, with the Information Commissioner’s office providing input on data protection.

The code notably requires each institution to publish a privacy notice that informs citizens about the specific datasets used, the way they are collected, the purpose of this data-matching exercise and its legal basis, the institutions with which the data are shared, the retention period for the data, and the rights of citizens including complaint mechanisms. This example illustrates both the necessity of transparency for integrity actors when implementing anti-fraud programmes and the value of their input to inform the creation of codes of practice that safeguard citizen’s rights.

Source: (Cabinet Office, 2018<sup>[69]</sup>).

## 2.5. Technology and processes

Digital maturity relies on technology, like IT systems and software, but it shouldn't be the sole focus. Instead, the broader vision for digital transformation should drive technology choices, tailored to specific needs. Considering the varied complexity and functionality of digital services and tools, a pragmatic approach involving cost-benefit analysis is vital for responsible technological investments. This section explores several challenges the TdC faces from the perspective of IT, digital tools and data integration. Some of these challenges have broader implications for the TdC’s Digital Strategy and audit work in general. Where appropriate, this section offers a more narrow discussion on issues concerning data-driven risk assessment in public procurement.

### 2.5.1. Advancing improvements to IT infrastructure for effective data-driven risk assessments in public procurement

As noted, in 2021, the TdC conducted an IT Audit Self-Assessment (ITSA) with the Court of Auditors of Spain facilitating the process. The primary goal of the ITSA was to examine the functionality and performance of the TdC’s existing IT systems and conduct a gap analysis of the TdC’s maturity in relation to key COBIT processes that impact TdC’s operations.<sup>10</sup> The ITSA demonstrated that although the TdC had a level of IT maturity that was in line with similar institutions in the European Union (i.e., Level 3—documented communicated processes), key gaps remained. In response to the results of the ITSA, the TdC implemented the following improvements:

- Improved communication methods with those being audited, accomplished through the implementation of an “eAccounts” portal.
- Developed a project for electronic audit management, which culminated in the creation of the “ModInAudit” application.
- Established and updated training programmes for auditors on an annual basis (Court of Auditors of Portugal, 2023<sup>[70]</sup>).

Since the TdC’s ITSA, advancements in technology necessitated further assessments and refinements that would ultimately lead to the TdC’s current Digital Strategy. To further advance its digital maturity, the TdC engaged an external consultant in 2021 to independently assess the IT architecture and infrastructures in specific Chambers of the TdC, focusing on functionalities of the document management (GDOC) and entity management (GENT) systems.<sup>11</sup>

Findings from this assessment offer some insights into the evolution of these systems that play a critical role in the TdC's digital transformation initiatives, including carrying out data-driven risk assessment and the IT challenges the TdC faces. According to TdC officials and questionnaire responses, some of these challenges are still ongoing as of December 2023. For instance, the user/system interface of the GDOC and GENT applications could be improved to cater better to specific user tasks and needs. Moreover, there is a need to further improve and define processes concerning various applications, and address challenges related to both information systems and technological infrastructure, including (but not limited to) the following:

- Development of the "portal of external services" to facilitate information exchange with external entities.
- Implementation of the "TdC in real-time" project to achieve interoperability with other public administration organisations. This depends on the interoperability between the TdC's information system and the information systems of public administration organisations where data on entities under control and jurisdiction reside.
- Creation of an internal services portal to provide TdC employees with easy access to information systems.
- Execution of the eContas project for prior inspection and implementation of responsibilities, integrating different stakeholders and aligning functional profiles with relevant information and tasks.
- Automation of procedures for internal verification of accounts and issuance of reports.

Several of these issues are directly relevant for the TdC's initiative to enhance its data-driven risk assessment in public procurement.

### **2.5.2. Addressing challenges concerning data integration and interoperability for public procurement data, including working with data owners to improve data quality**

Within TdC, all database management systems have a relational nature, meaning that, in theory, they share the same structures and types of data. The consistency in using relational databases provides for a unified approach to data management, which is particularly helpful for the TdC to query complex datasets and structured data. In some cases, there is the possibility of functional and semantic interoperability, in which certain fields in a system depend on fields in another system, enabling the integration activities. Achieving this interoperability is complex, given the need to maintain data integrity and synchronise data across different systems. The integration of functional and procedural activities across various systems poses additional challenges, particularly for real-time data processing and maintaining transactional consistency.

Ensuring the accuracy of results in any data-driven approach hinges on two fundamental aspects: the volume and the integrity of the data. Additionally, effectively integrating data from various sources plays a pivotal role in this process. This integration requires parsing, correcting, standardising, matching and consolidating to ensure data usability. For purposes of the TdC's initiative to assess public procurement risks, there are three high-priority databases, shown in the table below along with a matching variable.

**Table 2.3. Potential data integration**

Entity/Stakeholder	Component	Variable to Match
IMPIC – Institute responsible for Public Contracting Portal ("Base")	Public procurement data: procedure, contract/item-level	ID of the contract
AT – National Tax and Customs Authority	Company data (tax and financial) Amounts invoiced to the entities controlled by the Court	Tax number of supplier/candidates Tax number of the entities controlled by the Court
IRN – RCBE	Company data ("effective company beneficiaries")	Tax number of supplier/candidates

Analytical indicators can be obtained at different levels of aggregation and require additional fields to enable integration of various data sources, which can present several challenges. For instance, requirements for firm-level indicators might benefit from combining multiple databases that would naturally be matched using the tax numbers (e.g., one containing information about procurement activities and another concerning firm tax information). See Chapter 3 for further discussion on the data sources and variables that are relevant for the TdC’s risk assessment methodology.

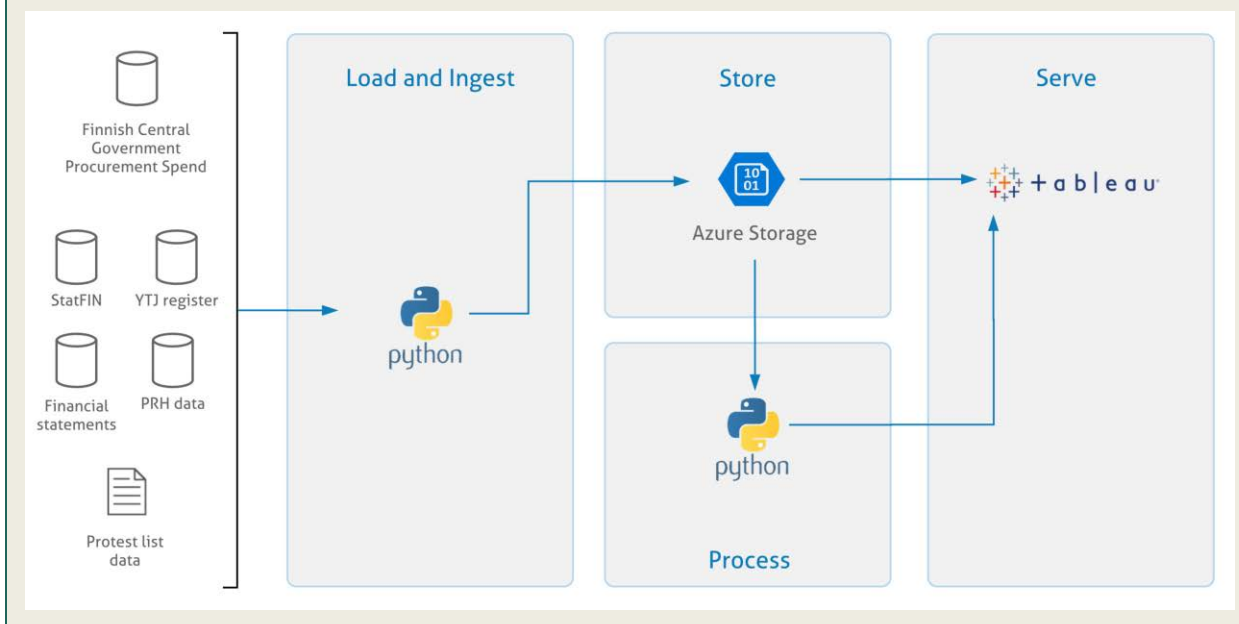
Despite the relevance of the data sources of the entities in the table below, data integration and interoperability present challenges. One of the main issues is the diversity of systems and formats used to store and manage data. Institutions typically have their own systems, databases, and software, all of which can make it difficult to establish interoperability. Moreover, data governance and security measures can vary across institutions, including concerns about data privacy and sharing protocols. In Finland, the National Audit Office was forced to develop its Risk Detector Tool for public procurement using open data due to data protection regulations and controls the prohibited more direct access to the data (see Box 2.5).

### Box 2.5. The Risk Detector Tool of the National Audit Office of Finland

The Risk Detector Tool, developed by the National Audit Office (NAO) of Finland, is designed to assist auditors in identifying potential risky procurements and guiding them in planning and targeting their work. It aims to enhance audit planning and ensure the quality of audit work by providing auditors with an overall picture of risks in public procurement, leveraging a bespoke. The tool primarily targets financial auditors, especially those involved in accounting unit level audits.

Developing the tool involved enriching the *Tutkihankintoja.fi* dataset with other public data and utilising Python, Tableau, and Power BI for data analysis. The NAO co-designed the tool with end users to strengthen buy-in and to hone visualisations that would be useful for users. The NAO faced several challenges, including heavy bureaucratic processes and restrictions for accessing data due to data protection policies. Moreover, the original datasets had limited features (i.e. low expressive power) and the methodology and approach was new for the NAO, which required overcoming an initial learning curve.

Figure 2.9. Pilot architecture using open data



The NAO was ultimately successful in developing a prototype based on open data, which includes AI-generated network analyses of public procurement risks. As part of its lessons learned, the NAO highlighted the need for experimentation, overcoming failures while iterating and developing tactics for communicating internally about the tool, which in their case was a podcast.

Source: (Gullichson, 2019<sup>[71]</sup>; Grünbaum, Gullichsen and Väänänen, 2019<sup>[72]</sup>).

The lack of standardised data schemas and protocols, primarily amongst data owners, further hampers integration efforts. Data quality standards and inconsistent data-entry practices can introduce errors and inconsistencies that reduce the accuracy and reliability of integrated data. Concerning the data for assessing risks in public procurement, many of these challenges reside with IMPIC. The TdC's initiative represents the first time in which it is directly accessing IMPIC's datasets in high volumes. To facilitate this data exchange, the TdC made several adjustments to its IT infrastructure. Nonetheless, challenges concerning data quality (e.g., high levels of duplicates) remain at the time of writing this report. Overcoming these challenges will require ongoing collaboration between the TdC and IMPIC, as well as other data owners to the extent needed, to ensure standardised frameworks and robust data management strategies underpin improvements to data integration and interoperability.

