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Application of BPR and Simulation tools to the Italian Supreme Court of Cassation

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Abstract

Purpose – The recently approved PNRR (Piano Nazionale di Ripresa e Resilienza) imposes a number of objectives to Italian institutions, including the SCC (Supreme Court of Cassation). The goals set for the SCC are in terms of Disposition Time – the time needed for a file to be fully processed – and backlog generation for the II, the IV and the V Civil Sections of the SCC. For these reasons, the goal of this study is to map all the processes, reengineer the critical phases, and create a simulation tool capable of predicting both the Disposition Time and the Backlog Generation

Design/methodology/approach – The study has been conducted using data from the Deloitte document, from which an Excel model has been developed. Such model is able to grant for each activity of the process, a range of times to compute into the simulation software, which ultimately estimates the productivity of the process under analysis.

Findings – The process mapping and the simulation carried out have highlighted that the current way of operating for the SCC is not sufficient to achieve the targets set in the PNRR. Indeed, according to the DT calculated for the *as-is*, the SCC takes about 1316 days, against the 976 days of the target Disposition time. For this reason, through the reengineering of the Filter and Examination phase described in this study, it has been possible to significantly reduce the DT and backlog generation, to fulfill the boundaries set in the PNRR plan.

Originality/Value – The main contribution brought by the study is the process mapping and analysis of each phase of the II Section, IV Section, and V Section of the Civil District. Indeed, for each phase of the process, activities have been modelled in terms of the timings, resources and working hours, with the scope of creating a simulation tool capable of predicting whether the targets set in the PNRR are feasible or not.

Theoretical and managerial implications – The main contributions carried out by the study are the process mapping and the simulation of all the phases of the II, IV and V Civil Section of the SCC. Among the simulation scenarios that have been created, a specific punctual scenario was created entirely for the decision maker. As a matter of facts, this scenario allows the decision maker to understand in an intuitive but comprehensive way, how the productivity of the process analyzed varies when specific inputs are modified. As such, the decision maker is capable of optimizing the selected phase of the process, allowing for a constant fine tuning of the solution proposed by this research.

Limits and further research – All the timings used as inputs in the Excel files are estimations, and as such, they contain elements of variability. Moreover, the simulation tool itself had some major flaws; indeed, in some cases, the simulation halted due to a lack of computing power, because of an excessive number of waiting instances in the proximity of bottlenecks. Finally, given that the organization is currently not very mature from a digital point of view, future developments regarding the use of AI to automate processes are to be considered. Indeed, while currently the risk of rejection of an AI solution is deemed as very probable, in a rather near future, it is likely that such barriers to change might fall, and AI solutions might be considered to optimize the processes, further reducing the Disposition Time.

Key-words: Business Process Reengineering, Reengineering, Process Simulation, Law Sector, Process Analysis.

Abstract in italiano

Scopo – Il PNRR (Piano Nazionale di Ripresa e Resilienza) recentemente approvato impone una serie di obiettivi alle istituzioni italiane, tra cui la CSC (Corte Suprema di Cassazione). Gli obiettivi fissati per la CSC sono in termini di Disposition Time – il tempo necessario per completare l'elaborazione di un fascicolo – e di generazione dell'arretrato per la II, la IV e la V Sezione Civile del CCS. Per questi motivi, l'obiettivo di questo studio è quello di mappare tutti i processi, reingegnerizzare le fasi critiche e creare uno strumento di simulazione in grado di prevedere sia il Disposition Time che la Generazione del Backlog

Design/Metodologia/Approccio – Lo studio è stato condotto utilizzando i dati del documento Deloitte, da cui è stato sviluppato un modello Excel. Tale modello è in grado di concedere per ogni attività del processo, un intervallo di tempi da computare nel software di simulazione, che alla fine stima la produttività del processo in analisi.

Risultati – La mappatura dei processi e la simulazione effettuata hanno evidenziato che l'attuale modo di operare per il SCC non è sufficiente per raggiungere gli obiettivi fissati nel PNRR. Infatti, secondo il DT calcolato per l'as-is, la CSC impiega circa 1316 giorni, contro i 976 giorni del Disposition Time target. Per questo motivo, attraverso la reingegnerizzazione della fase di filtro e spoglio, descritta in questo studio, è stato possibile ridurre significativamente la generazione di DT e backlog, per soddisfare i limiti fissati nel piano PNRR.

Originalità/Valore – I principali contributi svolti dallo studio sono la mappatura dei processi e la simulazione di tutte le fasi della II, IV e V Sezione Civile del SCC. Tra gli scenari di simulazione che sono stati realizzati, è stato realizzato uno specifico scenario puntuale interamente per il decisore. Infatti, questo scenario consente al decisore di comprendere in modo intuitivo ma completo, come varia la produttività del processo analizzato quando vengono modificati input specifici. In quanto tale, il decisore è in grado di ottimizzare la fase selezionata del processo, consentendo una costante messa a punto della soluzione proposta da questa ricerca.

Implicazioni pratiche e manageriali – Tra gli scenari di simulazione che sono stati realizzati, è stato realizzato uno specifico scenario puntuale interamente per il decision maker. Infatti, questo scenario consente al decisore di comprendere in modo intuitivo ma completo, come varia la produttività del processo analizzato quando vengono modificati input specifici. In quanto tale, il decisore è in grado di ottimizzare la fase selezionata del processo, consentendo una costante messa a punto della soluzione proposta da questa ricerca.

Limiti e ricerche future - Tutti i tempi utilizzati come input nei file Excel sono stime e, come tali, contengono elementi di variabilità. Inoltre, lo stesso strumento di simulazione presentava alcuni grossi difetti; anzi, in alcuni casi, la simulazione si è fermata per mancanza di potenza di calcolo, a causa di un numero eccessivo di istanze in attesa in prossimità di colli di bottiglia. Infine, dato che l'organizzazione è attualmente poco matura dal punto di vista digitale, sono da considerare gli sviluppi futuri per quanto riguarda l'utilizzo dell'IA per automatizzare i processi. Infatti, mentre attualmente il rischio di rifiuto di una soluzione di IA è ritenuto molto probabile, in un futuro piuttosto prossimo, è probabile che tali barriere al cambiamento possano cadere, e le soluzioni di IA potrebbero essere prese in considerazione per ottimizzare i processi, riducendo ulteriormente la Disposizione Tempo.

Parole chiave: Reingegnerizzazione dei processi, Analisi dei processi, Settore Giuridico, Simulazione.

Contents

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Introduction

Backgrounds and motivation

After being authorized by parliament, the Italian government changed the pillars and mechanism established by the European Union and presented the National Recovery and Resilience Plan, abbreviated as PNRR, on April 27, 2021.

The PNNR document describes how Italy intends to invest the money made available by the EU, as well as how to implement all necessary reforms in order to capitalize on this unprecedented socioeconomic opportunity to relaunch itself on the global stage and close the gaps that have accumulated in recent decades in comparison to other countries. In particular, Italy's revitalization effort is developed around three strategic axes: digitization and innovation, ecological transition, and social inclusion.

Of the three, the digitization and innovation is definitely the most ambitious one, particularly in the case of Public Administration. Indeed, Italian PA, and the justice system in particular, is one of the worst performing entities in terms of efficiency and grade of innovation, due to a combination of facts, namely the high barriers to change a very established way of working, that concur into creating a very hostile ground for innovations.

However, a project of such dimension and scope has never been approved in the past and has the potential of seriously bringing a breath of change. As a matter of facts, several objectives have been set regarding that involve the Supreme Court of Cassation. For instance, regarding the Civil Sections, the objectives set in the PNRR cover both the improvement of processes, by reducing the time needed to fully process a file, and technological enhancement, by making the most of the operations fully technologically assisted.

Despite the best efforts, both of the two objectives need guidance *to be* fully implemented, as the SCC does not have the know-how, nor the incentives, to create the conditions for the change. Indeed, the scope of this study is to both provide a possible solution to achieve the goals set in the PNRR, and to supply the SCC a simulation tool capable of showing the decision maker (i.e., the Magistrate, the President, or the Councilor) the results of specific managerial changes in the organizations in terms of efficiency and backlog generation.

Structure of the thesis

The thesis is divided into 6 sections: the first section (Chapter 1) describes the context of the study, introducing the juridical environment to the reader. The second section (Chapter 2) refers to the review of the academic literature, focusing on the concept of Business Process Reengineering and its most know methodologies. This, in order to ensure the comprehension of the topics and a reliable development of the research paradigm. The third section (Chapter 3) explains the main methodological tools employed in the study and the current way of operating for the Supreme Court of Cassation. The fourth section (Chapter 4) presents the main results of the study in terms of process mappings and simulation both for the *as-is* and *to-be* process. The fifth section (Chapter 5) aims at discussing the main results obtained in the study, with the aim of framing the results in an appropriate context. The sixth section (Chapter 6) summarizes the main findings of the study, draws the conclusions, and presents future insights that are interesting according to the authors.

1 Introduction

1.1. Justice

1.1.1. Italian Justice Principles

Each country has its organization regarding justice; however, it is possible to distinguish two different macro-categories of justice systems depending on whether it is based on civil law or common law. The legal systems based on civil law are founded on the rules originating from the legislative system, which identifies a generic formula (Imparato, 2016). The judges analyze the facts and take a decision starting from this generic formula.

Otherwise, the legal systems based on common law are generally more pragmatic, since they proceed case by case taking into consideration juridical precedents without the creation of a complex system of rules enacted by the legislative system.

Therefore, the main difference between the two different systems can be summarized by stating that the first systems are deductive methods while the former are inductive methods.

Civil law is used by the Latin countries with respect to the common law which is used by the Anglo-Saxon countries. Despite the differences, previously examined, both methods have the only aim of preserving the common good.

The general overview of the two most diffused juridical systems is useful to better frame and analyze the organization of the different justice systems of each country.

The Italian Justice System is based on Civil Law; indeed it is governed by a complex system of laws, which are enacted by the Parlamento della Repubblica Italiana.

The essential fundamental over which the entire procedural law is founded is the equal right. The Italian Constitution guarantees that the exercise of jurisdiction is not a source of unjustified inequality. In particular, Article 3 of the constitution implies that all subjects and all subjective substantive situations must receive reasonably equal treatment in terms of judicial protection, which means that access to justice cannot be prevented or made more difficult and that the procedural modalities cannot be discriminatory (Sassani, 2021).

This does not mean that the procedural mechanisms have to be the same for everyone and under all circumstances.

Complementary to the principle of equality, the two paragraphs of Article 111 of the Italian Constitution define the cardinal principles governing trials, they are (Sassani, 2021):

1. *Reservation of the law*, which states that only the legislature can regulate the conduct of the trial; this task cannot be carried out by administrative or judicial bodies;

2. *Due Process*, it refers to an ideal concept of justice, which pre-exists the law and is directly related to those inviolable rights of all persons involved in the process, which the state undertakes to recognize;

3. *"Weak" Contradictory*, refers to the fact that the judge's decision is issued *audita altera parte* which means that the person, who is affected by a jurisdictional measure, must be enabled to present his or her defenses before the measure itself is issued;

4. *The Equality of the Parties*

5. *The Impartial Judge*, impartiality concerns the function exercised in the trial and requires that there are no ties between the judge and the parties. Hence, it implies the separation of trial functions between the judge, prosecution, and defense;

6. *Reasonable Duration*, this principle sets the time limit within which the parties must obtain the result of the trial.

1.1.2. Organization

The practical organization of the Italian judicial system is composed of 2 main functions:

- The governmental function exercised by the Ministry of Justice and the CSM (Superior Council of the Magistracy);

- The judicial function exercised by the judiciary.

The functions of government are divided between the CSM and the Ministry of Justice. The Constitution of the Italian Republic assigns to the Ministry of Justice the functions related to the organization and operation of the entire process both civil and criminal, in fact, unlike in the past, it is no longer the apex of the judicial organization. In addition, the Ministry of Justice administers and regulates prison administration services and services related to juvenile justice (MIPA, 2004).

The CSM consists of 33 members of which: 3 ex officio members (President of the Republic, President of the Court of Cassation, and the Attorney General at the Court

of Cassation), 20 members belonging to the judiciary, and 10 members elected by Parliament.

The CSM is responsible of recruitment, assignments, transfers, promotions, and disciplinary measures. Its purpose is to ensure the autonomy and independence of the ordinary judiciary from the majority of political policy-making bodies. Thus, it is in charge of managing decisions related to the careers of magistrates (Consiglio Superiore della Magistratura, 2023).

The judicial function is assigned to the judiciary, composed of professional and honorary judges, recruited by the CSM through an open competition.

Italian justice is divided into different jurisdictions: constitutional, special, and ordinary.

Constitutional jurisdiction is vested in the Constitutional Court, composed of 15 judges: one-third by the President of the Republic, one-third by Parliament, and one-third by the supreme ordinary and administrative judiciaries. It has three main tasks:

- adjudicate disputes concerning the constitutional legitimacy of laws and acts;

- adjudicate conflicts of powers attributed to the state and regions;

- judging charges brought against the President of the Republic.

Judgment by the Constitutional Court can also be triggered by a judge who, during a trial, has doubts regarding the conformity of the law with the Constitution that must be applied to the specific case (aka Diffuse Syndication) (Consiglio Superiore della Magistratura, 2023).

The special courts, on the other hand, are the administrative, accounting, and military courts.

The first is attributed to the Regional Administrative Tribunal (TAR) which is responsible for adjudicating disputes concerning the legitimacy of administrative acts. The second is attributed to the Court of Accounts and has the function of monitoring the legitimacy of government acts and controlling the budget, assets, and accounting of the public administration., The last is related to military offenses committed by members of the armed forces. The third jurisdiction, the ordinary, will be described in detail in the next paragraph.

1.1.3. Ordinary Jurisdiction

Ordinary jurisdiction is exercised by ordinary magistrates and is divided into civil and criminal.

The civil trial has the goal of resolving a dispute concerning the protection of rights or the application of the law. Civil litigation can be brought by any public or private party

against another party. A criminal trial has as its object the decision on the merits or otherwise of the prosecution brought by the public prosecutor against a particular subject. The criminal trial can be initiated only by the magistrate, always belonging to the ordinary judiciary, of the prosecutor's office.

The aspect of determining the organs and subjects called upon to exercise jurisdiction is defined by the Testo Unico sull'Ordinamento Giudiziario (T.U.O.G.) (Sassani, 2021). This document is, thus, the basis for the exercise of the judicial function and should not be confused with the function aspect, which outlines how the organs exercise their competence as governed by the procedural norms(civil and criminal).

The various judicial offices, for both civil and criminal trials, are divided according to the degree of judgment, first, second and third, into Giudice di pace, the Corte di Appello (or Tribunale), and the Corte di Cassazione, with a single seat in Rome.

	Civil Process	Criminal Process
First Grade	Giudice di Pace	Giudice di Pace
Second Grade	Corte d'appello	Corte d'appello
	Tribunale	Tribunale
Third Grade	Corte di Cassazione	Corte di Cassazione

Table 1 - Judges per Grade (European e-Justice, 2023)

1.1.4. Corte di Cassazione

This paragraph is completely focused on the functions, structure and organization of the Supreme Court of Cassation in order to better outline this organ since the entire project is fully based on it.

The history of the SCC (Supreme Court of Cassation) began before the birth of the Kingdom of Italy; in fact, it was established in Torino in 1848 by the Kingdom of Sardinia following the Statuto Albertino. After the unification of the Kingdom of Italy, four other new regional Courts of Cassation were established: in Florence, Rome, Naples and Palermo. From the very beginning, the Court of Cassation in Rome assumed exclusive roles, such as settling "conflicts of jurisdiction between judicial authorities already dependent on different Courts of Cassation, between ordinary courts and special courts." In 1923 with Regio Decreto No. 601 came the abolition of the cassation courts of Florence, Turin, Naples and Palermo, and the unification of all functions at the Court of Rome, which assumed the name SCC.

In Italy, the SCC is at the apex of ordinary jurisprudence, and among its main functions is to ensure *"the exact observance and uniform interpretation of the law, the unity of the nation's objective law, and respect for the limits of the various jurisdictions"* (Legge Fondamentale sull'Ordinamento Giudiziario del 30 gennaio 1941 n.12(art. 65)).

The main function of the court is monophyletic. The word nomophylakia, of Greek origin, is composed of the words νόμος (rule) and φύλαξ (guardian), denoting the function performed by the magistrate in charge of guarding the official text of the law and ensuring the stability of legislation. Thus, the function of nomophylaxis plays a central role, as it is aimed at giving substance to the value of legal certainty, "the foundations of which also rest on the constitutional principle of equality, by which similar cases must be judged, as far as possible, in a similar manner." (Art. 3 Const.)

Therefore, the establishment of a single SCC has pushed towards a unique interpretation of the law, even in the most controversial issues, through a process of elaboration through different decisions. Despite the objectionability of the subject matter, this contributes to the determination of the communis opinio, and has eliminated the serious inconvenience of simultaneous conflicting interpretation by the various regional Courts of Cassation. In conclusion, the SCC does not rule on the merits of the case, but it is the guardian of the legitimacy of the judgments.

Appeals to the SCC may be filed against orders issued by ordinary judges in the appellate or single degree: the grounds set forth to support the appeal may be, in civil matters, violation of substantive law (errores in iudicando) or procedural law (errores in procedendo), defects in the reasoning (lack, insufficiency or contradiction) of the appealed judgment; or, again, grounds relating to jurisdiction. A similar regime is provided for the appeal to the SCC in criminal matters (Corte Suprema di Cassazione, 2023a).

When the SCC detects one of the above-mentioned defects, it has the power-duty to set aside the decision of the lower court, as well as to enunciate the principle of law to be observed by the contested decision: a principle with which the referring court also cannot fail to comply when it re-examines the facts relating to the case. The principles established by the Supreme Court are not, on the other hand, binding on judges, in general, when they have to decide different cases, with respect to which the SCC's decision can still be considered an influential "precedent." Nevertheless, judges of the lower courts comply with the decisions of the SCC in the majority of cases (Corte Suprema di Cassazione, 2023a).

According to Article 111 of the Constitution, any citizen may appeal to the SCC for violation of the law against any order of the judicial authority, without having to make any appeal in civil or criminal matters, or against any order restricting personal freedom (Grasso & Tria, 2017).

The SCC is also entrusted with the task of establishing jurisdiction (i.e., to indicate, when a conflict arises between ordinary and special courts, whether Italian or foreign,

who has the power to hear the case) and jurisdiction (i.e., to resolve a conflict between two courts of merit) (Grasso & Tria, 2017).

The SCC also performs non-jurisdictional functions in legislative elections and popular referendums to repeal laws.

The SCC, as shown in the diagram below, is organized into two main branches, civil and criminal, which in turn are ordered into several chambers, each of which specializes in a particular field. In addition to the General Secretariat division, briefly analyzed earlier, there are also divisions within the Supreme Court related to the C.E.D., the Massimarium, and the Governing Council. In conclusion, at the top of the organizational structure is the First President.
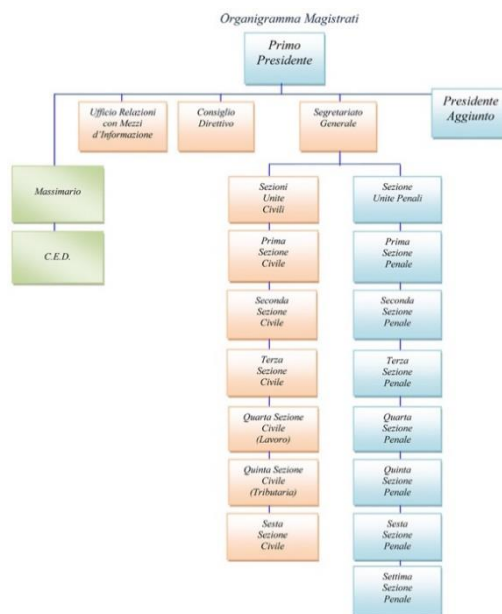

Figure 1 - CSC Organizational Structure (Corte Suprema di Cassazione, 2023b)

1.2. Benchmark

After having analyzed the cardinal principles on which Italian justice is based and having made a general excursus on what is the organization of the main organs of justice, it is important to understand how other countries are organized. This allows to examine the various differences between the systems and identify the best practices to improve the current situation.

The comparison with other systems allows to fully understand which are the weak points of the Italian system are or and to clarify which are the strong points that should not be changed at all.

As Italy is embedded in the European socio-economic context, this benchmark will focus on the countries belonging to the European Union community space to analyze countries closer to the Italian context. The European Union, through various institutions, carries out numerous studies to constantly monitor the performance of the various justice systems to check an overall alignment on high standards in order to create a united community and a system that fosters a flourishing development of each country.

The cardinal principles underlying justice for the European Union are efficiency, quality and independence.

The quality of a jurisprudential system is the degree of digitization, the ease of access to justice for citizens and businesses, the adequacy of human and financial resources, and finally the presence of performance evaluation tools.

The principle of independence is fundamental because as it protects autonomous and impartial judicial decisions (European Commission, 2022). Independence should be understood in two ways: external independence and internal independence. The external independence refers to the ability of the body in question to exercise its functions autonomously, without being subject to any hierarchical constraints or subordinate to other organs and without receiving orders or instructions from any source (European Commission, 2022). Instead, the internal independence, refers to the preservation of an equal distance between the parties to the proceedings and their respective interests in relation to the subject matter of the proceedings.

The performances which will be analyzed are the efficiency, the justice expenditure and the justice digitalization because through them it is possible to understand the general overview of the current state of justice systems.

Before providing a quantitative analysis of data among the different countries, it is appropriate to find out how justice is organized in other countries. In this case, Germany and France will be considered, since they are the most similar to Italy in terms of culture, economy and influence on the world stage. Moreover, both countries' judicial systems are based on civil law.

1.2.1. French Juridical System

The French Judicial System is divided into two main strands: the various jurisdictions are placed under the control of the authority of the Supreme Court (Cour de Cassation), with the exception of the administrative jurisdiction, which is placed under the control of another Supreme Court (the Conseil d'Etat) (MIPA, 2004).

Ordinary jurisdiction coincides with civil jurisdiction, while special jurisdictions deal with criminal jurisdiction. As for administrative justice, there are 7 courts of appeal, while the first level of judgment is represented by 35 administrative courts. The role of judges is very significant in administrative justice as they control most of the administrative activity (MIPA, 2004).

The Cour des Comptes performs the function of verifying the regularity of the public accounts of the state and the various public bodies. It also represents the appeal for the various Chambres Regionales des Comptes.

The Conseil Constitutionnel is responsible for checking the constitutionality of acts passed by parliament, and its members are appointed every six years by the President of the Republic, the President of the Senate and the President of the National Assembly (MIPA, 2004).

The Cour de Justice de la Republique is responsible for trying members of the government who are found guilty of crimes committed within their ministerial functions.

Civil jurisdiction in France is organized at several levels, and at the top is the Cour de Cassation, which is divided into five civil chambers and one criminal chamber. Its task is only to verify the formal correctness of the law applied by the lower levels of courts.

For the appeal level, there are 22 courts. Finally, at the first level of jurisdiction are the Tribunaux de Grande Instance, for cases above 7,600 euros, and the Tribunaux d'Instance for cases below that threshold.

With respect to criminal jurisdiction there are the Tribunaux de Police for petty crimes and the Tribunaux Correctionnels for more serious cases.

The Cours d'Assises has jurisdiction for felonies, while the Tribunaux et juges pour enfants deal with juvenile cases.

In each Court of Appeals there is a "chambre de l'instruction," which is in charge of adjudicating in the second instance the decisions made in pre-trial proceedings; and a "chambre des appels correctionnels," which is in charge of reviewing the decisions made by the Tribunaux Correctionnels.

In France, as in Italy, judges are civil servants and the constitutional principle of the independence of the judiciary applies. This principle is overseen by the Conseil Superior de la Magistrature.

1.2.2. Deutsch Juridical System

The German court system is a decentralized system by both lander and sector. There are five different federal courts that possess respectively: ordinary jurisdiction (Bundesgerichtshof), administrative jurisdiction (Bundesverwaltungsgericht), tax jurisdiction (Bundesfinanzhof), labor jurisdiction (Bundesarbeitsgericht) and social jurisdiction (Bundessozialgericht) (MIPA, 2004).

Judicial power is exercised by the Federal Constitutional Court, the Federal Courts, and the Lander Courts. Each Lander is responsible for its own administration of justice, jurisdiction and procedure, but the main legislation in this area is governed by the Federal Act, which is common to all courts. The Courts Organization Act (Gerichtsverfassungsgesetz) intervenes at the level of legislation on the organization of the courts (MIPA, 2004).

The Federal Courts are at the apex of the different five jurisdictions and serve as appellate courts for the Lander Courts to ensure uniform interpretation of the law.