### ***2.5.3. Aligning the Digital Strategy and tools with the TdC's technological maturity for assessing public procurement risks***

Robotic Process Automation (RPA) is described as the next frontier for SAIs, after data analytics (Otia, 2022<sup>[53]</sup>). The TdC's Digital Strategy emphasises the need to advance the automation of processes as one of its key initiatives to maximise efficiencies and the value-for-money of audits (Tribunal de Contas, 2023<sup>[57]</sup>), allowing auditors to reallocate their time to critical-thinking tasks, like data analysis and developing findings. By minimising manual data processing, automation also has the potential to reduce errors. For instance, risk dashboards that offer automated alerts could help auditors in conducting more targeted, co-ordinated audit selection.

While the TdC recognises the value of automation in its Digital Strategy, many of its core processes rely on manual methods and traditional tools, highlighting a gap between strategy and practice. Automation, especially in public procurement, could transform mundane tasks like risk identification and data management, allowing auditors to spot irregularities in a more efficient and co-ordinated manner. Bridging the gap between strategy and practice requires not only automation, but also equipping auditors with the necessary tools. The use of applications like Microsoft Excel and Caseware IDEA dominate the TdC's current practices. Some audit departments reported using Power BI and R software in responses to the OECD's questionnaire. Questionnaire respondents from multiple audit departments did not identify specific needs or gaps in software or tools available when asked. This suggests that within the TdC there is either general satisfaction with current tools or a lack of awareness of the benefits of other technologies. As the TdC develops its digital initiatives and integrates new approaches in its audit practices, including its data-driven risk assessment methodology, the TdC could consider conducting a deeper evaluation of current tools to ensure alignment between strategy, practices and the modern auditing needs of TdC's auditors.

Concerning data-driven risk assessments for public procurement, the "tool" or mechanism to collect, disseminate and potentially visualise the results of the assessment is equally as critical as the underlying methodology. An effective dashboard, for instance, centrally developed and managed by CITM or DSTI, can promote a co-ordinated approach that avoids duplication between audit departments and creates a horizontal feedback loop. Chapter 1 presents ALICE, an RPA tool used by Office of the Comptroller General (CGU) and the Federal Court of Accounts of Brazil (TCU). ALICE utilises an algorithm to assess unstructured data, in particular, to extract monetary values from non-uniform text in PDF bidding notices. It then organises this data using a Random Forest classification method to analyse the "materiality factor,"

an estimated risk value associated with these bids. ALICE effectively uses data and analytics to identify irregularities and improve auditors' efficiency in procurement, even amongst auditors without expertise in machine-learning or AI. Its success hinges on two factors:

- Senior management support was crucial in identifying irregularities in public procurement. This backing, seen as vital for fostering a culture of integrity, led to innovative auditing practices. For example, TCU Counsellors agreed to sign an ordinance validating a new workflow, enabling auditors to make use of the AI-based technology and act efficiently to address the risks of irregularities.
- To manage data overload and human limitations in data processing, the CGU and TCU implemented two strategies to aid auditors. Firstly, ALICE sends daily emails summarising key bid information and alerts, helping auditors focus their analysis. Secondly, they developed a specialised dashboard that offers various filters to streamline their search and access detailed bid analyses and irregularities identified by ALICE (OECD, 2022<sup>[73]</sup>).

TdC's development of its own data-driven risk assessment in public procurement could benefit from these findings about its institutional context and Brazil's example by keeping in mind opportunities for automation, auditors' current digital literacy, and the need for a risk dashboard to support non-technical users. Brazil's experience with ALICE, particularly in analysing unstructured data to address financial irregularities, underscores the potential of advanced analytics in this domain. However, the scope of effective methodologies in public procurement is not limited to financial aspects alone.

TdC's commitment to assessing a wide range of irregularities and risks, including both financial and non-financial risks that can affect the efficiency of public procurement, points to the need to consider a diverse set of tools and approaches. Text mining techniques, as demonstrated in the academic context of Morocco's green public procurement initiative, can provide inspiration. The box below explores the use of text mining for scrutinising unstructured data in procurement documents and it highlights the potential for analysing the extent to which environmental considerations are integrated into tendering processes. For an organisation like TdC, aiming to encompass both financial and non-financial risks, as well as analyse both structured and unstructured data, Morocco's approach provides valuable insights and highlights the possibilities for its own risk assessments.

### **Box 2.6. Advancing Green Public Procurement in Morocco: A Case Study on Text Mining for Sustainable Procurement Auditing**

#### **Overview of the initiatives**

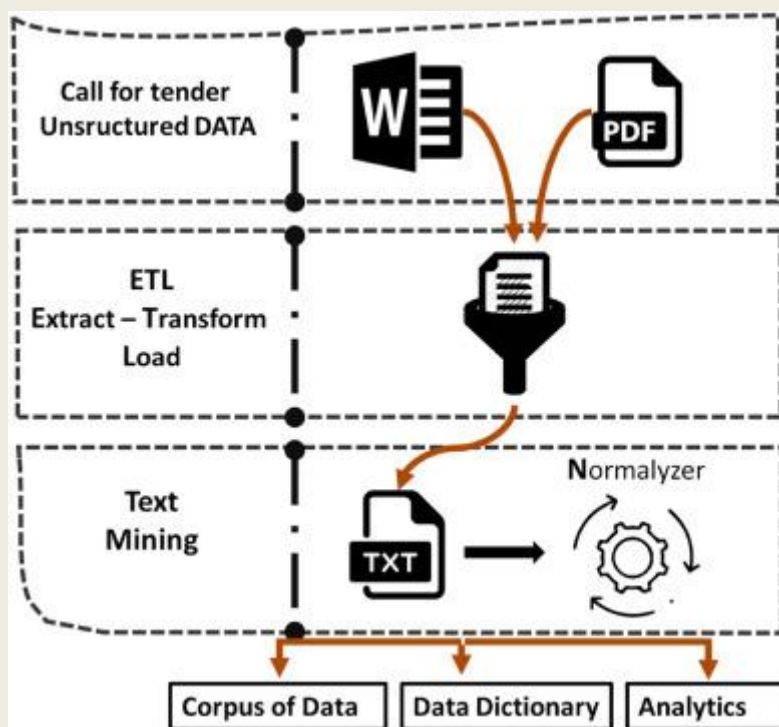
A group of researchers explored the use of text mining techniques to analyse public procurement processes and measure the degree of environmental criteria integration. The purpose of this approach was twofold: to gauge the current state of green procurement practices (i.e., "green infiltration") within the public sector, with a focus on tenders for Information and Communication Technologies (ICT), and to develop a tool that could objectively and efficiently assess environmental aspects in tender documents. This was driven by the need to address the lack of systematic and objective methods in evaluating the green attributes of public procurement, a critical issue considering the increasing global emphasis on environmental sustainability.

#### **Text mining for analysing procurement practices**

The researchers employed automatic analysis or supervised statistical learning using advanced text-mining algorithms to analyse a high volume of unstructured data in tender documents. The process involved three major steps:

1. **Data Collection and Preparation.** Data was directly collected from the Moroccan public procurement platform. This included a wide range of document types, such as .doc, .docx, .pdf, and image files, relating to the purchase of computer equipment.
2. **Keyword Analysis and Correlation Study.** Keywords relevant to environmental sustainability were identified and their frequency of occurrence in the tender documents was analysed. A semantic network and keyword correlation cube were created to understand the relationships and contextual uses of these keywords.
3. **Scoring System and Threshold Setting.** A scoring system was devised to assign weights to keywords based on their relevance to environmental sustainability. This enabled the establishment of a threshold to categorise tenders as 'green'.

**Figure 2.10. Python-based text mining process for assessing green public procurement**



The results showed that the “infiltration” of environmental concerns remains weak in Morocco’s public procurement. Only 3.38% of the ICT tenders analysed incorporated green criteria (in a sample of 592 calls for tenders), highlighting a significant area for improvement in sustainable public procurement practices. The researchers suggest the development of a “decision support tool,” and an automated monitoring model, to improve sustainable, green public procurement in Morocco.

#### Relevance to Supreme Audit Institutions

The text mining methodology piloted in these initiatives demonstrates one approach that SAIs can take to objectively assess and track the integration of environmental criteria in public procurement, a key metric for evaluating the performance of public entities in adhering to environmental policies and regulations. The approach can help to identify potential risks and shortcomings in the implementation of green procurement practices, enabling SAIs to pinpoint areas where interventions or improvements may be necessary.



Additionally, the methodology offers a robust framework for assessing the impact of public policies aimed at promoting environmental sustainability in procurement. It provides data-driven insights, facilitating a thorough evaluation of policy effectiveness and highlighting areas for further development. Furthermore, the approach enhances transparency and accountability in public procurement processes. By providing a clear and objective analysis of how environmental criteria are embedded in procurement documents, SAIs can effectively hold entities accountable for their environmental commitments and obligations.

Source: (El Haddadi et al., 2021<sup>[74]</sup>).

Similarly, researchers in Belgium conducted a longitudinal study and used text-mining analysis to identify patterns in sustainable public procurement practices (SPP) over time. They used a concept of SPP that targeted seven categories: 1) environmentally friendly procurement, 2) circular economy, 3) social return on investment, 4) ethical trade, 5) local and/or SME-oriented procurement, 6) Innovation-oriented procurement and 7) the use of sustainability labels. Among other findings, they found that public authorities implemented SPP in more than 70% of the notices reviewed, which was a higher rate than what had been self-reported previously. Nonetheless, they also found a gradual decrease in the implementation of SPP during the years studied (2014-2016). Overall, the researchers demonstrated the value of text-mining as a tool for assessing unstructured data and the implementation of SPP in public procurement notices to identifying patterns, which would not have been possible with other methodologies, such as conducting surveys or interviews (J. (Jolien) Grandia, 2020<sup>[75]</sup>).

The TdC's risk assessment methodology could ultimately integrate both structured and unstructured data. As a starting point, TdC could first concentrate on developing a risk assessment methodology that incorporates structured data as an initial proof-of-concept, and then build on this in the future with additions to the methodology that incorporate unstructured data and text analysis, as illustrated in the examples of this above. For instance, as discussed in Chapter 1, the TdC's entity management system (GENT) includes unstructured data based on information in the Official Government Gazette of the Portuguese Republic that could be leveraged for refining future risk assessments. This phased and iterative approach would allow the TdC to prioritise its resources and first demonstrate the value of its risk assessment methodology internally, using structured data that capitalises on the progress made with integrating IMPIC's data, before turning to other types of risk assessment techniques.