Both civil and criminal jurisdiction fall under ordinary jurisdiction. At the lowest level are local courts (Amtsgerichte), followed by regional courts (Landgerichte), which, depending on the case, may function as courts of first instance or appellate courts. The regional High Courts of Appeal (Oberlandesgerichte) handle all appeals and second appeals in criminal matters. With regard to criminal cases of particular gravity, the High Regional Courts of Appeal function as the first instance. At the top of the hierarchy is the Federal Court of Justice (Bundesgerichtshof), which deals with appeals from second instance courts in civil matters and first instance courts in criminal matters (MIPA, 2004).

The uniqueness of the German legal system lies in the fact that matters such as labor and social law can be brought before highly qualified courts. Moreover, in Germany there is not the equivalent of the Court of Cassation. At the same time, there is a clear separation between the judiciary and the executive, with the consequence that the latter has no quasi-legal functions.

1.2.3. Efficiency

A quantitative analysis of the efficiency of European justice systems, allows to get an overview of where the Italian system ranks.

Categorizing the efficiency of a legal system is by no means simple, but in this section, it will be defined as the speed at which a case is processed in the various levels of justice and in the ability to handle pending cases that accumulate or have accumulated in previous years.

The graphs that will be given below are taken from the EU Justice Scorecard, an annual document that aims to show member countries the state of their legal systems and guidelines for improving them (European Commission, 2022).
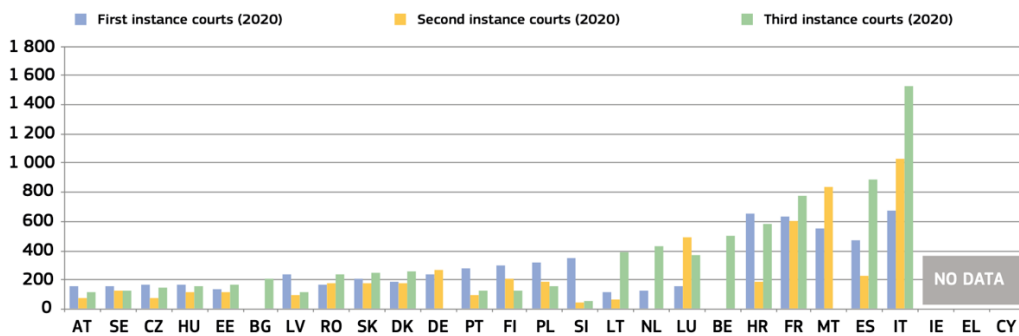
Figure 2 - Estimated Time needed to solve civil cases (European Commission, 2022)

The figure shows the estimated time to resolve civil cases through the three degrees of justice. As the graph evidences, Italy is the tail end of all member countries in all three degrees of justice, although the time needed to handle cases increases dramatically in the last degree, when the case reaches the Court of Cassation.

Italy takes about more than 600 days in first instance, about 1,000 days in second instance, and more than 1,400 days in third instance to process a civil case. These figures are significantly higher than the German and French court systems. In fact, the former takes about 200 days for both first and second degrees, while the latter takes between 600 and 800 days for the different three degrees.

The next graph represents the number of pending civil cases in the first instance of the different European countries.
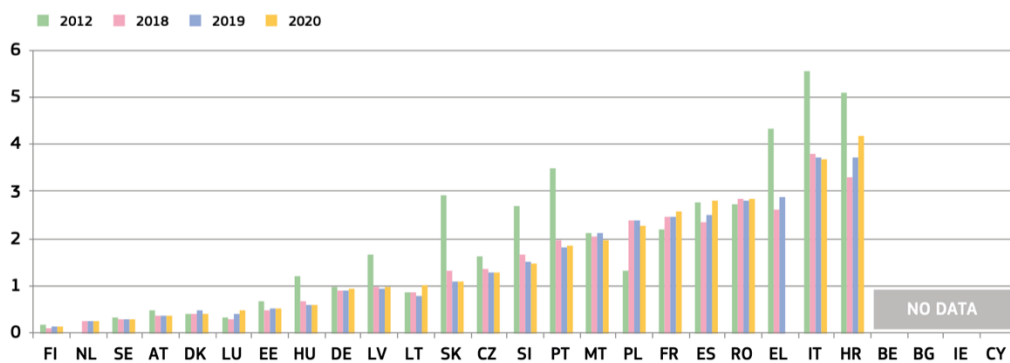
Figure 3 - Number of pending civil cases (European Commission, 2022)

Again, Italy's performance is significantly lower and not comparable with Germany and France, which are found to have far fewer pending cases per 100 inhabitants. Italy turns out to have between 3 and 4 pending cases per 100 inhabitants. It should be emphasized that the trend from 2012 to 2020 is clearly improving and the number of pending cases is gradually decreasing, indeed, it has gone from more than 5 pending cases per inhabitants to less than 4. The decisions that have been taken in recent years point in the right direction, but they are still too weak to bring the Italian lawmaking sector to the level of its "competitors."

This inefficiency also translates onto a substantial waste of financial resources for Italy. As reported by an OCPI study, the inefficiency of the Italian justice system discourages investment, increases the cost of credit and reduces employment and labor market participation rates (Casamonti, 2020). The World Bank's 2020 Doing Business report ranks Italy 122nd out of 190 for the Time and Cost of Litigation category (Casamonti, 2020).

1.2.4. Justice Expenditure

Another parameter to consider when evaluating the performance of a given system is the costs associated with it, to better understand how much and how public money is spent.
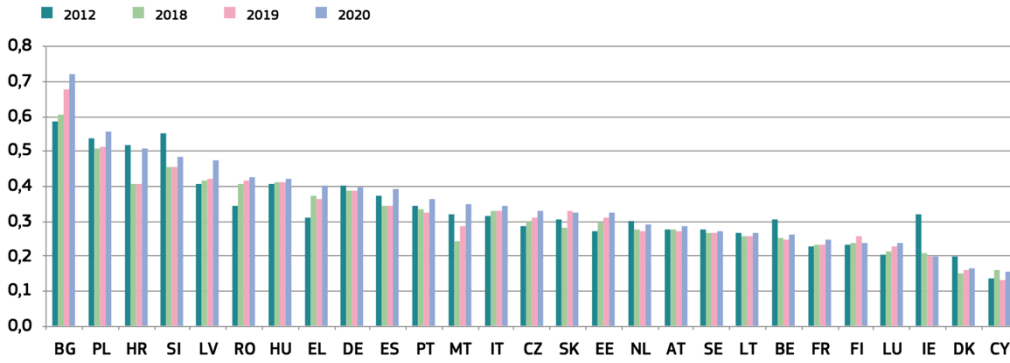
Figure 4 - Justice expenditure as a percentage of GDP (European Commission, 2022)

The figure above shows how Italy spends more than 0.3 percent of GDP on justice, about 6 billion euros, so on an absolute level it is a considerable amount of money. Compared to Germany, Italy spends less money, but in comparison to France it spends more money. It should also be noted that the spending trend is increasing in the years from 2012 to 2020.

Thus, Italy is in line with the spending in justice in major European countries, but with significantly lower performance. It is, therefore, difficult to judge from these numbers whether Italy is spending too much money or too little and especially how it is spending its money, but it is still possible to state that, relating the time for the process and the expenditure related to it, the shortcomings of the Italian system are definitely evident and overt.

Therefore, below is the graph regarding the number of judges present.
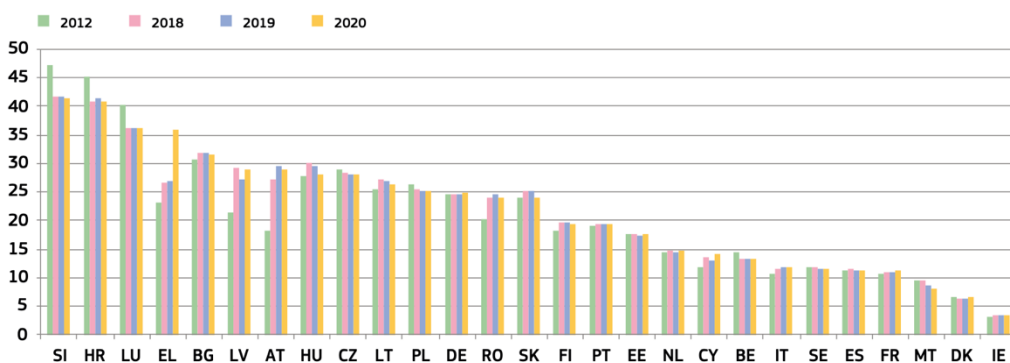
Figure 5 - Number of Judges (European Commission, 2022)

As this graph shows, the number of Italian judges is significantly lower than their German colleagues, while it is in line with their French colleagues. In Italy there are more than 10 judges per 100,000 inhabitants and the trend in recent years has been

growing. At this point the question arises as to why Italy spends more money than France despite having the same number of judges and spends about the same amount as Germany despite having far fewer judges. Moreover, another question arises as to why the Italian processes are longer compared to the ones of the other two countries even if the number of judges is equal.

To answer this question, an OCPI study shows how Italian judges and PMs earn significantly more than their German and French counterparts relative to the national average salary. Thus, most of the public spending in the judiciary is related to wage income, despite the fact that human resources in the judiciary, both considering judges, PMs and administrative staff, are rather undersized compared to other countries.

1.2.5. Digitalization

Analyzing the digitization of legal systems is important to understand how ICT systems can strengthen the justice of member countries by making them more accessible, more efficient, more resilient, and ready to face current and future challenges. This was especially evident during the Covid-19 pandemic, which highlighted some of the shortcomings and power of ICT systems to cope with various problems and demonstrated how all legal systems need to improve their level of digitalization.

Below are two charts regarding the implementation of technological solutions in legal systems.
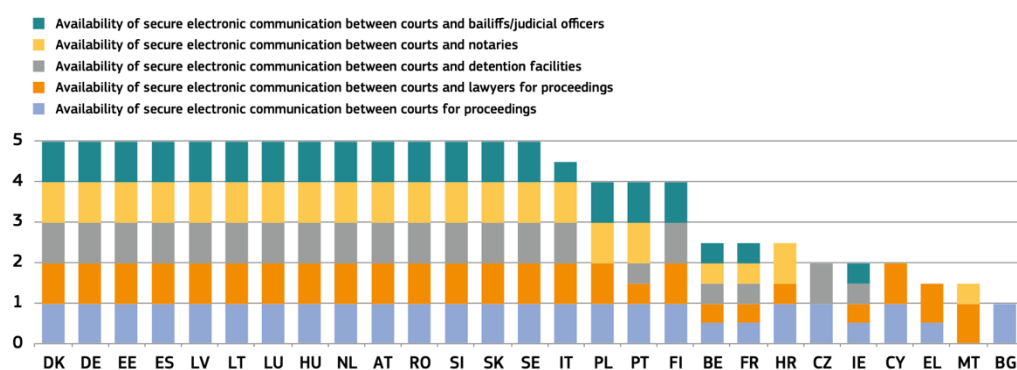
Figure 6 - Electronic communication tools (European Commission, 2022)

This graph shows the use of technological systems and it can be seen that, unlike for other parameters, Italy does not appear to be the tail-end of the European Union but is aligned for the better with the others.

For each Member State, the two columns represent the digital solutions to initiate and follow proceedings in the following types of cases (from left to right):
1. civil/commercial cases
2. administrative cases

- ■ Possibility to initiate proceedings / file a claim online
- ■ Possibility for clients to access the electronic file of their ongoing cases
- ■ Official court documents can be served electronically on businesses (when procedure is not initiated by the business)
- ■ Possibility to file an application for legal aid online
- ■ Possibility for clients to access the electronic file of their closed cases
- ■ Availability of online information about the court fees
- ■ Availability of electronic acknowledgment of receipt proving submission of documents with the court
- ■ Official court documents can be served electronically on citizens (when procedure is not initiated by the citizen)
- ■ Possibility of online payment of court fees

Figure 7 - Digital solution to initiate and follow a civil case (European Commission, 2022)

The chart above shows the levels of digitization to initiate and follow up civil processes through digital solutions. As before, Italy is also ahead of other European countries in this, even when compared with Germany and France.

It must also be emphasized that this does not mean that Italy does not need to work on the digitization of justice as there is much work to be done to bring this sector in line with other fields far ahead in terms of technological development, however, it certainly starts from a better base than other European realities. Without any doubt, it can be stated that without an adequate organization, the technological tools, even if well implemented, cannot be effective and cannot be a source of added value

2 Literature review

2.1. Introduction of Business Process Reengineering

Business Process Reengineering (BPR) is a management paradigm that finds its origins in the early years of the 90s. It can be described as the rethinking and radical redesign of the main internal processes, in order to achieve better performances. Examples of such indicators are cost, quality, time, and service that in any case can be observed by both the internal management and the external client (Mariado et al., 2013).

Historically, BPR has been one of the most widespread examples of radical organizational change: indeed, in the 90s it was not uncommon to read statistics where 80-90% of all organizations were either adopting or planning to adopt this type of management paradigm. Reasons behind the mass adoption of BPR are to be found in the efforts of those years to redefine the role of Information Technology (IT) and the value of communication in the innovation processes of organizations. Yet, BPR really became popular only after the publications of Davenport & Short (1990) and Hammer (1993) that for this reason are considered the fathers of BPR.

However, despite acquiring a great success in the 90s, BPR has received several critiques regarding organizational issues in the management of interventions. Several authors have pointed out the top-down nature of BPR, where the senior management should employ an aggressive and autocratic style of leadership and employees become important in the later stages of the process (Chiarini, 2011). Grover & Malhotra (1997) has identified the key failure factors in the inadequacies in the change management, the lack of commitment from the top management, technological problems, and the absence of a time schedule for the project.

In the recent years, attention towards BPR has significantly decreased, both in terms of literature research and adoption rate in organizations. However, BPR still remains one of the prime managerial approaches to increase business competitiveness (Fetais et al., 2022).

2.2. Definition of Business Process Reengineering

The mission of defining BPR is rather a complex task. Indeed, focus must be put on the two building blocks that create the concept: on one side, there is the Business Process notion, and on the other, there is the Reengineering aspect.

Starting with the former, authors in literature agree that there is not a consentient definition in the first place. Indeed, the concept of Business Processes has been extensively researched in the latest years, and consequently, a plethora of definitions have emerged. Among all, there are two Business Process definitions that have been extensively cited in the literature environment, and as such deserve to be highlighted. These are:

- "A business process is a collection of activities that takes one or more kinds of inputs and creates an output that is of value to the customer." (Hammer & Champy, 1993);

- "A business process is defined as the chain of activities whose final aim is the production of a specific output for a particular customer or market." (Davenport, 1993).

Although they appear extremely similar, the two definitions differ on the basis of the aim of a Business Process; while for Hammer and Campy the explicit goal of a Business Process is the value creation for the final client, for Davenport the emphasis is placed on the chain of activities internal to the company delivering the product/service.

Having defined the concept of Business Process, it is possible to dive deeper into the aspect of reengineering. With this term, the focus is on the creation of a radical change within the organization (particularly in its internal processes) in order to stimulate an improvement that is tangible to the final client. As a matter of fact, Hammer (1993), pag. 108, defines reengineering as *The rethinking of fundamental aspects and the radical redesign of business processes, in order to obtain strong improvements in the critical performances of the enterprise, such as, but not limited to costs, quality, service, and speed, granted through the use of Information Technology"*.

Imbedded in the concept of reengineering there is the idea of radical change, in contrast to incremental improvement(Bartezzaghi, 2010). While the former is characterized by a cut with the past, in terms of *status quo* regarding both the organization and the operations, the latter focuses on small changes within an organization, that do not twist the organization at its most profound levels, but brings innovation continuously, adapting to changes in a series of small steps (Petrozzo & Stepper, 1994).

Radical improvement delivers higher results when it is efficiently integrated in the organization, but it is sensibly riskier as:

- it requires a higher amount of resources;

- depends on key implementation factors such as organizational culture, and commitment of the top management;

- is not guaranteed to succeed, or in other terms, the levels of performances might be different than what anticipated in the goal setting phase.

	Incremental	**Radical**
Starting point	Existing process	Clean slate
Frequency of change	One-time/Continuous	One-time
Time required	Short	Long
Participation	Bottom-up	Top-down
Typical scope	Narrow, within functions	Broad, cross-functional
Risk	Moderate	High
Primary enabler	Statistical control	Information technology
Type of change	Cultural	Cultural/Structural

Figure 8 - Differences between Incremental and Radical change (Adapted from E, Bartezzaghi,. 2010)

Nonetheless, radical changes are necessary for organizations, as marginal benefits derived from incremental improvement are decreasing, meaning that after a set amount of time, gains obtained from incremental improvement tend to plateau due to achieving local optimums in carrying out operations (Bartezzaghi, 2010). In those circumstances a radical improvement is not only important, but it becomes essential to the survival of organizations, as not upgrading leads to improvement stagnation and therefore a loss of competitive advantage towards competitors (Petrozzo & Stepper, 1994).
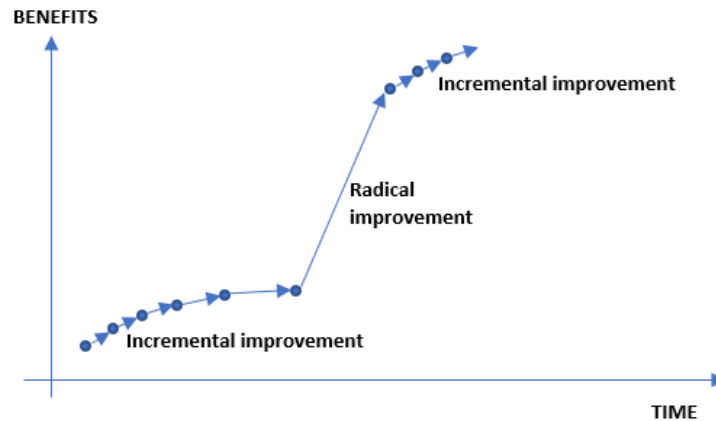
Figure 9 - Different returns between radical and incremental improvement (Adapted from E, Bartezzaghi,. 2010)

Given all the above, it comes with no surprise that there is a plethora of definitions for BPR, starting with the one from Hammer and Champy (1993), pag. 108 that define BPR as *"The central rethinking and radical redesign of commercial processes for reaching significant enhancements in critical modern measures of functionality like the expenses, quality, service, and speed"*. Many other authors have described their own definition of the subject, but from the literature analysis, all definitions share common traits (Bartezzaghi, 2010).

- For instance, as previously discussed, BPR finds its basements in the idea of radical improvement;

- The focus of the redesign is internal business processes;

- The goal is to reach a level of measurable performances that bring a competitive advantage to the organization and are defined *a priori* by the main actor responsible for the reengineering.

- The central importance of Information Technology Systems (Batterzaghi, 2010).

About the last trait, there is controversiality in the analyzed literature on whether the ITS are a key component of BPR, without whom the execution of a reengineering process is impossible, or whether they are a mere, yet crucial, facilitator towards BPR. Indeed, many authors describe ITS as a catalyst for organizational change, that must be used in conjunction with an adequate change management policy to avoid internal resistances that ultimately lead to the failure of the BPR project (Vergidis et al., 2008). In this sense, ITS is conceived as a support tool, rather than a fundamental characteristic of BPR projects.

2.3. Methodology of BPR

Given the radicality of the tool, a BPR project intrinsically carries an enormous quantity of risks, bounded to the unpredictability of the running of the new organization and the resistances to the change. It is therefore extremely crucial that an execution plan is carried out in the clearest way possible, and it typically takes the shape of a two-step process, where it is possible to distinguish:

1. A strategic vision setting phase;

2. A planning and implementation of the interventions (Batterzaghi, 2010).
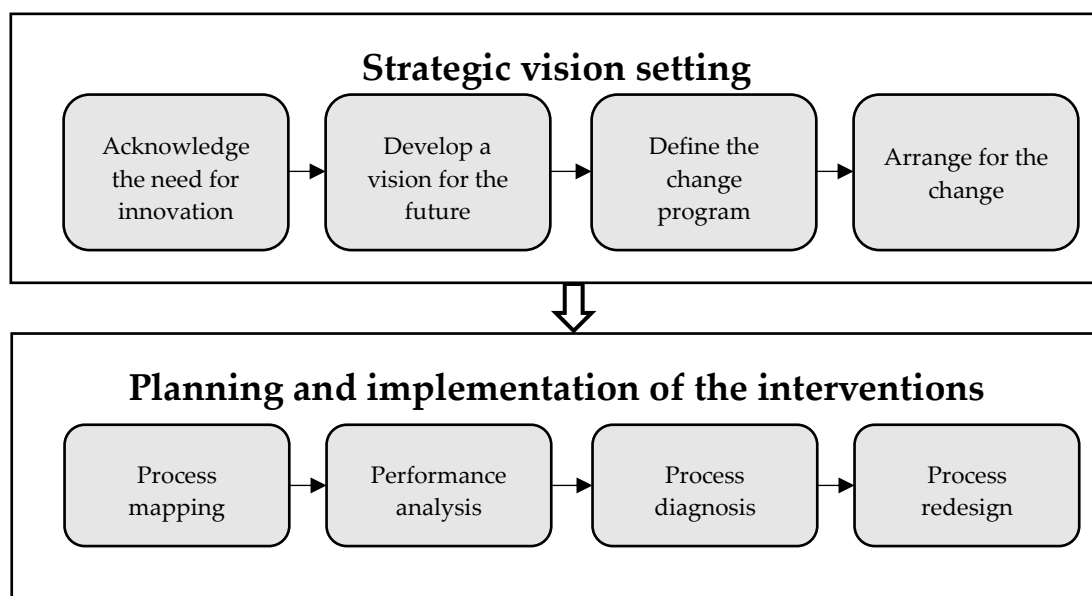
Figure 10 - Change process representation (Adapted from E, Bartezzaghi,. 2010)

2.3.1. Strategic vision setting

Starting with the former, it is the act of preparation for the transformations that the organization will suffer when the BPR project will take place (Fetais et al., 2022). As it is imaginable, it is vitally important that a clear vision of the goals and strategy of the reengineering process is communicated to the organization, as to avoid internal resistances that can spoil the desired effect of the project. As such, this phase must be rigorously defined and, to be implemented effectively, it typically requires the steps of:

1. *Acknowledge the need of innovation.* For this phase, the role of the top management is particularly central, as it must show commitment towards innovation (Chiarini, 2011). The need of innovation can be blatantly obvious in some cases (i.e. sudden losses for a specific Business Unit, unsatisfactory levels of performance…), but in most cases it is rather subtle, as it can manifest as new

requests by the clients, worsening of the working environment and lower satisfaction from colleagues. These are all indicators that the environment is evolving, and as such also the way of working has to innovate (Bartezzaghi, 2010). The centrality of management lays on the fact that managers themselves have to understand the change that is happening and find the tools to better support it (Chiarini, 2011);

2. *Develop a vision for the future.* Once acknowledged the need for innovation, management has to define both the target for the long term that innovation will bring to the organization and the business model or the underlying principles that will define the new organization, either by comparing business models that other organizations have already implemented, or by creating a custom fitted one(Bartezzaghi, 2010);

3. *Define the change program.* It implies the definition of the processes or the Business Units that need to be changed and the priorities and times necessary to start the various reengineering projects (Fetais et al., 2022). Regarding the process/BU, it is particularly important to consider the overall processes, and not specific problematics that are endemic to a portion of the process, as the reengineering target is the resolution of problematics concerning the whole organization, not just a fraction of it;

4. *Arrange for the change.* The forecasted change must be communicated effectively to the whole organization, and the key actors that allow the organizational change must be involved, prepared and guided to the change, to avoid resistances to change that will ultimately make the reengineering project fail (Chiarini, 2011).

2.3.2. Planning and implementation of interventions

All these steps work as prerequisites to the actual reengineering phase that involves the second main phase that is *planning and implementation of interventions* (Bartezzaghi, 2010). This phase has two different approaches, a blank paper procedure, where the future organization is conceptualized based on the best practices available of the relevant industries, and an *as-is – to-be* methodology, where the current way of operating (*as-is*) is considered to create the future way of operating. While the former disregards almost entirely the current way of operating, and chases the best practices of external organizations, the former puts an accent on the established way of working and leverages it to create an organization that has not completely changed its identity (Vergidis et al., 2008).