## 2.6. Environment and partnerships

National laws and directives play a pivotal role in institutional digital transformation, shaping the digital governance and data management framework. This legal backdrop can either limit or advance technology adoption, impacting digital project success. In addition, fostering collaborative relationships between entities is crucial for digital maturity. This section highlights several opportunities for the TdC to enhance its digital maturity with specific consideration for the relevance and sustainability of its digital initiative for data-driven risk assessments. They include the formalisation of data-sharing protocols and collaboration with data owners to enhance the TdC's own training.

### **2.6.1. Formalising data-sharing protocols for public procurement data so that data-driven risk assessments remain relevant and useful for auditors**

INTOSAI's Working Group on Big Data conducted a survey that revealed 45% of SAIs lack data-sharing mechanisms and regulations for big data use, 41% have limited international co-operation on big data, and 32% face challenges in inter-departmental data exchange (INTOSAI Working Group on Big Data, 2022<sup>[76]</sup>). These survey results suggest a gap in establishing effective data sharing and co-operation mechanisms, despite intentions and examples of SAI collaboration on big data audits.



Timely access to data is crucial for the effective implementation of the TdC's new risk assessment methodology. The primary users of this methodology, the real-time and *ex post* audit teams, rely heavily on the availability and accessibility of relevant data to conduct audits on ongoing and completed activities, contracts, and projects. As is often the case for SAIs, data access poses one of the greatest risks and bottlenecks for the TdC's digital initiatives, in particular, its goals to enhance its assessment of risks in public procurement. The initial access to IMPIC's database, Portal BASE, and the collaboration established during the project for data sharing marks a significant step forward. However, challenges remain in accessing other databases, as elaborated in Chapter 3 (e.g., IRN's database of beneficial owners). Future iterations of the risk model for assessing public procurement risks could be enhanced by addressing these challenges, thereby broadening the data sources available for the risk model and improving risk coverage.

According to TdC officials, challenges for accessing data reflect inter-institutional dynamics as much, if not more, than any legal or regulatory provisions that restrict the TdC's access to data for audit purposes. Engaging with legal and policy frameworks to foster a conducive environment for data sharing is crucial. Continuous dialogue with policymakers and stakeholders to advocate for supportive laws and regulations may also help beyond the scope of this project. CITM and DSTI are critical drivers of this effort. To keep the momentum after the project, the TdC could establish a broader dedicated task force to oversee the development and implementation of data-sharing protocols, providing a more focused and collective approach to overcoming the identified challenges. This task force could also serve as a liaison between, or even include, the TdC and data owners that are relevant for the TdC's audit work, promoting a more harmonised approach to data sharing that ensures alignment with the goals of TdC's digital transformation journey.

### **2.6.2. Enhancing collaboration around training and guidance with data owners, while ensuring privacy**

Looking across government at the various owners of databases the TdC uses, opportunities exist to strengthen a co-ordinated and collaborative approach to enhancing data literacy and knowledge-sharing. As detailed in Chapter 3, the TdC relies on many external databases for its current and future auditing and risk assessments in public procurement. In concert with these stakeholders, the TdC could facilitate the development of more structured trainings to gain a deeper understanding of how the data can be used in its work and the nuances in terms of data structure, reliability and other technical issues.

Currently, the IGFEJ focuses on providing training in public procurement exclusively to its employees. IMPIC takes a comprehensive approach by preparing and disseminating good practice manuals, technical guidelines, FAQs, webinars, videos, videocasts, and providing training programmes, often in collaboration with other entities. The IRN conducts frequent training sessions for various entities and participates in conferences and colloquia. The AT does not provide external training, but it ensures that protocols for data sharing contain confidentiality rules and obligations. Collaboration with these entities could help the TdC to strengthen its current training plan by tapping into existing resources or creating modules that are specific to such databases that auditors commonly use or cite.

Enhancing collaboration could also involve strengthening the feedback loop with data owners to drive improvements in data quality, which in turn would enhance future risk models. The TdC is well-positioned to drive improvements in gaps in data and enhance the quality of public procurement data, as the TdC deepens its reuse of this data for analysing risks. Currently, feedback loops with data owners, such as IMPIC and AT, occurs on an ad hoc basis (or not at all). As its digital initiatives evolve, the TdC could establish a more consistent and systematic mechanism for exchanging insights and feedback with data owners, outside of audit engagements and within the scope of its data use. The feedback could inform not only improvements to the data, but also trainings and guidance on using specific databases. For instance, the aforementioned NFI in the United Kingdom produces guidance that sets out data specifications in terms of how data should be formatted, and the types of data checks entities can conduct.

## 2.7. Conclusion

The TdC has made significant strides in its digital transformation journey, which is crucial for upholding its role as a standard-bearer of transparency, accountability, and public trust. This transformation is particularly vital in enhancing the TdC's capabilities for data-driven risk assessments in public procurement. The digital strategy of the TdC, as discussed in this chapter, necessitates a comprehensive approach encompassing strategy and organisation, people and culture, technology and process, and environment and partnerships. Each of these domains presents its unique challenges and opportunities.

The TdC's Digital Strategy, while ambitious, requires greater coherence among its initiatives and a robust mechanism for monitoring and evaluation. This strategic alignment is essential for effective implementation and for achieving desired outcomes in risk assessment and transparency. In terms of people and culture, there is a pressing need for change management, data literacy, and digital skills enhancement, particularly in the context of public procurement risk assessments. Ensuring that auditors are well-versed in data ethics and privacy is also paramount.

Technologically, the TdC faces challenges in IT integration, digital tool efficacy, and data interoperability. Addressing these issues is critical for the success of the Digital Strategy and for improving the TdC's overall audit efficacy, especially in assessing risks in public procurement. Finally, the TdC's environment and partnerships are key to its digital maturity. By formalising data-sharing protocols and collaborating with data owners, the TdC can strengthen its training programmes and enhance its capacity for effective, data-driven risk assessments.

Overall, the TdC's commitment to digital transformation is a positive step towards more efficient and effective auditing processes. However, for the full potential of this transformation to be realised, a balanced focus on strategy, people, technology, and partnerships is necessary. This will not only improve the TdC's internal processes but will also reinforce public trust and accountability in the area of public procurement.

## Notes

<sup>1</sup> For instance, see the discussion on “Establishing quick wins and realistic expectations” in OECD (2019), *Analytics for Integrity: Data-Driven Approaches for Enhancing Corruption and Fraud Risk Assessments*, <https://www.oecd.org/gov/ethics/analytics-for-integrity.pdf>; and the INTOSAI Development Initiative (2020), *Strategic Management Handbook For Supreme Audit Institutions*, <https://www.idi.no/elibrary/well-governed-sais/strategy-performance-measurement-reporting/1139-sai-strategic-management-handbook-version-1/file>.

<sup>2</sup> See [https://www.nao.org.uk/insights/quality-assurance-of-models/?utm\\_source=LinkedIn&utm\\_medium=social&utm\\_campaign=Orlo](https://www.nao.org.uk/insights/quality-assurance-of-models/?utm_source=LinkedIn&utm_medium=social&utm_campaign=Orlo) and [https://www.nao.org.uk/wp-content/uploads/2016/03/11018-002-Framework-to-review-models\\_External\\_4DP.pdf](https://www.nao.org.uk/wp-content/uploads/2016/03/11018-002-Framework-to-review-models_External_4DP.pdf)

<sup>3</sup> <auditingtobenefitthesocietyoftomorrow.pdf> (riksrevisjonen.no)

<sup>4</sup> [Algorithmic Impact Assessment Tool - Canada.ca](Algorithmic_Impact_Assessment_Tool_-_Canada.ca)

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<https://cdn.www.gob.pe/uploads/document/file/2008919/EI%20control%20concurrente:%20estimando%20cuantitativamente%20sus%20beneficios.pdf?v=1630447278>

<sup>6</sup> The 8 Steps for Accelerating Change, previously know as the 8 Steps for Leading Change, was pioneered by John Kotter, a professor of Harvard Business School and internationally recognised as a leader in change management. The four principles

<sup>7</sup> <https://intosaijournal.org/journal-entry/data-auditing-strategy/>

<sup>8</sup> <https://english.rekenkamer.nl/about-the-netherlands-court-of-audit/news/2022/09/28/netherlands-court-of-audit-publishes-online-course-on-data-analytics-in-audits>

<sup>9</sup> Detailed under articles 132, 163, and 164 of the CPC.

<sup>10</sup> Control Objectives for Information and Related Technologies (COBIT) is a framework for the governance and management of enterprise information and technology, aimed at the whole enterprise. See <https://www.isaca.org/resources/cobit>.

<sup>11</sup> The TdC also explored the Supreme Audit Institutions - Information Technology Maturity Assessment (SAI ITMA) tool, developed by the German co-operation (GIZ). The TdC decided not to use ITMA for several reasons, including the tool's complexity, its requirement for an external assessment team, and its primary focus on digitalization and dematerialisation as opposed to digital transformation, which was the TdC's priority.

## Annex 2.A. Key dimensions for assessing institutional digital maturity

The dimensions and key practices below are based on reviews of academic literature, discussions with subject matter experts in government, industry and non-governmental institutions, insights from the OECD's technical support for governments to strengthen their digital strategies and data-driven risk assessments, as well as OECD Recommendations.<sup>1</sup> Numerous self-assessment tools for digital or technology maturity that are relevant or made for integrity actors at an institutional level, such as the Supreme Audit Institutions (SAI) Information Technology Maturity Assessment, also provided inspiration. These practices consider digital maturity and transformation from an organisational perspective, but many are applicable for designing and implementing digital projects.

### Strategy and organisation

This dimension encompasses leadership's vision and strategy for digital transformation, including its goals for strengthening the use of digital technologies and data. A digital transformation strategy can stand alone or be integrated with existing organisational strategies. Either way, the aim is to ensure alignment of the digital strategy with other organisational priorities, audit processes and IT strategies (Bumann, 2019<sup>[52]</sup>). Clear delineation of roles and charting out responsibilities is imperative. This can include establishing an entity internally with an organisation-wide mandate to implement and co-ordinate digital initiatives. Data management and data governance are also key aspects of this dimension. They involve the policies, procedures, standards and controls that ensure data privacy, quality, consistency and security. Relative to project-based improvements, digital transformation by nature has a disruptive effect on an organisation's traditional approaches to data management and data governance.