This phase is composed by three stages that are:

1. Process mapping;
2. Performance analysis and process diagnosis;

3. Process redesign.

2.3.2.1. Process mapping

As the name suggests, it consists of the identification and later representation of the processes of the organization that need to be changed. Multiple approaches can be used while in this phase; it can be used a Pareto logic, where only the key processes will be affected by the change given the huge impact on the outcome, or the focus can be only on the problematic processes, or lastly, all processes are taken in consideration for reengineering (Bartezzaghi, 2010). Another key aspect is the level of detail for the process representation. Indeed, especially in the case of an *as-is – to-be* approach, information needs to be detailed to create a *to-be* solution that is in line with the performance expectations, while in the first steps of the project, information must be high-level, as not to overload the process mapping with too many details. In literature, there is an extensive classification of process mapping techniques (formally defined as process modelling techniques), given that the field of BPR models is rather an explored one. According to K. Vergidis *et al.* (2008), all BPR models can be classified into three different sets: 1) diagrammatic models, 2) mathematical models, 3) business process languages.
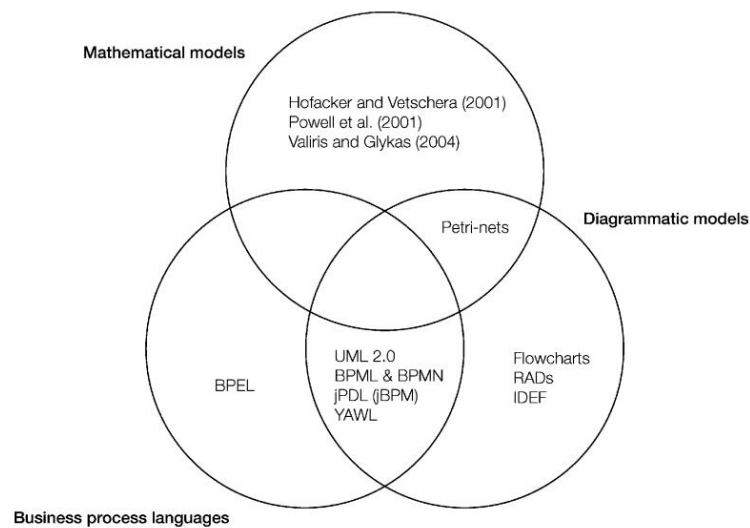
Figure 11- Classification of BPR models (K.Vergidis et al,. 2008)

1. *Diagrammatic models* are the most simplistic form of model representation, in fact, they are diagrams that represent graphically a process or a series of processes. For this reason, they are simply to understand and require no technical expertise to be made, but on the other hand, they lack formal semantics, which impedes further quantitative analysis, and they are subjective to the skill of the analyst (Valiris & Glykas, 1999; van der Aalst, 1996);

2. *Mathematical models* are by contrast, precisely and rigorously defined, since they can be verified mathematically, they are far more consistent than diagrammatic models. However, what it is gained in consistency and formality, it is lost on the practical sense, as this set of models is more difficult to be represented due to the qualitative nature of the business process elements that is in deep contrast with the formal nature of mathematical models (Tiwari, 2001). Hofacker & Vetschera (2001) propose a mathematically grounded approach. They describe a business process using a set of mathematical constraints (that define the feasibility boundaries of the business process) and a set of objective functions (that include the various business process design objectives). Although this approach cannot model complex constructs, it is appropriate for further quantitative analysis and improvement. Powell et al. (2001) presents a similar

Business process modelling techniques	modelling set(s)	Selected references
–Flowcharts	–Diagrammatic models	–(Knuth, 1963) –(Chapin N., 1971) –(Chapin, 1974) –(Feldman, 1998) – (Lakin *et al.*, 1996)
–IDEF	–Diagrammatic models	–(Mayer *et al.*, 1994) –(Menzel and Mayer, 1998) – (Peters and Peters, 1997) – (Zakarian and Kusiak, 2001) – (Zakarian and Kusiak, 2000) – (Zakarian, 2001) – (Badica *et al.*, 2003a) – (Shimizu and Sahara, 2000) – (Zhou and Chen, 2002)
–RADs	–Diagrammatic models	–(Ould, 1995) –(Holt, 2000) – (Phalp and Shepperd, 2000) – (Badica *et al.*, 2003b)
–UML	–Diagrammatic models –Business process language s	– (Quatrani, 2001) –(Kim *et al.*, 2003) – (Wohed *et al.*, 2004)
–Petri–nets	–Diagrammatic models –Formal/mathematical models	– (van der Aalst, 1998) – (Li *et al.*, 2004b) – (Donatelli *et al.*, 1995) – (Raposo *et al.*, 2000) – (Peters and Peters, 1997)
–Business process models based on mathematical or algorithmic models	–Formal/mathematical models	– (Hofacker and Vetschera, 2001) – (Powell *et al.*, 2001), – (Valiris and Glykas, 1999)
–BPEL –BPML	–Business process language	– (Reimer *et al.*, 2000) – (Havey, 2005) – (Grigori *et al.*, 2004) – (Smith, 2003)
–jPDL (jBPM)	–Diagrammatic models –Business process languages	– (Koenig, 2004)

Figure 12- Main modelling techniques (K.Vergidis et al,. 2008)

approach. They describe a mathematical model that contains the fundamental components of a generic business process. Valiris & Glykas (1999) also propose using formal mathematical notations to introduce and verify business rules;

3.   *Business process languages* are the most recent form of modelling and aim to combine the simplicity of diagrammatic models to the consistency and possibility to conduct future analysis of the mathematical models. To achieve this, this set uses process languages (i.e., XML-based) to model and execute a business process. The two most well-known examples of this set are BPEL (Business Process Execution Language) and BPML (Business Process Modelling Language) (van der Aalst et al, 2003), where BPEL in not strictly a notational language, but it inherits XML characteristics such as programmability, exportability, and executability. It is also an XML-based language that encodes a business process's flow in an executable format. BPML is complemented by Business Process Modeling Notation (BPMN), a graphical flowchart language capable of visually representing a business process form (Vergidis et al., 2008) . Each BPML process has a name, a set of activities, and a handler; subprocesses are also supported (Havey, 2005). The research from Vergidis et al. (2008), shows the patterns that each supports when it comes to business process modeling in order to analyze and compare the capabilities of different modeling methodologies. According to Riehle & Zullinghoven (1996), pag. 4, a pattern is *"the abstraction from a concrete form that recurs in specified nonarbitrary circumstances"*. Pattern support is critical for process modeling since patterns allow for the standardization of solutions to often recurring problems within business processes as well as the reuse of these standardized process pieces across multiple process models.

2.3.2.2. Performance analysis and process diagnosis

The aim of this step is to acknowledge the presence of gaps between the target set in the *strategic vision setting* phase and the real outcomes that the process carries out at the moment of analysis (Bartezzaghi, 2010). This is rather a hard task, as data is not always available to support the gap analysis, especially if the organization has not implemented a performance measurement system, which in most cases corresponds to a (series of) dashboard(s). Once information is retrieved, and the gap analysis is conducted, the next step regards the analysis of why there is a gap in the first place with the process diagnosis. In this phase the focus is on the identification of criticalities within the various actor that carry out a specific process, with the aim of highlighting the improvement points the BPR project will create for the future.

Following the research of Vergidis et al. (2008), it is possible to assign for each set of modelling technique a specific type of process analysis.
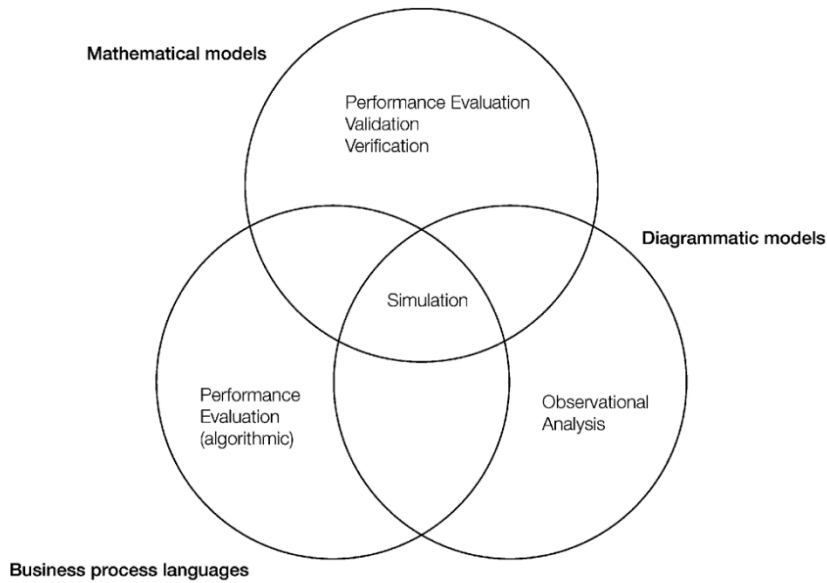
Figure 13 - Types of process analysis (K.Vergidis et al,. 2008)

Indeed, for diagrammatic models, the most common type of analysis is observational analysis, which essentially involves changing the process structure through diagram examination (Aldowaisan & Gaafar, 1999). The observational analysis technique provides a set of options for redesigning a process, including eliminating nonvalue added activities (such as redundant, rework, and supervisory activities), simplifying activities, combining activities, increasing activity concurrency, and automating activities (Kusiak et al., 1994). Despite that, as previously discussed, critics have been made regarding the dependence on the skill of the analyst, and lack of quantitative notation (Ould, 1995; Zakarian, 2001).

One of the primary causes for the creation of process models with formal underpinnings is the necessity for quantitative analysis of business process models (i.e., mathematical models set). These formal approaches to business process modeling provide a solid foundation for developing performance indicators that monitor the achievement of strategic goals and objectives by linking these goals and objectives to the core processes (Lewis, 1993). The new formal approaches require levels of 1) validation, 2) verification, and 3) performance analysis or performance evaluation. Validation determines if the system performs as predicted in a given setting, whereas verification determines whether the business process model is free of logical flaws (van der Aalst, 1998). Unlike validation, verification is context agnostic; it discovers, for example, deadlocks in process designs as a logical fault regardless of the process's purpose. The goal of performance evaluation is to characterize, evaluate, and optimize systems' dynamic, time-dependent behavior (Havey, 2005; Raposo et al., 2000).

Finally, business process languages set, the only tool suggested explicitly by literature is simulation; a software-assisted technique to analyze business processes. Simulation

provides a structured environment in which one may examine, analyze, and improve business processes (Gunasekaran & Kobu, 2002). Business process simulation is used to aid decision-making by offering a tool for analyzing and comprehending a system's present behavior. It may also assist anticipate system performance in a variety of circumstances chosen by the decision maker (Greasley, 2003). Process simulation aids process diagnosis (i.e., analysis) by replicating real-world scenarios and allowing for what-if studies (van der Aalst, 1998). The benefit of simulation is that it is a very flexible approach (van der Aalst, 2001) since it may be used to analyze present process performance and/or to create hypotheses regarding prospective process redesign (Abate et al., 2002). The fundamental benefit of simulation-based analysis is that it can anticipate process performance based on a variety of quantitative indicators such as lead time, resource utilization, and cost (Greasley, 2003). As such, it provides a technique of analyzing business process execution to identify wasteful behavior (Ferscha, 1998). Consequently, data from business process execution may be fed into simulation tools that use mathematical models to optimize and redesign business processes (Abate et al., 2002). By providing quantitative process parameters such as cost, cycle time, serviceability, and resource utilization, dynamic process models can enable the modeling of different process scenarios (Gunasekaran & Kobu, 2002). These parameters serve as the foundation for assessing options and selecting the most promising implementation scenario (Levas et al., 1995). (Volkner & Werners, 2000) reflect on the high expenses and length of time necessary to construct a simulation model owing to the complexity and knowledge required. According to van der Aalst (2001), simulation simply facilitates "what-if" analysis and does not recommend any process changes. According to Basu & Blanning (2000), while process simulation can give important insight into process behavior, it does not address issues concerning the interrelationships between process components.

business process MODEL	modelling SET(S)	business process analysis TYPES	business process analysis APPROACHES
–IDEF	–Diagrammatic models	–Observational –Simulation	– (Kusiak and Zakarian, 1996a) – (Kusiak and Zakarian, 1996b) – (Zakarian and Kusiak, 2001) – (Zakarian and Kusiak, 2000) – (Zakarian, 2001) – (Badica et al., 2003a) – (Peters and Peters, 1997) – (Shimizu and Sahara, 2000)
–RADs	–Diagrammatic models	–Observational –Performance analysis	– (Phalp and Shepperd, 2000) – (Badica et al., 2003b)
–Petri–nets	–Diagrammatic models –Mathematical/formal models	–Observational –Validation –Verification –Performance analysis –Simulation	– (van der Aalst, 1998) – (van der Aalst et al., 1994) – (van der Aalst and van Hee, 1996) – (van der Aalst, 1995) – (van der Aalst, 2003) – (Kiepuszewski et al., 2003) – (Li et al., 2004b) – (Donatelli et al., 1995) – (Gao et al., 2003) – (Raposo et al., 2000) – (Peters and Peters, 1997)
–Mathematical models	–Mathematical/formal models	–Performance analysis –Simulation	– (Powell et al., 2001) – (Valiris and Glykas, 2004)
–Business process languages	–Business process languages	–Performance analysis (algorithmic) –Simulation	(none reported in literature)

Figure 14- business process analysis approaches (K.Vergidis et al,. 2008)

2.3.2.3. Process redesign

Having identified all the criticalities for a specific process, the next step is to create a possible configuration for the *to-be* process. As it is imaginable, this is rather a complex task, given that it requires a high amount of creativity and technical expertise to be able to imagine a possible future configuration of the specific process. The typical interventions that are applied in this phase are: 1) changes in the workflow, 2) redefinition of tasks and responsibilities, 3) reshape of activities within the process, 4) preparation to the use of IT resources (Bartezzaghi, 2010).

In literature, the redesign phase is associated with an optimization phase, however, there is ambiguity on the term. Gao et al. (2003) advise that business process optimization should aim at lowering lead time and cost, increasing quality of product, and boosting the happiness of customer and people so that the competitive edge of an organization be kept. According to Reijers (2002), the aims of business process improvement are frequently cost and flow time reduction. Nevertheless, Hofacker & Vetschera (2001) emphasize that the idea of "optimality" in process designs is not straightforward, and process quality is characterized by a variety of, often contradictory, criteria.
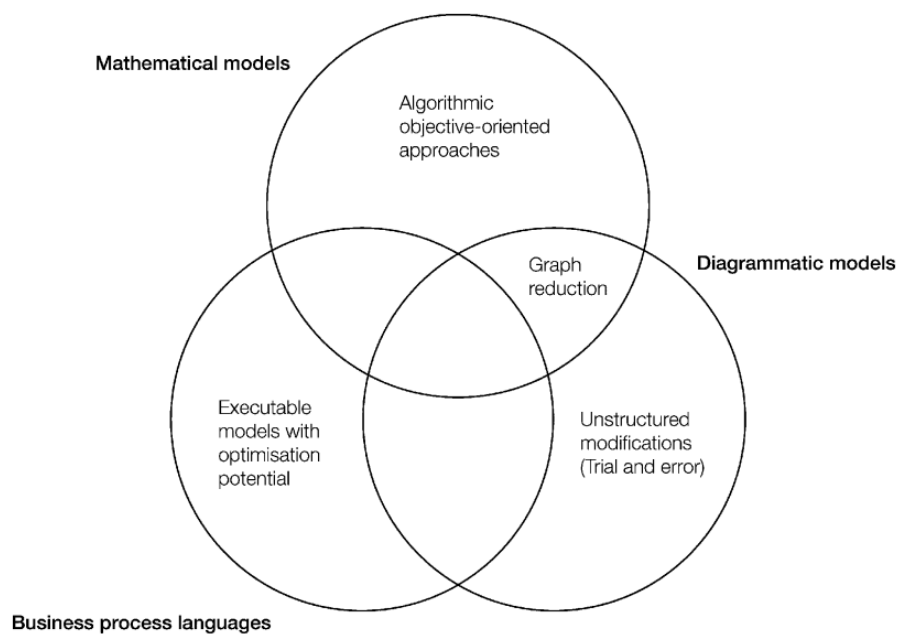
Mathematical models

Algorithmic
objective-oriented
approaches

Graph
reduction

Diagrammatic models

Executable
models with
optimisation
potential

Unstructured
modifications
(Trial and error)

Business process languages

Figure 15 - Optimization techniques (K.Vergidis et al,. 2008)

As previously stated, diagrammatic process models do not provide optimization. This is due to the fact that optimization necessitates quantifiable metrics of process performance that cannot be obtained. Nonetheless, several qualitative improvement techniques to diagrammatic process models have been developed, such those by Zakarian (2001) and Phalp & Shepperd (2000). Nevertheless, these strategies are limited since they are dependent on a trial-and-error approach to developing existing diagrammatic models.

Another systematic approach for business process optimization is graph reduction technique, which is applicable to models that include elements from both diagrammatic and mathematical models (Vergidis et al., 2008). Modern optimization methodologies are nearly entirely tied to formal modeling techniques on a collection of mathematical models. Because of the formality and quantitative structure of these models, systematic optimization is possible. Quantitative criteria are deemed necessary for evaluating improvements in a business process through changes to the fundamental structure (Volkner & Werners, 2000).

The bulk of optimization strategies are algorithmic in nature. Soliman (1998) gives an example of an optimization issue. According to this author's perspective, business processes may be thought of as a complicated network of activities linked together by decision variables and an objective function subject to a variety of restrictions. Hofacker & Vetschera (2001) provide a similar approach to the optimization problem, providing analytical help for optimizing the design of (mostly administrative) business processes. Han (2003) creates an algorithmic framework for designing business processes with the use of decision models. The goal of this methodology is to

reduce the total cost of implementing decisions by developing a quantitative model and implementing four design change patterns: 1) simple automation for process streamlining; 2) linear sequencing; 3) resequencing involving process parallelization; and (4) radical process integration that is algorithmically implemented.

3 Objectives and Methodology

3.1. Context and Background of the Project

3.1.1. Next Generation EU

Following the unprecedented crisis generated by the coronavirus pandemic, the European Union responded with the Next Generation EU (NGEU). The NGEU is a program of an unprecedented scale, providing for investments and reforms to accelerate the green and digital transition, improve worker training, and achieve greater gender, territorial, and generational equity. Indeed, the Next Generation EU is not just a recovery program; rather, it is a unique opportunity to transform the economy, create opportunities and jobs for Europe. (European Commission, 2020)

The tool designed to stimulate recovery constitutes the largest stimulus package ever funded in Europe, in fact a total of 2018 billion euros in current prices has been allocated. Countries will benefit from a mix of grants and loans at reduced interest rates compared to what could be obtained in the market. (Magnani, 2021)

The allocation mechanism among member states is not only a function of structural variables such as population, but also contingent variables such as the loss of gross domestic product caused by the pandemic. Given these assumptions, the NGEU channels considerable resources to countries such as Italy, which, despite being one of the largest countries in Europe, have suffered from high unemployment exacerbated by consistently below-expected growth.

Italy is the country that will receive the most resources along with Spain, precisely to emphasize how this tool is not only a means to overcome the difficulties that have arisen with the pandemic, but it is above all an investment to enable all countries to catch up and close the gap with more prosperous nations in order to make Europe once again the center of the world economy and sustainable development (RedZone Economia, 2020).

The Next Generation EU plan is based on six major areas of focus, better known as pillars, on which each country's plans will have to focus in order to obtain funding:

1. Single market, innovation and digital: they are enablers for future growth and the decarbonization goals pursued by member countries, to ultimately improve digital performance in line with the "Designing Europe's Digital Future" plan. The main aim is to rationalize and digitize the public services offered by the

public administration so that the structures of the state are also in step with the times and increasingly in line with the needs of citizens.

2. Cohesion, resilience and values: this point aims to strengthen cohesion and reduce disparities locally and between urban centers and rural areas. In addition, the plans will need to address challenges related to gender and income inequalities among different social groups.

3. Natural resources and environment: this point is closely linked to the European Green Deal and from the EU's twin goals of achieving climate neutrality by 2050 and reducing greenhouse gas emissions by 55 percent by 2030.

4. Migration and border management: this pillar has the aim of strengthening the efficiency of the European asylum system so as to rationalize and humanize the migration system that has exploded in recent decades.

5. Security and defense: the aim is to improve the defense system by aiming for greater cohesion and cooperation of the various states.

6. Neighborhood and the world: with these funds, the European Union will be able to defend and strengthen its influential role as a global player with the goal of helping the development of emerging and most struggling countries in the rest of the world.

7. European public administration: the goal is to strengthen the European public administration, which is increasingly overburdened and must respond to the growing needs of European countries and its citizens. Better efficiency in public administration would enable the community to be more cohesive and responsive at all times, but mainly in times of crisis.

Single Market, Innovation and Digital
149.5 (+ 11.5 from NGEU)

Cohesion, Resilience and Values
426.7 (+ 776.5 from NGEU)

Natural Resources and Environment
401 (+ 18.9 from NGEU)

Migration and Border Management
25.7

Security and Defence
14.9

Neighbourhood and the World
110.6

European Public Administration
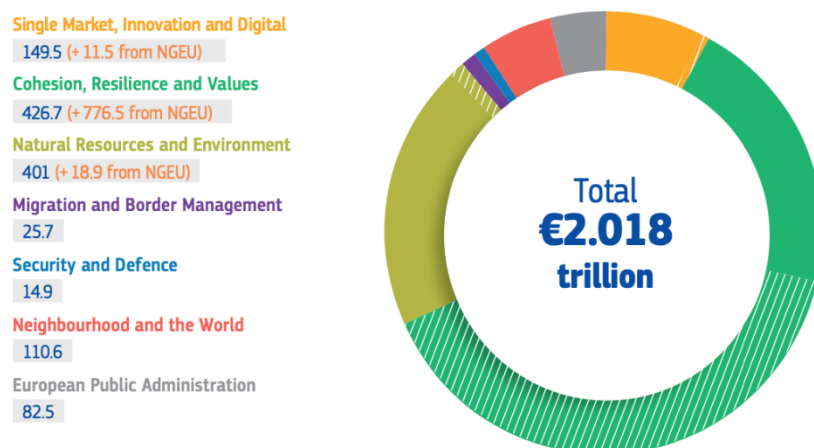82.5

Total
€2.018
trillion

Figure 16 - NGEU Budget Allocation (European Commission, 2020)

The pie chart above shows the breakdown of funding allocated to support the seven pillars on which the reform lines of the beneficiary countries of the maxi-instrument provided by the EU are to be based (European Commission, 2021).

3.1.2. PNRR

On April 27, 2021, the Italian government, after being mandated by parliament, revised the pillars and instrument introduced by the European Union and presented the National Recovery and Resilience Plan, better known as PNRR.

This document describes how Italy intends to invest the money made available by the EU and how to implement all the necessary reforms in order to take advantage of this unprecedented socio-economic opportunity to relaunch itself on the world stage and fill the gaps accumulated in recent decades compared to other countries.

Italy's revitalization effort is developed around three strategic axes: digitization and innovation, ecological transition, and social inclusion.

Transizione digitale
~25%

Transizione ecologica
~37%

Mezzogiorno
~40%

Figure 17 - PNRR Strategic axes (Governo Italiano, 2021)

This chart shows the percentage allocation of resources that Italy will invest in each of the three strategic axes.

1. Digitization, innovation, competitiveness, culture and tourism: The goal is to support the country's digital transaction, ensuring the coverage of the entire territory with ultra-wideband networks so as to facilitate the evolution of society and businesses, rather than the development of tourism.

2. Green revolution and ecological transition: Provides for initiatives for sustainable agriculture, improving waste management capacity, and investing in research for sustainable energy sources. It also provides for actions to upgrade the efficiency of public and private housing stock.

3. Infrastructure for sustainable mobility: The goal is to invest more and more in green modes of transportation, such as upgrading the national and regional rail network with a focus on the South.

4. Education and research: The goal is to address the structural, quantitative and qualitative deficiencies in the country's educational offerings, which has among the highest illiteracy rates on the old continent.

5. Cohesion and inclusion: Focuses on strengthening active labor policies and gender equality. It also aims to achieve fair working conditions and equal opportunities for all segments of the population.

6. Health: This mission has two main points, strengthening prevention and care at the grassroots level and modernizing the technological equipment of the national health system.

In order to pursue the totality of the missions, the Italian government has requested to take advantage of all the 191.5 billion euros allocated by the EU to allocate them as depicted below among the six missions.
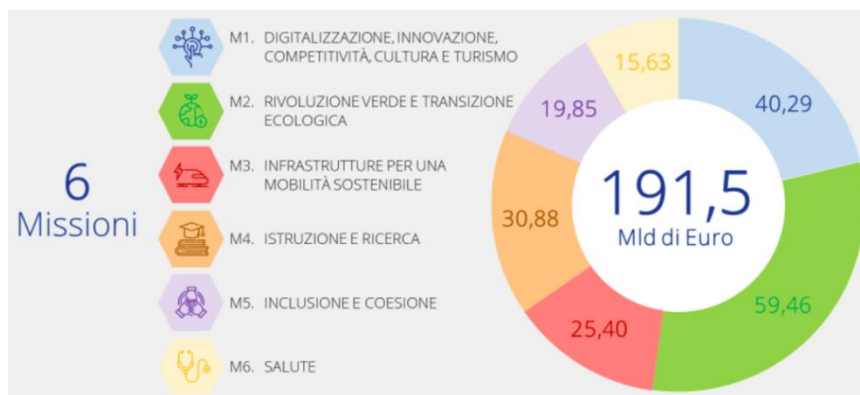

Figure 18 - PNRR Six Missions (Governo Italiano, 2021)

The actions outlined by the Italian state are challenging and ambitious and, alongside, parallel reforms are needed to be implemented with the aim of reducing bureaucratic burdens and removing constraints that to date have been obstacles to the realization of investments and have reduced their productivity.