Key practices in this dimension include:

- Align the Digital Strategy with the goals and objectives of other institutional strategies, such as the Strategic Plan and IT Strategy.
- Conduct assessments and establish a baseline for digital maturity, capabilities, IT infrastructure and architecture, and possible gaps.
- Identify key opportunities and challenges concerning data management and data governance, including priorities for ensuring data security and quality.
- Define roles and responsibilities internally, including the designation of an entity to implement the Digital Strategy that has an organisation-wide mandate and access to leadership.
- Engage with key stakeholders in the design of the Digital Strategy, including leadership, management and users of new tools, to understand digital maturity and priorities.
- Establish a plan and key performance indicators to monitor the implementation of the Digital Strategy.

## People and culture

The expertise, skills and commitment of individual employees within an organisation are central to digital maturity on any level, whether the goal is transformation or introducing a new tool for using data. Core competencies often revolve around digital and data literacy, sometimes extending to advanced programming skills. Alongside these technical proficiencies, it is critical that employees understand the policies, processes and behaviours that promote the ethical use of data (OECD, 2020<sup>[55]</sup>). Furthermore, sector-specific knowledge and specialised expertise are also critical competencies, such as having sector-specific knowledge to understand the data landscape for risk analyses. Legal expertise is also valuable for navigating the legalities of data access, privacy, storage, and security. A digital-ready culture is not only about having the right set of skills and experiences available, but it demonstrates tangible ways that leadership and employees rally around digital goals. This can manifest in different ways, such as having policies that allow for the experimentation of new technologies or providing training for employees to improve their digital skills (OECD, 2022<sup>[56]</sup>).

Key practices in this dimension include:

- Ensure that leadership visibly endorses and partakes in digital initiatives, embodying a top-down commitment to the organisation's digital aspirations.
- Develop and implement a change management and continuous learning plan that focuses on enhancing digital and data literacy, as well as sector-specific knowledge.
- Introduce and encourage training programmes targeting technical proficiencies like advanced programming and data ethics.
- Institute clear policies that favour experimentation with new digital tools and technologies to foster innovation and a “trial-and-error” mentality.
- Establish guidelines on the ethical use of data, ensuring that staff understands and adheres to them.
- Prioritise and establish mechanisms for internal knowledge sharing, facilitating the dissemination of sector-specific, technical and legal expertise.
- Promote a culture of collaboration and digital empowerment, where employees at all levels feel engaged and invested in digital transformation objectives.
- Collaborate with legal experts to navigate the intricacies of data laws, ensuring the organisation remains compliant while maximising its digital potential.
- Implement feedback loops to understand employee challenges and needs in the digital landscape, adjusting strategies based on this feedback.
- Regularly evaluate the digital skills gap within the organisation and adjust training programmes accordingly.

## Technology and processes

While technology, including IT systems, tools, and software, and the processes encompassing them are vital components of digital maturity, they should not be perceived as the primary objectives. The broader vision for digital transformation or the intent of any given project should inform technological advancements rather than being led by them. This underscores the importance of tailoring technology to specific needs. The term “state-of-the-art” is contextual, acknowledging that digital services, IT mechanisms, and tools differ in their complexity, resource needs, functionality, and alignment with various organisational goals. Given the rapid evolution of technology, expending resources without a lucid objective can lead to a waste of resources. Thus, a pragmatic approach involving cost-benefit analysis can guide judicious decision making about technological investments. This analysis can consider collaborative investments or leveraging open-source technologies that may offer additional public benefits, such as the promotion of

systemic transparency and collective technological development. Moreover, it is critical that considerations about adopting new technologies include assessments of their impacts on society, human rights and privacy, among other issues, to avoid exacerbating risks of discrimination and digital exclusion.

Key practices in this dimension include:

- Ensure any technology adoption aligns with the strategic objectives or specific goals of the organisation.
- Understand current capabilities, identify gaps, and ensure alignment with the organisation's digital maturity and objectives.
- Before investing in any new technology, gauge its potential return on investment and long-term sustainability.
- Start with a minimum viable product or proof-of-concept to test and validate new technologies or digital tools.
- Given the fast-paced nature of technological evolution, adapt and update tools and systems based on changing needs and feedback.
- Regularly research and explore new technological advancements that could replace legacy systems and enhance organisational effectiveness and efficiency.
- When selecting technologies, consider how easily they can be scaled or adapted to changing organisational needs or goals.
- Ensure that technologies are user-friendly, meet the needs of the organisation, and are accessible to all relevant stakeholders.
- Ensure that any new technology or process integrates robust cybersecurity protocols to safeguard organisational data.
- Define roles, responsibilities, and decision-making processes related to technology adoption and usage.
- Facilitate channels for sharing best practices, lessons learned, and feedback regarding technology tools and processes.
- Establish mechanisms to assess the social, human and ethical impact of adopting new technologies and mitigate associated risks, including those concerning data privacy, discrimination and digital exclusion.

## Environment and partnerships

National frameworks, ranging from laws to directives, can considerably shape the trajectory of institutional digital transformation. For instance, a country's legal and policy framework can lay the foundation for managing digital governance, data stewardship and the sharing of data. These external parameters can influence the effectiveness of a digital transformation project, either limiting or propelling the adoption of digital technologies. Within an organisation, while robust data governance streamlines the sharing and accessibility of data, the true essence of data sharing transcends just infrastructure or processes. Cultivating collaborative relationships between entities, including industry, academia and civil society organisations, is an indispensable cornerstone for advancing digital maturity and ensuring that necessary safeguards are in place.

Key practices in this dimension include:

- Stay abreast of updates to knowledge of laws, policies, and guidance related to digital governance, data management, and sharing.
- Engage with policymakers to advocate for supportive laws, regulations and policies that bolster the goals of digital initiatives.
- Establish data-sharing protocols that align with both internal goals and external legal requirements, allowing for efficient and timely exchange of information.
- Define institutional roles, responsibilities and expectations for all digital initiatives that involve collaboration with external stakeholders.
- Ensure that partnerships are mutually beneficial, fostering a sense of shared ownership and collective achievement.
- Establish channels to gather feedback from partners, ensuring continuous improvement in collaborative endeavours.
- Encourage an organisational mindset that values partnerships as a key enabler of digital growth.
- Establish relationships with other organisations, both within and outside the government (e.g. industry, academia, civil society), to promote collaborative digital initiatives, share best practices, and ensure ethical use.

## Note

<sup>1</sup> For instance, see: OECD (OECD, 2023<sup>[98]</sup>), “Recommendation of the Council on Artificial Intelligence” <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>; OECD (2014<sup>[100]</sup>), “Recommendation of the Council on Digital Government Strategies”, <https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf>; OECD (OECD, 2020<sup>[99]</sup>), The OECD Digital Government Policy Framework: Six dimensions of a Digital Government; OECD (2022<sup>[56]</sup>), *Strengthening Analytics in Mexico’s Supreme Audit Institution: Considerations and Priorities for Assessing Integrity Risks*; OECD (OECD, 2021<sup>[40]</sup>), *Countering Public Grant Fraud in Spain: Machine Learning for Assessing Risks and Targeting Control Activities*; Otia and Bracci (Otia, 2022<sup>[53]</sup>), *Digital transformation and the public sector auditing: The SAI’s perspective*; and Bumann and Peter (2019<sup>[52]</sup>), *Action Fields of Digital Transformation - A Review and Comparative Analysis of Digital Transformation Maturity Models and Frameworks*.



## Annex 2.B. Standards and guidance for technological and data maturity in Supreme Audit Institutions

The International Organization of Supreme Audit Institutions (INTOSAI) develops and promotes principles, standards and guidance for SAIs. Some of these focus explicitly on technical requirements for SAIs when conducting specific types of audits, highlighting the importance of having subject matter expertise related to technology, data and analytics. For instance, the Compliance Audit Standard (ISSAI 4000) highlights the potential for auditors to use analytics as part of risk analysis or evidence collection. It also highlights the possibility, depending on the type of engagement, for audit teams to have data collection and analysis as critical skills within the team (INTOSAI, 2019<sup>[77]</sup>).

In the context of public procurement, INTOSAI guidance (GUID 5280) also promotes the use of technology and data as fundamental aspects of auditing this sector. It notes that SAIs can use data, analytics and artificial intelligence (AI) to analyse contract data and assess patterns, trends and risks. The guidance also recognises the challenges SAIs may face in doing this from the perspective of recruitment, training and access to data (INTOSAI, 2022<sup>[78]</sup>). Other INTOSAI guidance, such as the Guidelines for the Audit of Corruption Prevention (GUID 5270), imply a need for auditors to have a sufficient understanding of technology to effectively audit anti-corruption systems and entities (INTOSAI, 2019<sup>[79]</sup>). For instance, it emphasises the importance of information and communications technology (ICT) systems and procedures, as well as safeguards to ensure data privacy, as critical areas that auditors may wish to consider during an engagement.

Beyond standards and guidance, the SAI community has long recognised the need to keep pace with technological advancements. One example of this is the 2019 Moscow Declaration (named after the location where the XXIII INTOSAI Congress (INCOSAI) took place that year). According to the Declaration, rapid data accumulation and evolving technology present both opportunities and challenges for SAIs. It calls on SAIs to respond effectively to technological advancements, including promoting the availability and openness of data, source code, and algorithms, as well as making better use of data analytics in audits (INTOSAI, 2019<sup>[80]</sup>). Annex Box 2.B.1 provides a summary of relevant standards and guidance that support technological advancement in SAIs.

### Annex Box 2.B.1. Key standards promoting technological advancements in SAIs

The following is a non-exhaustive list of key standards, principles and guides for SAIs to keep pace with technologies in government and overcome any internal inertia that may exist that slows or inhibits digital transformation or optimisation. Some SAIs focus primarily on what and how SAIs should audit in government from the IT perspective, but they provide additional context and encouragement for SAIs to lead by example, as promoted by the Lima Declaration (INTOSAI-P-1). Similarly, while not a standard, the Moscow Declaration outlines that in an era of rapid technological transformation, SAIs must strive to transform themselves to enhance the value and benefits they bring to citizens. It acknowledges that embracing new technologies is central to improving the effectiveness of public auditing. By adopting advanced technologies, SAIs can better handle the increasing volume and complexity of data, conduct more thorough analyses, and make more informed decisions.