Precisely, the plan also includes three types of reforms:

- Horizontal or contextual reforms of cross-cutting interest to all missions in the plan to improve the country's equity, efficiency, competitiveness and business climate;

- Enabling reforms, such as functional actions to ensure implementation of the Plan and remove administrative and procedural obstacles;

- Sectoral reforms, meaning regulatory innovations relating to specific policy areas or economic activities designed to introduce more efficient procedural regimes.

The goal for the first reform is to improve administrative capacity, which has always been an obstacle to improve service delivery and public investment in recent years. On the other hand, the goal for the second is to reduce the complexity and slowness of the Italian justice system.

3.1.3. PNRR and Justice

Given the context of this study, the focus will be on horizontal reforms as they are referred to public administration and justice.

Justice reform is one of the main points of the national resilience plan as it is considered an enabling factor for growth and success of the changes to be implemented in the coming years, in fact the length of trials negatively affects perceptions of the quality of justice delivered in courtrooms and unduly tarnishes its value.

Contrary to popular belief, an efficient legal system is critical to sustaining economic growth, as it can improve the business climate, attract foreign investment and accelerate innovation. All these benefits have been demonstrated by several studies, including those by the International Monetary Fund (IMF), the European Central Bank (ECB) and the World Bank (European Commission, 2022).

These studies show how reducing the duration of processes by 1 percent would benefit the country's business growth rate by 1 percent (European Commission, 2022). Other studies indicate a positive correlation between how independence of justice systems is perceived and foreign investment flows (European Commission, 2022).

In addition, the annual monitoring of Italy's attractiveness in the world, published last April by the Censis Foundation and the AIBE (Italian Association of Foreign Banks) Observatory, identifies civil justice times as the second cause of the country's lack of attractiveness to foreign investors, preceded only slightly by the regulatory and

bureaucratic burden and followed by the effectiveness of government action (Bernardini, 2019). A 2017 Cer Eures Study shows that delays in the system cost 2.5 points of the Gross Domestic Product (GDP) and that if Italy's civil justice system had the same timeframe as Germany's, about 40 billion euros would be recovered (Bernardini, 2019). Of course, the benefits would not only be limited to GDP, but would also imply an increase of about 100,000 jobs, an increase of 1,000 euros per year in per capita income, and an overall improvement in the degree of confidence of families and businesses (Bernardini, 2019).

From the analysis of the aforementioned studies, the main goal of projects and reforms within the justice sector is to reduce the time of trial, so all interventions must converge with the common goal of returning the Italian trial to a model of efficiency and competitiveness.

The Ministry of Justice intends to operate following two main directives: the identification of measures that can be adopted immediately to halt the growing trend in the demand for justice right from the start, and to identify a reforming work that is not based solely on procedural interventions, but also attacks unresolved organizational knots, in order to bring down the enormous backlog that weighs down on judicial offices.

The projects presented under the PNRR allow us to decline in different aspects the reorganizational action of the judicial and administrative machine with the main purpose of:

- Bring the Ufficio Per il Processo (UPP) to full implementation;

- Develop the administrative capacity of the system, enhancing human resources, strengthening the chancelleries, ensuring the contribution of technical professionals, other than those of a legal nature, who are essential to implement and monitor the results of organizational innovation and to ensure adequate knowledge transfer;

- Increase the degree of digitization of justice through the use of evolved knowledge tools (useful both for the exercise of jurisdiction and for making informed choices), the recovery of the documentary heritage, the enhancement of software and technological equipment, and the further strengthening of the (civil and criminal) telematic process;

- Ensuring efficient and modern building facilities for the justice system;

- Laying the groundwork for a real fight against recidivism that places the re-education and social inclusion of individuals placed in the prison circuit at the center.

3.2. AS-IS Situation

As previously analyzed, the SCC is the last instance of judgment concerning ordinary Italian jurisdiction. Within it, it is organized into several sections that follow either civil cases or criminal cases. To be precise, there are seven sections for criminal cases and five sections for civil cases.

At this moment in history, the court of cassation is placed under the magnifying glass as a result of the introduction of the PNRR. The latter, in addition to setting very pretentious and challenging goals, must be seen as an opportunity to revitalize a judicial system that has long failed to perform as it should and continues to underperform in a country like Italy.

In order to initially analyze the AS-IS situation, the starting is the Deloitte's document, which allowed to possess a general representation on the macro-processes of the Supreme Court, the main stakeholders and the current performance of the justice system.

The PNRR sets both qualitative and quantitative targets for all legal administrations to be achieved in the coming years.

Figure 19 - PNRR Jusitice Milestones

Above it can be seen what the goals are for ordinary justice. On the top one can find the qualitative goals, defined in the PNRR as milestones, where the first point concerns a large recruitment of human capital that is often under-organized. The other points focus on better monitoring of the performance of the justice system, which to date appears to be completely inconsistent.

Further down it is possible to find the quantitative objectives, the targets, which focus on two main points: the reduction of the backlog and the reduction of the length of court proceedings.

The backlog to date, as will be seen below, turns out to be of a very substantial magnitude. Of concern turns out to be the backlog in the wake of the Pinto Law, which provides that all those who have taken part in a trial concluded in times "beyond reasonable duration," regardless of the position taken in court, can claim compensation from the state for the damage suffered (Ministero della Giustizia, 2018).

The goal is to arrive in 2026 both for First and Second Grade with a backlog reduced by 90 percent, so that all trials can be focused solely and exclusively on new pending cases. The other point concerns the reduction of trial time for both civil, which is to be 40 percent, and criminal, which is to be at least 25 percent.

Going into the details of the court of cassation, the goals turn out to be in line respect to what previously stated. In particular the goals are focused on the reduction of disposition time, which is the ratio that measures how frequently a juridical system turns over the cases received:

- Reducing the disposition time of the civil trial by 25 percent, to arrive in 2026 at a disposition time of 976 days

- Reducing the disposition time of the criminal trial by 9 percent, to arrive in 2026 at a disposition time of 166 days.

Of course, all this can only and solely be achieved if it is supported by an overall reorganization design aimed at raising the efficiency rate and reducing time. The reorganization is structured around three main pillars:

1. Justice Reform: it is planned to introduce new rules for the conduct of trials. With regard to the criminal trial, a time limit is set beyond which the trial will be extinguished (Institute of Trial Prescription). Of course, ceilings are also set to the duration of the trial, respectively, for the second instance of two years and the SCC of 1 year. As for the civil trial, it was planned to abolish the filter section at the end of 2022, which will be incorporated into each section. In addition, interlocutory referral to the SCC is introduced, so the possibility for

the judge on the matter to go directly to the SCC to submit to it the resolution of an issue that has not yet been addressed.

2. Digitization: The goal is to bring judicial processes up to speed and therefore enhance digital systems and technological equipment to improve performance. This will digitize acts and procedures and create a system for remote hearings.

3. Process efficiency: Main directive is to facilitate the transmission of files between the various levels of court through digitization. Next will be a need for simplification of the rites, which are often and frequently slowed down by too many internal steps that require massive coordination efforts, and massive bureaucracy.

3.2.1. Process Analysis

Before quantitatively studying the performance of the SCC and analyzing the distribution of staffing and digitization, it is necessary to understand how the flows are organized. The goal is to have a high-level mapping of processes so that it is possible to critically reflect on the Court's numbers.

For this reason, the work done was focused on the planning and implementation of interventions phase (Bartezzaghi, 2010). In particular, the mapping of the activities has been done with diagrammatic models, as they were the most suiting for both the final user, due to their simple to understand nature (Vergidis et al., 2008), while for the process analysis, simulation tools have been deemed as more useful, given the need to anticipate future behaviors of the process under analysis (Greasley, 2003).

Thanks to a study conducted by Deloitte in December 2021, the following is a high-level analysis which was obtained from a series of interviews conducted at the Court, evidence from 'analysis of official documents, and elaborations on management data provided by the Supreme Court Statistics Office.

It should be specified that this paper will focus on the civil process, so from now on, only the activities and critical issues related to it will be analyzed. It has been chosen just the civil process because the analysis of both the case typology would have been too complex with the risk of missing the focus on the goals and jeopardizing the efforts made in order to improve the performances. Moreover, the civil processes are the one most in suffering compared to the criminal ones, in fact the objectives fixed by the PNRR are more challenging respect to the others.

The organizational structure of the civil processes is composed by five sections, each one specialized in a particular case.

The macro process of civil is divided into six main macro activities:

- Reception:

  The objective of this phase is to acquire the file from the substantive authorities, in case of criminal cases, or from the lawyers, in case of civil cases, and then sort it to the relevant sections. The main actors that are involved are the front office central registry office and the back office central registry office. The former is in charge of receiving the file, starting the review, uploading it to an internal management system, and then booking the entry on the docket. The second, on the other hand, performs an initial check on the data and documents entered and then forwards the file to the sixth section. The back office is also responsible for checking the fiscal correctness of the proceedings and taking action in the event of debt collection. It is important to highlight that the cases can be delivered to the Supreme Court in different modalities, or telematically or by hand at the relative office or by the post office.

- Filter:

  The objective of this phase is to select the fast-defining files, such as the inadmissible and the ones to be processed by the united sections, and sort the files to the relevant sections. There are a variety of actors involved, from the section clerk's office, the chairperson, the subsection perusal coordinators to the perusal clerk. The former is mainly involved in more administrative activities such as checking the completeness of the file and extracting the fascicle, registering the fascicles and then sending them to the perusal and registering the orders. The other actors mentioned above are predisposed to the summary examination of the files in the subsection to identify those definable in the sixth section or united sections and to the establishment of the calendar and creation of the meeting roles.

- Spoglio Sezionale:

  The objective of this phase is to verify the completeness of the file and identify homogeneous files to facilitate processing by establishing thematic hearings. The actors involved are the sectional clerk's office, the president, the sectional perusal coordinators, and the perusal clerks. As in the previous phase, the section clerk's office is in charge of administrative activities to verify the completeness of the file and fascicle and to print any documents received later that have not yet been integrated by the sixth section. The other actors are responsible for identifying the subjects and sub-subjects of the file, assigning the weighted value and nomofilactic value. Another task of important added value is related to the study of the file to create the in-depth resume to treat them by thematic hearings.

- Sectional hearing preparation:

  The objective of this phase is to organize the hearing calendar by identifying speakers and defining roles. The actors involved are the sectional chair, the area coordinators, and the sectional clerk. The first two are in charge of organizing the hearing calendar, defining the role and identifying speakers. The sectional clerk's office supports the chairperson and coordinators in administrative activities by entering the hearing role into the system, managing the filing of the file and correspondence with the lawyers, and sending the documents to the PG, also recording the orders in digital copy.

- Hearing and post sectional hearing:

  The objective of this phase is to select the files of quick settlement and to sort the files to the relevant sections. The actors involved in the hearing and post hearing phase are the panel, the rapporteurs, and the sectional clerk's office. The first two are responsible for filing the hearing roster with the clerk's office by noting the outcomes and for the drafting of the orders by the rapporteurs by depositing the minutes in the clerk's office. The sectional clerk's office is in charge of sending to the Sectional Publications Office of the order signed by the President, telematically notifying the attorneys and the Authorities of Merit of the judgment, checking the correctness of the data and the regularity of contributions, and possibly sending the order to the "massimario".

- File management:

  The objective of this phase is to manage the request for copies and withdrawal of party files and return of merits files. The actors involved are part of the archive people, who are responsible for transferring the file to the Current Office, moving the file to the underground archive after checking for completeness of data, and handling the hearing and correspondence.

Already from a granular mapping it becomes evident how far from linear the path of the file is and that the exchanges between the various actors are multiple and convoluted.

3.2.2. Court Overview

For the sake of completeness, it is also essential to have an overview of the staff working in the Court. An initial analysis by Deloitte shows a chronic overhang of the official staffing plan, compounded by a significant presence of "fragile" figures in service and the physiological need to work remotely.