- *ISSAI 4000—Compliance Audit Standard*. Promotes the need for auditors to have the necessary competencies, including skills regarding data collection and analysis. It also highlights the value of assessing risks and collecting audit evidence through statistical and data-driven techniques.
- *ISSAI 5100 – Guidance on Audit of Information Systems*. Provides guidance for auditors on how to conduct performance and compliance audits related to Information Systems or where the audit of information systems may be part of a larger audit engagement.
- *GUID 5270 – Guideline for the Audit of Corruption Prevention*. Provides additional guidance for SAIs on preparing and conducting audits of anti-corruption policies and procedures within government organisation.
- *GUID 5280 – Guidance for audits of public procurement*. Provides guidelines on conducting audits of public procurement, and highlights the critical role of data and analytics for such audits.
- *GUID 5290 – Guidance on Audit of the Development and Use of Key National Indicators*. Discusses key national indicators and their importance in assessing the impact and effectiveness of public policies and programmes, with a focus on statistical and econometric techniques for improvement.
- *Guidance on conducting audit activities with data analytics*. Offers guidance for SAIs in producing high-quality audit products using cutting-edge technologies, particularly focusing on data analytics for audit activities.
- *Data Analytics Guideline*. Prepared by the INTOSAI Working Group on IT Audit, it details the processes from data maturity to analytics creation and its deployment in audit scenarios. It aims to provide a comprehensive understanding and application of data analytics in audit contexts.
- *Integrating big data in public sector audit*. This publication of AFROSAI-E provides insights into the background, context, and uses of big data in audit, along with the factors affecting its analysis.
- *Capacity building requirements for conducting IT audits* - Provides guidelines on building capacity for conducting IT audits and outlines a model for building IT audit capacity in SAIs.
- *Managing Information Communications Technology: A guide for SAIs*. Provides senior managers in SAIs in understanding what constitutes modern ICT and helps identify the key aspects that comprise a modern ICT capability, recognising varying levels of maturity.

Sources: (INTOSAI, 2019<sup>[81]</sup>; INTOSAI, 2019<sup>[82]</sup>; INTOSAI, 2019<sup>[83]</sup>; INTOSAI, 2019<sup>[84]</sup>; AFROSAI-E, 2020<sup>[85]</sup>; Mehrishi, 2022<sup>[86]</sup>; INTOSAI, 2022<sup>[87]</sup>; INTOSAI, 2015<sup>[60]</sup>).

# 3

## The data landscape in Portugal and opportunities for enhancing the TdC's audits of public procurement

### 3.1. Introduction

Public procurement is a complex process that involves multiple actors and institutions, from which several sources of information are essential for audit activities. As with all data-related endeavours, when a task requires assessing data from multiple sources at different levels of granularity, data mapping is a critical first step. The main challenge in data mapping lies in the data landscape, which involves a variety of potential data owners, influencing data accessibility.

This chapter presents a comprehensive overview of the data landscape in Portugal, specifically identifying data opportunities to enhance the Tribunal de Contas (TdC) - Portuguese Court of Auditors' - audit tasks related to public procurement activities. The primary objective is to identify key variables from stakeholder databases that can serve as valuable sources to identify core risks and irregularities in public procurement. Specifically, the chapter highlights crucial features of these databases, particularly data quality and appropriate methods to identify risks/irregularities, delving into the first steps for implementing a data-driven framework.

By focusing on these essential aspects, this chapter lays the groundwork for developing a robust data-driven approach that empowers the TdC to enhance its capacity to assess risks related to public procurement, thereby strengthening its oversight of public procurement activities in Portugal. The approach to assessing the data landscape involved desk research, meetings with important stakeholders, online questionnaires, and analysis of data sources. Specifically, this task included analysing existing databases, government platforms, legal documents, and other relevant sources. This data mapping exercise established a holistic view of the data ecosystem, facilitating a more accurate and informed analysis of opportunities for TdC's audits.

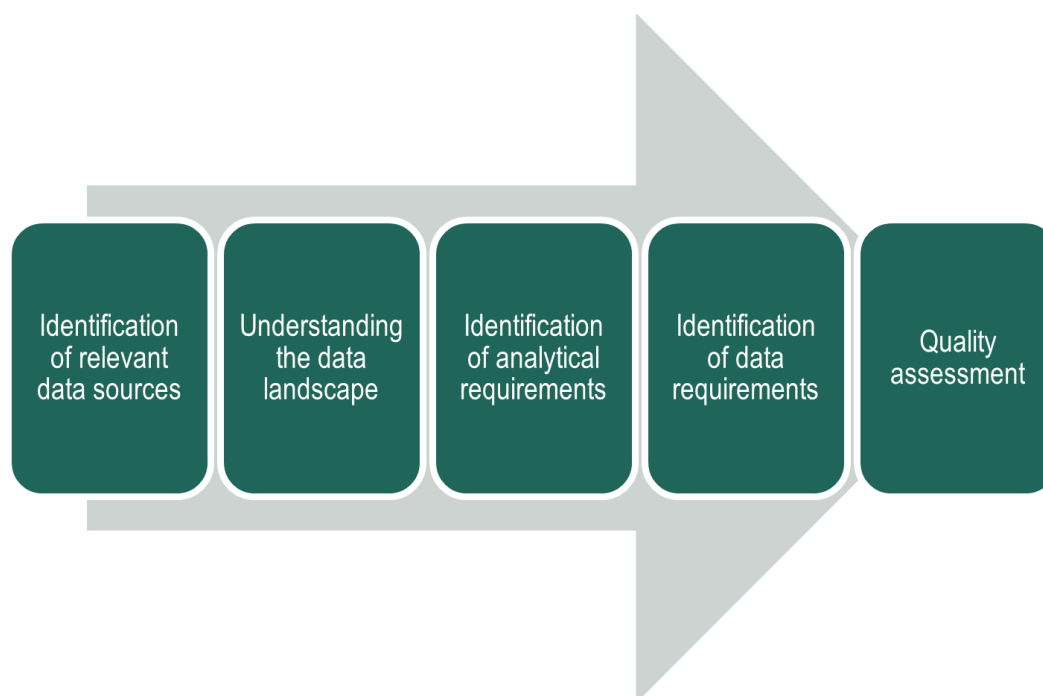
### 3.2. Overview of data mapping and activities undertaken

The data landscape encompasses all systems and processes involved in creating, collecting, processing, storing, and general use of data (internal analysis, sharing with third parties, etc.). Generically, a data mapping process involves defining the scope of the project, identifying relevant databases and data sources, and assessing the overall data landscape. The data mapping process also includes a quality assessment of the mapped data to ensure its accuracy and reliability. In other words, data mapping consists of surveying existing databases that are potentially relevant, profiling the available datasets (e.g., data quality, available features, and their data types, completeness of the dataset, and record key identifiers), and identifying opportunities/challenges to combine different data sources.

Thus, a data map serves as a comprehensive inventory of the available sources within the range of organisations related to public procurement in Portugal. Chapter 1 identified and described relevant databases for the project's scope, and Chapter 2 addressed opportunities and challenges for data integration.

This chapter addresses the downstream tasks related to data mapping, specifically identifying relevant methodologies and variables to assess risks and irregularities. Additionally, this chapter covers a quality assessment of the relevant available data sources. By undertaking this data mapping exercise, it is possible to identify the analytical requirements, allowing TdC to effectively leverage available data resources and optimise their audit activities to achieve more robust and informed outcomes.

**Figure 3.1. Data mapping process**



Source: Author' elaboration.

### 3.3. Exploring approaches for analytical requirements

Identifying the analytical requirements is an important step in data analysis and decision-making since it is the cornerstone for aligning data collection and analysis. Specifically, understanding the analytical requirements allows us to effectively determine what data is needed, how it should be collected, and which analytical methods are most suitable. This is relevant to ensure that the data analysis process is efficient, relevant, and tailored to the needs of TdC's audit activities.

Therefore, this task considered relevant data-driven risk/irregularity indicators compiled by the Court (see Chapter 1, Section 1.4.2). These indicators can be segmented on whether the analytical requirements are based on rules, statistical inference, or machine learning/statistical models. These categories are related to the complexity of the risk/irregularity indicator. Particularly, indicators assessed through rule-based methods are less complex and more intuitive than indicators assessed through machine learning models.

### 3.3.1. Rule-based

Rule-based approaches are methods that rely on a set of predefined rules to make decisions or solve problems. In a rule-based approach, knowledge is encoded in the form of if-then rules or condition-action rules. These rules consist of the antecedent (if part) and the consequent (then part). The antecedent specifies the conditions or criteria that must be satisfied, while the consequent defines the actions or conclusions to be taken if the conditions are met. When applied to a specific situation or problem, the rules are evaluated based on the available information or data, and the system follows the actions or conclusions specified by the rules that match the given conditions.

Rule-based approaches are particularly useful when well-defined rules or guidelines can be explicitly stated, and the decision-making process can be structured deterministically. Rule-based systems are often designed to handle complex sets of rules and can provide transparent and explainable reasoning, as the decision-making process is based on explicit rules. However, rule-based approaches may have limitations when faced with uncertainty or situations that require reasoning beyond simple if-then conditions. In such cases, other procedures may be more appropriate.

Table 3.1 displays a risk/irregularity assessment through rule-based methods. Specifically, the risk indicator that a call for tender was not published in the official journal. The failure to publish a call for tender can lead to legal and reputational risks, undermine fair competition, and compromise the efficiency and transparency of the procurement process. Thus, to determine whether a call for tender is published in official journal, an if-then condition that checks if the public procurement procedure is published in the official journal is enough to flag possible bids. Since not all call for tenders are required to be published in the official journal, this approach will contain additional conditions to restrict the indicator to the appropriate calls.

**Table 3.1. Risk/irregularity considered in the rule-based approach**

ID	Indicator Type	Indicator Group	Name of Risk Indicator	Approach for risk/irregularity assessment
1	Irregularities/Risks	Procurement procedure	Call for tender not published in official journal	If the fields related to the official journal are empty, then the bid will be flagged.

### 3.3.2. Inference-based

Inference-based approaches use statistical methods in decision-making or inference tasks. In inference-based processes, uncertainty is represented using probability distributions or probabilistic models. Instead of relying on strict rules or deterministic relationships, these approaches assign probabilities to different events or outcomes based on available evidence. In that sense, indicators compare the features in contracts against the expected (estimated through a sample), and deviations typically highlight cases that should be relevant to study further.

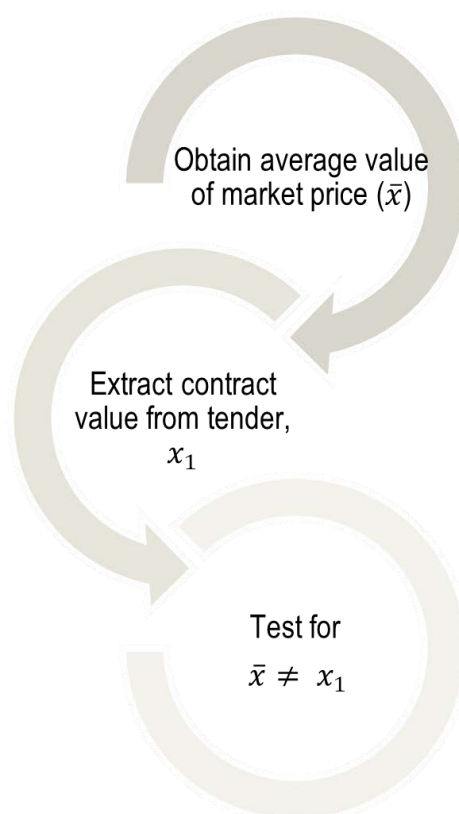
Table 3.2 exemplifies a risk assessment through inference-based methods. Specifically, the underestimation or overestimation of the contract value in relation to market prices. A rule-based method is not adequate, when it is required to obtain an estimation. An estimation adds complexity to the approach since it is necessary to account for the uncertainty of the sample. Thus, we can compare the contract value of the procedure with the estimated market price (obtained, for example, from a sample of similar bids, within the same type of procedure and/or within the same type of industry/sector).

The contract value is defined by the contracting body and it represents the economic value of the contract. The base price (upper limit of cost) is the maximum value the contracting body is willing to pay and it could be equal or lower than the contract value. The contractual price is the price of the winning bid and it should

be less than the upper limit of cost. Thus, if the economic value of the contract (which determines the upper limit of cost, which in turn determines the contractual price) is over or underestimated, it represents a risk and it should be flagged.

The comparison between the contract value and the market price can be assessed through a statistical test or a confidence interval (Hyari, Tarawneh and Katkhuda, 2016<sup>[88]</sup>).

**Figure 3.2. Inference-based approach**



Source: Author's elaboration.

This approach is suitable to identify more complex risk/irregularities than the rule-based methods. Additionally, these approaches are appropriate when the market prices can be estimated accurately. If that is not possible, alternative models (Hyari, Tarawneh and Katkhuda, 2016<sup>[88]</sup>) should be considered, placing these indicators in the model-based approaches.

**Table 3.2. Risk considered in the inference-based approach**

ID	Indicator Type	Indicator Group	Name of Risk Indicator	Approach for risk/irregularity assessment
1	Risks	Evaluation of bidders, tenders and award procedure	Underestimation/overestimation of the contract value in relation to market prices	Statistical Test Confidence Interval

### 3.3.3. Model-based

Model-based approaches refer to methods that utilise models to represent and understand a given system. These approaches involve constructing a representation or abstraction of the system, capturing its key components, relationships, and dynamics.

In model-based approaches, a model serves as a conceptual or mathematical/computational representation of the system under study. The model can take different forms depending on the context and requirements of the problem.

Table 3.3 contains a risk indicator that can be assessed through a model-based approach. Several approaches could be considered in this case, depending on the data (i.e., percentage of missing values) and the overall goodness-of-fit of the models.

Random Forest is an ensemble machine-learning method that combines multiple decision trees to make predictions. This approach can be used to identify bid-rigging cartels (García Rodríguez et al., 2022<sup>[89]</sup>; Huber and Imhof, 2019<sup>[90]</sup>; OECD, 2021<sup>[40]</sup>), identify connections between public and private entities (Popa, 2019<sup>[91]</sup>) and detect single bidding (Fazekas, Sberna and Vannucci, 2022<sup>[92]</sup>). Neural networks are a class of machine-learning models inspired by the human brain, which can also be used for bid-rigging cartels (Anysz, 2019<sup>[93]</sup>; Huber and Imhof, 2019<sup>[90]</sup>; García Rodríguez et al., 2022<sup>[89]</sup>). Support Vector Machines are a type of machine learning model that finds a hyperplane to separate data into different classes with the maximum margin. SVM can be used to detect single-bid in public procurement (Rabuzin and Modrušan, 2019<sup>[94]</sup>), collusion (Dadfarnia et al., 2020<sup>[95]</sup>; García Rodríguez et al., 2022<sup>[89]</sup>) and favouritism (Torres-Berru and López Batista, 2021<sup>[96]</sup>). Finally, logistic regression is a statistical model used for binary classification tasks, estimating the probability of an input belonging to a particular class and it has been used to detect single bidders and collusion (Fazekas, Sberna and Vannucci, 2022<sup>[92]</sup>; Rabuzin and Modrušan, 2019<sup>[94]</sup>).

In general, there is not a singular, universally superior method for identifying risks in public procurement (Lyra et al., 2022<sup>[97]</sup>). Numerous machine learning models can prove efficient and suitable, allowing for the implementation of various approaches.

**Table 3.3. Risk considered in the model-based approach**

ID	Indicator Type	Indicator Group	Name of Risk Indicator	Approach for risk/irregularity assessment
1	Risks	Conflicts of interest, fraud, and corruption	Bid rotation (price matching)	Random Forest Model Neural Network Models Support Vector Machines Logistic Regression

### 3.4. Identification of data requirements

Data requirements refer to the specific attributes and characteristics of the relevant data. Understanding the data requirements is important for several reasons. Firstly, it ensures that the data analysis process is accurate, as misaligned or irrelevant variables can lead to flawed results. Secondly, it contributes to the efficiency of the data analysis process by focusing resources and efforts on the most pertinent variables, thus saving time and reducing complexity. Moreover, a clear grasp of data requirements helps in identifying potential issues, such as missing or incomplete data, which can be addressed proactively.

The structure of data existing in TdC's database management systems (DBMS) is broad, namely unstructured data (emails, images, videos, other formats), semi-structured (text published on the web), and structured data that comply with classification and formal logic. Currently, the information relating to



the TdC's activity and residing in the DBMS is mostly structured, although there is a lot of unstructured, relevant information subject to processing. Moreover, TdC classifies the nature of the variables as usual: quantitative and qualitative (numeric vs. categorical). The first is presented in the form of numerical data, which may be discrete numerical data or continuous numerical data. Qualitative variables integrate data into categories, which can be ordered categories or unordered categories. The variables are also characterised according to their functional nature with characteristics such as transactional, master, reference, and metadata. Additionally, the origin of the data is classified as primary, secondary and tertiary. Primary data is obtained from the domain of the TdC itself. Secondary data is from an external source to the TdC and it is not publicly available. Finally, tertiary data is from an external source, but is considered public.

Considering the available data sources and the broad data landscape, the selection of relevant variables should consider the analytical requirements. Table 3.4 displays variable matching for the analytical requirements presented in the aforementioned tables (see Table 3.1, Table 3.2 and Table 3.3). For data-driven approaches, this process is indispensable for ensuring that all the relevant variables are included in the analysis and to increase efficiency and reliability.

**Table 3.4. Data requirements from available sources**

Risk/Irregularity indicator	Variables	Type	Source
Call for tender not published in official journal	Number of public announcement	Numeric	Secondary - IMPIC's Database
Underestimation/Overestimation of the estimated value and base price in relation to market prices	<ol style="list-style-type: none"> <li>1. Winning bid price</li> <li>2. Bid prices</li> <li>3. Contract value</li> <li>4. Type of procedure</li> <li>5. Sector/Industry</li> </ol>	<ol style="list-style-type: none"> <li>1. Numeric</li> <li>2. Numeric</li> <li>3. Numeric</li> <li>4. Categorical</li> <li>5. Categorical</li> </ol>	Secondary – IMPICS's Database
Bid rotation (price matching)	<ol style="list-style-type: none"> <li>1. Tender code</li> <li>2. Type of procedure</li> <li>3. Bid values</li> <li>4. Winning bid value</li> <li>5. Number of bids per auction</li> <li>6. Date of tender</li> <li>7. Location</li> </ol>	<ol style="list-style-type: none"> <li>1. Numeric</li> <li>2. Categorical</li> <li>3. Numeric</li> <li>4. Numeric</li> <li>5. Numeric</li> <li>6. Date</li> <li>7. Categorical</li> </ol>	Primary – Public Contracting Files (econtas), GENT Secondary – IMPIC's Database

Source: Author's elaboration.

Despite the richness of the available data sources, it is critical to highlight the risks that the TdC will not be able to measure with the existing data sources, as well as the additional sources that could further improve the risk assessment methodology in the future. Specifically, IRN's database is relevant to obtain data on the companies' ultimate beneficiary, which is an important feature to determine conflicts of interests' risks, such as if the owners/shareholders of the tenderer(s) are the same. In addition, AT's data sources, such as invoice data (from the e-fatura database), would also be relevant in the context of the TdC's audit activities to identify risks related to the payment or financial obligations. Specifically, for the former it would be relevant to determine if the amount paid is higher than the invoiced values declared by suppliers. Additionally, these external data sources could include features that would improve the machine-learning approaches by adding more complex attributes related to the tender in the model, thereby increasing their accuracy. Thus, although there are several available data sources that would allow the TdC to implement data-driven approaches, there are opportunities to build on and improve the initial risk assessment methodology by accessing additional data that is essential for assessing specific risks in public procurement. Table 3.5. Data requirements from unavailable sources maps the data requirements concerning data sources that were unavailable at the time of developing the risk methodology during the project.

**Table 3.5. Data requirements from unavailable sources**

Risk/Irregularity indicator	Variables	Type	Source
Supplier partners are also procurement officials	→Supplier partners' name Supplier partners' VAT number	→Nominal Numeric	Primary – Public Contracting Files (econtas), GENT Secondary – IRN database
Owners/shareholders of the tenderer(s) are the same	Owners/shareholders VAT number	Numeric	
Amount paid is higher than the invoiced values declared by the suppliers	→Payment amount (in tender) →Invoice value (declared to AT) →VAT number of supplier Date of payment	→Numeric →Numeric →Numeric Date	Primary – Public Contracting Files (econtas), GENT Secondary – AT invoice database (efatura)
Artificial split of works/services/supplies across several tenders	→Payment amount (in tender) →Invoice value (declared to AT) →VAT number of supplier →Date of payment →Date of tender Tender code	→Numeric →Numeric →Numeric →Date →Date Numeric	

Source: Author's elaboration.

Understanding data requirements in sources that are available requires a comprehensive analysis. This includes an examination of the indicators for risks and irregularities, first developed by the TdC, an evaluation of international examples outlined in the analytical requirements section, and a scrutiny of available data sources. This led to the identification of 15 primary variables (see Table 3.6). These variables were identified for their inherent significance and their widespread applicability for a data-driven risk assessment and enhancing the TdC's audit activities.

**Table 3.6. Relevant variables for the TdC's data-driven risk assessment**

Variables	Type	Source
Contracting authority	Categorical	GENT, Compliance Reporting System (eContas), IMPIC's Database
Contract object	Categorical	Compliance Reporting System (eContas), IMPIC's Database
ID Contract	Numeric	Compliance Reporting System (eContas) only from 2023, IMPIC's Database
Type of contract	Categorical	Compliance Reporting System (eContas), IMPIC's Database
Type of procedure	Categorical	Compliance Reporting System (eContas), IMPIC's Database
Base price	Numeric	Compliance Reporting System (eContas), IMPIC's Database
Contract price	Numeric	Compliance Reporting System (eContas), IMPIC's Database
Award date	Date	IMPIC's Database
Visa date	Date	Compliance Reporting System (eContas), IMPIC's Database
Date of authorisation of the expenditure	Date	IMPIC's Database
Due date	Date	Compliance Reporting System (eContas), IMPIC's Database
Appointment date	Date	Compliance Reporting System (eContas), IMPIC's Database
Payment day	Date	Compliance Reporting System (eContas) (only first day of payment), IMPIC's Database
Payment amount	Numeric	Compliance Reporting System (eContas), IMPIC's Database
Sum of payments made in the last 3 years to the successful tenderer in each type of procedure	Numeric	Compliance Reporting System (eContas), IMPIC's Database
Number of interactions with the prior control department before obtaining visa	Numeric	GDOC

Source: Author's elaboration.

The data requirements identified above consider mostly structured data. However, the TdC could benefit from using unstructured data as well to further refine its methodology for assessing risks in public procurement, as discussed in Chapter 2. For example, methodologies that use unstructured data can help the TdC to detect whether the tender had an insufficient definition of the object of the contract. This type of risk is relevant because the opacity of the object of the contract can restrict competition, thereby creating inefficiencies and undermining principles of legality, transparency and the public interest. In addition, the uncertainty in the object of the contract can contribute to encumbering the contract with the performance of complementary works, all of which have an impact on the financial result of the contract and the efficiency of public expenditure. By analysing the unstructured data contained within the tender through machine learning and AI methods, it would be possible to detect the opacity of the object of the contract. Additionally, PORTAL BASE's content can be validated against the information available in unstructured data (documents related to tenders and contracts). This approach would allow for content verification of the databases, which would lead to more accurate data, while taking benefit of the unstructured data sources.

### 3.5. Quality assessment

The final task of the data mapping consisted of quality assessment. The following criteria were considered:

- **Relevancy:** Ensuring that the data meets the needs of the Court, i.e., to what extent the data is pertinent for the user.
- **Accuracy:** Verifying the degree of validity, i.e., to what extent the data values are in conformance with the actual values and free of error.
- **Completeness:** Evaluating if there are any gaps or missing data, i.e., to what extent the data are sufficient for the task.
- **Timeliness:** Evaluating the speed of data retrieval, i.e., to what extent the data is up-to-date.
- **Accessibility:** Assessing the ease of data access, i.e., to what extent the data is available.
- **Coherence:** Ensuring data consistency, i.e., to what extent the data is aligned logically within the dataset.

Through to these guiding principles, it is possible to effectively prioritise the relevant databases to enhance the efficiency and effectiveness of TdC's activities. The tasks undertaken at this stage were mainly focused on data profiling and data auditing. Regarding the profiling, the goal was to analyse the structure and metadata. Regarding auditing, the purpose was to validate the data against expected values (in terms of data format) and find potential errors. The data profiling and audit were aligned, since the first allowed to identify the type of variable and the second allowed to check if the data values were according to the metadata definition. This quality assessment did not involve verification of whether the data was correctly inputted in the database, in terms of content, but if the format of the variables is according to the expected. The databases considered were GENT, Compliance Reporting System (eContas) and IMPIC's Database.

The principles were evaluated quantitatively and/or qualitatively. Relevance was ensured in the previous task of the data mapping. Specifically, the relevance was assessed qualitatively, according to the content and the retrieved variables of the database, whether these were relevant or not for audit activities and for implementing the data science framework (see Chapter 1). Accessibility was also evaluated qualitatively, according to whether TdC had access to the database or not. Table 3.7 contains the metrics considered for the quantitative assessment of the remaining principles.

**Table 3.7. Data Quality Metrics**

Principle	Data Quality Metric	Formula
Accuracy	Percentage of data values that match expected or reference values.	$1 - \frac{\text{Number of incorrect data values}}{\text{Total number of data values}}$
Completeness	Percentage of records with all required fields complete.	$1 - \frac{\text{Number of incomplete/null data values}}{\text{Total number of data values}}$
Timeliness	Average number of days between date published in the database and the date the record was available to be imputed	$\frac{\sum_{i=1}^{\# \text{ records}} \text{Published date}_i - \text{Available date}_i}{\text{Number of records}}$
Coherence	Percentage of data values with consistent values.	$1 - \frac{\text{Number of inconsistent data values}}{\text{Number of checked data values}}$

The initial phase of the data quality procedures involved importing the provided sample data, which was predominantly available in either CSV or XLSX formats.

The accuracy assessment included ensuring the uniformity of data values, with a specific emphasis on verifying the appropriateness of data types throughout the dataset's columns and assessing the proper formatting of variables, particularly those of date types. An examination of anomalous values, such as the presence of negative figures in price-related variables or the uniformity of VAT numbers (9 digits for Portuguese contracting bodies/hired entities), was also an integral part of this accuracy measurement.

The assessment of completeness similarly entailed a column-based approach, subsequently aggregated to provide an overall perspective on the dataset's completeness. This assessment approach recognises that certain variables may exhibit substantial incompleteness but might not be relevant for subsequent analyses. It is important to note that the completeness assessment considered only the sampled data, i.e., the percentage of records that are complete. An alternative strategy, which was not applied in this assessment, involves evaluating potentially absent records by comparing against the comprehensive scope the database should encompass.

Given that the publication dates of records were unavailable for most of the databases analysed, the assessment of timeliness was predominantly through a qualitative approach, considering the insights from the data landscape.

The coherence measurement was initiated with an observation of the datasets, culminating in the formulation of defined rules and coherence checks between columns. An illustrative example of such a check could involve the validation that the total price corresponds precisely to the sum of the decomposed price variables.

The quality assessment considered samples of the identified databases. Using sample data instead of production-level data in quality assessment serves several important purposes. Firstly, it is more efficient. Working with a smaller sample set streamlines the assessment process. This approach requires fewer computational resources and reduces the time needed for analysis, which is especially beneficial for initial exploratory analysis and quick quality checks. Secondly, sharing smaller sample datasets for assessment purposes simplifies collaboration among different teams or stakeholders. It is easier to transfer, analyse, and discuss findings based on manageable sample data compared to handling large production datasets. Finally, by using sampled data, the data owners can mask or anonymise sensitive information while retaining the essential characteristics needed for quality assessment. However, it is crucial to ensure that the sample data is representative and accurately reflects the characteristics of the entire production dataset. Given the diversity and variability of public procurement data and considering that the selection process of observations was through random sampling, the following conclusions should be interpreted with caution.

### 3.5.1. GENT: TdC's entity management system

TdC provided a random sample of the database of 1 000 observations and a support file that contained the row counts, total space used and completeness of each table. This file also included a description of the variables with the corresponding data type and a flag indicating if that given variable is a key variable for identification within the table.

The analysis of the data quality was focused on *DB\_Organismo*, which is the most important table in this relational database. It holds critical information on the contracting body, and it connects to the other tables through the organism code ID variable. Table 3.8 contains the organism code, the date of creation and ending (it will be null if the entity is still in vigour), activity code, country, juridic form, codes to connect with other entities, such as the statistical body, the number and place of registry.

**Table 3.8. GENT's quality assessment**

Principle	Assessment Summary
Relevancy	Highly relevant database since it contains the universe of entities the Court plans to control (see Chapter 1).
Accuracy	For date variables, the date format was appropriate, and it did not show any errors.  The VAT number of the entity presented some issues, namely 325 observations had this value field as zero and one observation had a value that was less than 9 digits. For this field, the accuracy measure is around 67.4%. This is particularly important because this field can be used to connect to different sources and normalise entity values, such as the name.
Completeness	DB_Organismo presented around 67% of complete records, considering the complete 20 626 records and not the sample of 1 000 records.
Timeliness	The data entries are imputed manually by a specially assigned team, responsible for managing GENT's database. The sources from this imputation are IRN communications to TdC and the Portuguese National Gazette. Thus, a lot of the work involved in the data entry of this database involves a thorough analysis of the Portuguese National Gazette. This work is done periodically, thus fields available in this Gazette (or other more direct sources) are easily up to date. Some entry fields are not easy to update due to the lack of access to their corresponding sources and might not be regularly monitored. However, these fields are deemed more complementary attributes. The regularly reviewed are characterised by being structural fields of the entity and their corresponding standard accounting. There are some differences regarding timeliness between mainland Portugal and the islands, specifically, there is longer timeliness in the latter.
Accessibility	Very accessible, since it is managed by TdC.
Coherence	The main coherence check was regarding the dates, specifically the date of creation should be before the date of ending. The DB_Organismo table included two pairs of date-related variables, with start and ending date. The columns "Data_Inicio" (date of creation) and "Data_Fim" (ending date) presented 675 records where the date of creation was complete, but the ending date was null. Excluding these records, from the assessed sample, all the records presented the date of creation before the date of ending.  The second pair of date-related variables is "Data_dr_Inicio" (date of creation, published in the Portuguese National Gazette) and "Data_dr_Fim" (ending date, published in the Portuguese National Gazette). For these variables, around 337 records have the date of creation complete and the ending date null and around 131 records had the creation date set to null and a complete value for the ending date. Excluding these records, all the records had the creation date before the ending date. Thus, excluding missing values the coherence measure is 100%.  An additional and very relevant coherence check would be to verify whether the relationships and integrity between tables are correct. For example, to check whether an entity that has a designation but does not exist in the DB_Organismo table. However, to conduct this assessment, it is necessary to include all the records of the database instead of a sample.

### 3.5.2. Compliance Reporting System (eContas)

The compliance reporting system contains information regarding administrative hiring of public bodies. The information is submitted by the public entities through a reporting map which includes additional information to the budget data **about all the celebrated contracts that were subjected to financial execution during the period**. TdC provided a sample of the five different reporting maps,<sup>1</sup> for five different accounting standards relevant for this purpose,<sup>2</sup> within the compliance reporting system. Some of these reporting

maps shared the same columns and thus were joined, leading to three different reporting maps: reporting map #1, reporting map #2 and reporting map #3.

There is not a specific variable to join this reporting maps with other sources. Currently, TdC joins through the VAT number of the contracting entity, the bidder and the amount with IMPIC's database information. This could lead to some issues when the amount is wrongly inserted in IMPIC's database, which then requires manual correction. These matching procedures are currently conducted on an ad hoc basis, handled individually by auditors for specific purposes. At present, the Court doesn't execute this matching as part of a comprehensive, organisation-wide process.

**Table 3.9. eContas' quality assessment**

Principle	Assessment Summary
<b>Relevancy</b>	Highly relevant database, containing important information regarding company data (see Chapter 1).
<b>Accuracy</b>	<p>In the reporting map #1, the deadline variable is in text format and does not present a unique measure of time. Some entities report as "1 year", others as "365 days". The column related to VAT numbers for the contracting bodies did not present any issues. However, for the hired entities, the VAT number presented some issues. Specifically, 33 cases had a character value, such as the name of the company and 5 cases had a number with less than 9 digits (number of digits of the VAT in Portugal). However, since the suppliers of goods and services, i.e., the companies being contracted by public entities, can be foreign entities (not registered in Portugal), it is expected that the fiscal ID is distinct from Portugal's 9-digit VAT Field. Finally, regarding the dates, a lot of accuracy errors arise, specifically, the observations were imputed with different date formats, which is an issue when analysing or applying operations to these columns.</p> <p>Regarding the reporting map #2, for the date variables, no issues related to formatting appear in this map. The VAT number of the public body had 201 observations having a value of more or less than 9 digits. Similarly, to reporting map #1, the deadline variable had inconsistent formats.</p> <p>Overall, the accuracy measure of the assessed reporting maps is around 96.10%</p>
<b>Completeness</b>	The reporting map #1 presented a completeness measure of 88.46%, reporting map #2 of 87.33% and reporting map #3 of 95.46%. In reporting map #2, relevant variables such as the deadline and VAT number of the hirer had around 24% and 5% of missing values, respectively. The remaining variables of the reporting maps that presented missing values are related to observations columns or similar variables, which can be classified as irrelevant.
<b>Timeliness</b>	Yearly until April, however, the entities may ask for deadline extensions to deliver the information.
<b>Accessibility</b>	Very accessible, since it is managed by TdC.
<b>Coherence</b>	<p>For the coherence assessment only the reporting map #1 and #3 were considered since no coherence checks were needed for the reporting map #2. The coherence checks assessed were (1) ensuring the contractual price without VAT is less than or equal to the contractual price with VAT and (2) ensuring that the total value of payments is equal to the sum of the decomposition payment variables. Additional coherence checks related to the date variables could be included, however since the formatting differs among columns, it would require extensive pre-processing, exiting the scope of this analysis. Overall, the coherence measure for map #1 and map#3 is, respectively, 99.29% and 98.98%.</p> <p>Similarly, to GENT database, an additional and very relevant coherence check would be to extend the coherence checks to include external sources, specifically verify whether the values from this reporting system are aligned with the ones provided to IMPIC's obligatory contracting portal.</p>

### 3.5.3. IMPICS's Database

IMPIC provided 18 individual datasets in 27 physical files. The names of the files are defined according to the Annexes defined by Order No. 284/2019 (for more details, see Chapter 1). Around 9 of these files contained information regarding same Annexes, but with two different versions: one regarding the procedures and another regarding the contracts. The same information needs to be provided at different stages of the public procedure, hence these two versions. In a sense, the procedures files are a super set of the contract files, since they contain information on the procedures that were fulfilled as a contracts and those that did not had any bids or answers to the call. Currently, the Court only considers the tables regarding the contracts, thus the quality assessment was focused on those files only.



**Table 3.10. IMPIC's Database tables**

Table	Observations per column (with duplicated records)	Variables	Duplicated Records	Completeness Measure
Annex II (for contracts only)	142378	31	0	55.98%
Annex III	2301	16	0	90.45%
Annex IV (for contracts only)	481767	9	0	99.71%
Annex IX (for contracts only)	5	7	0	100.00%
Annex V	572	7	0	85.71%
Annex VI	75	12	0	32.78%
Annex VII	354411	11	0	91.11%
Annex VIII	57868	10	0	63.77%
Annex XI	79814	5	0	98.39%
Annex XII (for contracts only)	6806	12	0	84.63%
Annex XIII	3	5	0	73.33%
Annex XIV (for contracts only)	30116	14	0	58.47%
Annex XV (for contracts only)	681	16	0	55.93%
Annex XVII	92	13	0	82.94%
Contracts (for contracts only)	602930	56	31171	49.77%
Lotes (for contracts only)	201347	9	0	92.92%
Portal Base (for contracts only)	189958	13	19294	49.15%
Procedures	142360	19	0	62.50%

**Table 3.11. IMPIC's Database quality assessment**

Principle	Assessment Summary
<b>Relevancy</b>	Highly relevant database, containing important information regarding public procurement data (see Chapter 1).
<b>Accuracy</b>	<p>The "Lotes", "Contracts", "Annex II" and "Annex IV" tables presented accuracy issues. Specifically, "Lotes" and "Contracts" table presented 1 record, where the contract price was negative. Additionally, "Annex II" table had 2 observations with negative bid prices and the variable "Deadline" presented inconsistent formats (in some cases was depicted has "365 days", in others as "1 year").</p> <p>Overall, the accuracy measure for "Lotes", "Contracts" and "Annex IV" table was 100% (the number of inaccurate observations was very small to have an impact on the measure), 96.77% for "Annex II".</p>
<b>Completeness</b>	<p>The completeness measure for each table is displayed in Table 3.9. Although some tables present low values of completeness, such as "Annex IV", "Annex II", "Contracts" and "Portal Base", it is important to note that these tables contain empty columns that are supposed to be non-empty only in specific cases, such information and/or description columns. Thus, are not generic relevant variables, that apply to all types of procedures/contracts.</p> <p>Overall, the tables assessed present a completeness measure of 96.29%.</p>
<b>Timeliness</b>	The timeliness of the announcements depends of the type of procedures. If the process is published in the National Gazette is more automated, hence it is faster to publish in the database. However, if it depends on the entities, it could take longer and in some cases the announcement is only published by the entity when the contract is already signed.
<b>Accessibility</b>	Very accessible, publicly available and TdC has access to the private area.
<b>Coherence</b>	<p>The coherence checks performed in the "Contracts" table were to check consistency in date-related variables (i.e., check if ending date of the contract is after starting date) and ensuring that if the procedure type was a direct award, then the flag column corresponding to that procedure was equal to one. For the "Contracts" table the coherence metric was around 100%.</p> <p>For "Annex IV" the date-related variables assessed presented a consistency of 99.97%.</p>



### 3.6. Strengths and weaknesses of available data sources

The quality of any data endeavour depends on the availability and quality of relevant data sources. Moreover, features regarding award, tender, hired and contracting bodies are crucial for enhancing the Court's audit activities through a data-science framework.

The universe of available data sources includes several relevant variables which can be used to implement simple methods, such as rule-based methods and more complex methods, for example machine learning algorithms. In addition, the available data sources are not managed by a single entity, allowing to enrich the records available, which in turn reduces potential biases in the data. Finally, the Court has detailed knowledge of the data sources, which is beneficial for contextual understanding and interpretation.

Nevertheless, there are some weaknesses that should be considered. Firstly, since the available data has different sources, there are different variable formats and structures, which adds complexity to the data integration. Secondly, another challenge is the presence of missing values. For example, the contracting body VAT number in the GENT database presented some completeness issues. This variable is important to identify an entity and, in some cases, join different data sources. Thus, missing values associated with the VAT number could lead to information loss. In general, considering the variables identified in Table 3.6 and the quality assessment, there were no major issues identified. With the exception of some date-related variables, that had different formats within the same database. To mitigate these weaknesses, it is essential to thoroughly assess and preprocess the data to ensure its suitability for the intended analytical purposes. Finally, the timeliness of data can be a concern, the data is not updated in real-time and the timeliness varies widely among data sources. This could cause potential inaccuracies and the results should be analysed considering this particularity.

### 3.7. Conclusion

This chapter focused on the follow-up tasks related to data mapping, specifically the identification of analytical and data requirements and quality assessment of available data sources, with the goal to identify opportunities to enhance the TdC's audit activities.

The risk/irregularities indicators matrix developed by the Court allowed to identify of three main analytical requirements categories: rule-based, inference-based and model-based. Rule-based indicators can be of high gain with a low cost of implementation and would already have a considerable impact on improving the TdC activities. Additionally, considering the rich universe of available data sources, model-based methods are relevant to capture more complex indicators.

From the quality assessment, the main challenge lies in optimising the processes to efficiently extract value from semi-structured and unstructured information, which can be found both within and outside the TdC. The available data has different sources, which leads to different formats across variables. Additionally, missing values on relevant features could be a potential issue. A thorough data preprocessing is essential to overcome some of these challenges.

Finally, with the data and methods identified, the auditors may apply analytical procedures for their activities within the Court and enhance the identification of risks and irregularities. However, it is important to note that, despite the potential of the available data sources, these are limited since they do not allow for the identification of all the risks. Thus, this work should be seen as the beginning of a data-driven journey within the Court, where the methods and data sources should be expanded, leading to a constant and iterative improvement of these approaches.

## Notes

<sup>1</sup> The map 3000012 for entities that report in SNC AP is applicable to the entities in the full regime, in the small entities regime or in the micro entities regime.

<sup>2</sup> Local Business Sector (map 3000011), SNC Local Business Sector (map 300003), SNC-AP, Local Administration (map 3000013) and SNC-AP MNE Services (map 3000014).

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## OECD Public Governance Reviews

# Strengthening Oversight of the Court of Auditors for Effective Public Procurement in Portugal

## DIGITAL TRANSFORMATION AND DATA-DRIVEN RISK ASSESSMENTS

This report looks at efforts by Portugal's Court of Auditors (*Tribunal de Contas*, TdC) to make better use of data and analytics in assessing risks in public procurement. It identifies key financial and non-financial risks to refine the TdC's audit selection process and increase the effectiveness and efficiency of the public procurement system. The report provides recommendations for improving and maintaining data-driven risk assessments that align with the TdC's Digital Transformation Strategy. The report also includes a data-mapping exercise and data reliability assessment in preparation for the next phase of the project, which includes developing a working model to detect procurement risks and irregularities using real-world data.



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