Funzioni	Organico	Presenze effettive	Vacanze	Scopertura
Personale di magistratura	484	351	133	**27%**
Primo Presidente	1	1	0	*0%*
Presidente aggiunto	1	1	0	*0%*
Presidente di sezione	59	49	10	*17%*
Consigliere	356	249	107	*30%*
Magistrati di tribunale	67	51	16	*24%*
Personale amministrativo	**756**	**546**	**210**	**13%**
Totale	*1.240*	*897*	*343*	*28%*

Distribuzione dell'organico al 31/12/2020

Figure 20 - Human resources (Deloitte, 2021)

As illustrated in the image above the judiciary staff requires a staffing of 484, but these are only 351 so there is a lack of 27%. Relative to administrative staff there should be a staffing of 756, but a 13% overflow is reported. The greatest overstaffing concerns both counselors and court magistrates, who being significantly understaffed, represent the bottlenecks of trials as they are unable to cope with all the files that come in. The staffing situation requires timely intervention to fill the gaps and bring the level of human resources back to the minimum acceptable level to be able to pursue the ambitious goals set by the PNRR. It is important to point out that this situation is destined to worsen if corrective action is not taken due to Quota 100, which will provide for a relevant series of retirements that will burden an already decidedly understaffed workforce.

The last step in the analysis before embarking on an initial critical assessment of process difficulties and a timely analysis of performance, it is essential to study the adoption of information systems in the Court.

The use of information systems merely assists in the management and handling of the paper flow, by the timing of which the overall court activity is greatly affected.

The information systems used in the Court are basic when compared to the management systems present to date in the current labor market that allow companies to manage processes more efficiently (Deloitte, 2021). Despite the basilary of the systems present, the use of them in the Court is not as widespread. In the civil sector, it can be seen that more use is made of digital systems than in the criminal process, where their deployment is reduced to the bone and where two of the two tools used are MS Teams and PECs. This "backwardness" from a technological standpoint emerged bursting forth during the pandemic, during which it was difficult to keep the Court's business going normally.

Thus, even on the digitization side, the situation in the Court of Cassation is to be defined as decidedly critical and must necessarily be improved to ensure that even legal processes remain in step with modern times, which are increasingly characterized by the use of technological systems that manage to simplify daily activities and eliminate the workload for the actors involved, who will no longer have to waste time on non-value-added activities.

Digitization must, therefore, be seen as an enabling factor in achieving the goals of the PNRR. Work needs to be done from both an infrastructural and instrumental endowment perspective.

3.2.3. Criticalities

Thanks to this initial cursory analysis, it is now possible to identify the main critical issues that emerge from the study of the flow of processes in addition to the aforementioned problems related to staff shortages and the backwardness of the technological systems in use.

First of all, it jumps out at the multiplicity of channels of entry of documents, which can reach the Court either by hand delivery, postal delivery or telematically. This greatly complicates the management of the receiving stage, which must cope with three different channels of entry and therefore must triple equal activities depending on how the file is delivered. This implies both a management difficulty, a potential loss of information, and the hybrid nature of the file which can have paper and digital documents. The misalignment that is created is dangerous and requires a great deal of coordination effort, which is often made difficult by the plurality of actors involved in the process.

Another major problem is related to the study of the same file, in fact in each macro phase of the process each actor performs its study of the file without having visibility of what has been done previously, due to poor coordination and due to the absence of a database that can enclose all the information necessary to avoid repeating activities that have been performed previously with the aim of reducing the redundancy of non-

value-added activities. All this leads to the risk of a potential loss of information that at the hearing can be detrimental to the normal course of the process.

In addition, it is worth noting that the absence of a homogeneous perusal pattern among the sections exacerbates the misalignment of information and increases the criticality of losing data along the way. That said, it can be inferred how the lack of standardization necessitates a massive coordination effort that drastically reduces the Court's performance.

Unfortunately, although the entire model of the Supreme Court seems to be based on coordination among the various actors, it is not developed as it should be. There is a difficulty in communication between the actors in the different offices, while there appears to be an absent mode of communication between the Court and the Merit Authorities.

During the hearing phase, there are very significant critical issues that greatly undermine the normal continuation of activities. To be precise, the most problematic points concern the scheduling of hearings and the recording of the same. Both are carried out in paper mode, the setting of the hearing is marked on a paper "clipboard," which makes it difficult to find the set date and any changes to it. The recording of the hearing is also done in paper form, which generates a potential and substantial risk of losing relevant information that could frustrate all the efforts made up to that point.

As a final critical issue, we must highlight the absence of an internal control model, which does not allow real-time monitoring of the Court's performance and also makes it difficult to unearth weaknesses that necessarily need to be revised to improve problems.

It is not only a matter of continuous improvement, but also of preventing processes from becoming out of control, with no possibility of timely action if something does not work properly.

For the sake of accuracy, it should be emphasized that these critical issues should be seen as a starting point for the work, so that we already have a general idea of what the Court's broad problems are, and they cannot be taken for granted, as it is relevant to continue investigating to finally ascertain them.

3.2.4. Quantitative Analysis

At this time, after having analyzed the processes and organization of the SCC and listed the main critical issues that emerged from high-level mapping, data on the performance of the third instance can be reviewed critically.

The goal now is to practically observe the timing and productivity of legal processes to ultimately understand what challenges are imposed by the PNRR. The figure below

shows extrapolated data from the Supreme Court Statistics Office and refer to the period from January to November from 2019 to 2021(Deloitte, 2021).

	Civile			Penale		
	2019	2021	Var. %	2019	2021	Var. %
Pendenze iniziali	111.356	120.473	8,2%	24.610	24.473	-0,6%
Fascicoli in ingresso	35.094	28.532	-18,7%	47.027	42.368	-9,9%
Definiti	29.767	36.389	22,2%	47.746	43.314	-9,3%
Pendenze Finali	116.682	112.590	-3,5%	23.891	23.527	-1,5%
Disposition Time*	1.309	1.033	-21,1%	167	181	8,6%
Durata media	1.101	1.290	17,2%	5m + 17g	7m + 1g	26,3%
Indice di ricambio**	85%	128%	50,4%	102%	102%	0,7%
Produttività***	186	222	19,4%	418	405	-3,1%

Figure 21 - Court of Cassation Data (Deloitte, 2021)

Firstly, it is necessary to understand how indicators, such as disposition time, turnover ratio and productivity, were calculated.

Disposition time, is defined as the ratio which measures how frequently a juridical system turns over the cases received, is parameterized as follows:

$$DT = (365 - 31) \times \left(\frac{Pendenti\ fine\ periodo}{Definiti\ nel\ periodo} \right)$$

Equation 1 - Disposition Time

The *indice di ricambio* is the percentage of files entering the system that are defined in the reporting period, so it is calculated as:

$$Indice\ di\ ricambio = \frac{Definiti\ nel\ periodo}{Fascicoli\ in\ ingresso\ nel\ periodo}$$

Equation 2 - Indice di Ricambio

Finally, the average productivity, which is the yardstick for judging the efficiency of

the Court's workforce, is calculated as:

$$Average\ Productivity = \frac{Definiti\ nel\ periodo}{Forza\ di\ lavoro\ effettiva\ nel\ periodo}$$

Equation 3 - Average Productivity

The first glaring element from Figure 21 is the *number of initial civil trial pending files* which, in addition to constituting more than 80% of all court pending files, also increased by about 8%between 2019 and 2021. This figure is a consequence of the drastic increase in the average duration of civil trials, which increased by 17.2% during the period from January to November from 2019 to 2021. This means that the system, given the high duration of trials, is not only unable to process the entirety of incoming cases, but also fails to attack the large number of pending cases, a thorny issue also highlighted by the PNRR points.

Sixty percent of the incoming files are criminal proceedings, and although the numerically are greater than in civil proceedings, the criminal magistrate handles about twice as many files as his colleague in civil.

However, from an initial view of the data, it can be said that some indicators are being improved, partly due to the introduction of the Trial Office in the civil sector, but there are still major problems that do not allow the Court to attack and break down the immense mountain of backlogged cases, many of which are close to the Pinto Law.
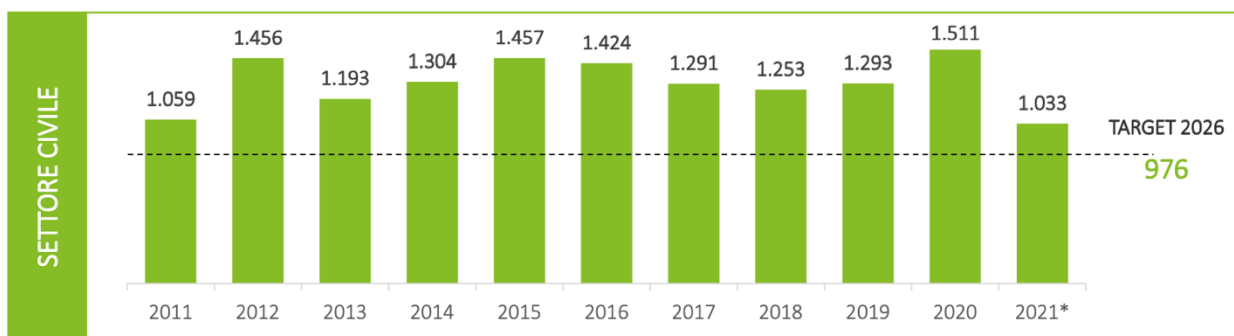

Figure 22 - Disposition Time Evolution (Deloitte, 2021)

One of the most worrying figures turns out to be that of disposition time, which although improving over the past few years, is still too high compared to the PNRR target of 976 days to be achieved by 2026 at the latest.

So based on the year 2021, the DT needs to be reduced by about 6 percent from the current one. This might not seem like too high a percentage, but it is not so since large-scale corrective actions will need to be taken to achieve this reduction.

It is also necessary to understand in detail the performance of each section of the civil sector, as not all of them perform in the same way and the reasons are among the most diverse, but often coincide with the organization of the flow of activities.

Below is a table where the quantitative data for each section are explained.

	Pendenza Inziali	Definiti*	Pendenza finale	Disposition Time	*Var. DT vs.19*	Durata Media	Var. Durata vs. 19	Indice di ricambio	Incidenza magazzino
Canc. CC	19.086	39.146	8.528	73	-53,2%			137%	8%
Sottos I	5.456	2.266	6.116	262	89,7%	1a+6m+6g	24,1%	92%	5%
Sottos II	2.603	1.590	2.694	153	-0,9%	1a+7m+23g	30,0%	98%	2%
Sottos III	2.737	1.405	3.762	261	-11,9%	1a+8m+27g	14,5%	82%	3%
Sottos Lav	3.207	1.463	4.196	265	36,1%	1a+9m+19g	13,9%	84%	4%
Sottos Tri	9.263	3.073	11.421	369	26,5%	1a+9m+20g	33,3%	83%	10%
Totale VI	23.774	9.799	29.545	299	38,4%	1a+6m+17g	23,4%	85%	26%
SU	497	520	553	304	6,2%	1a+6m+17g	-0,2%	92%	1%
I Sezione	9.683	5.084	9.864	642	-42,8%	2a+6m+18g	1,5%	97%	9%
II Sezione	10.623	3.199	11.448	1.157	-6,0%	3a+24g	-15,5%	80%	10%
III Sezione	5.554	2.682	5.739	686	100,2%	2a+1m+21g	-8,0%	94%	5%
Lavoro	14.012	4.199	13.601	1.073	5,3%	3a+10m+18g	0,3%	111%	12%
Tributaria	37.244	10.906	33.312	1.000	-50,4%	6a+1m+4g	16,9%	155%	30%
Totale	**120.473**	**36.389**	**112.590**	**1.033**	*-21,1%*	**3a+6m+15g**	*17,2%*	**127%**	**100%**

Figure 23 - Quantitative data for each section (Deloitte, 2021)

As can be seen from the table, but most sections, including the sixth section that was turned off by the end of 2022 have drastically increased the average trial duration compared to 2019. The exception is the labor section and the second section, which even reports a reduction in duration of nearly 16 percent.

The sixth section processed about 27 percent of the files, and this gives an idea of the impact once this was eliminated and incorporated into the other sections, which are already burdened by their large workload.

Finally, it should be pointed out that the "Sezione Tributaria" and its subsection absorb about 40 percent of the final pending cases, a decidedly large number, which despite the large number of files finalized, cannot be decreased.

From what has been said above, one of the main problems turns out to be precisely the large amount of the backlog, which despite the actions taken fails to be decreased. On the contrary, as shown in the graph below, during the last few years it has dramatically increased.
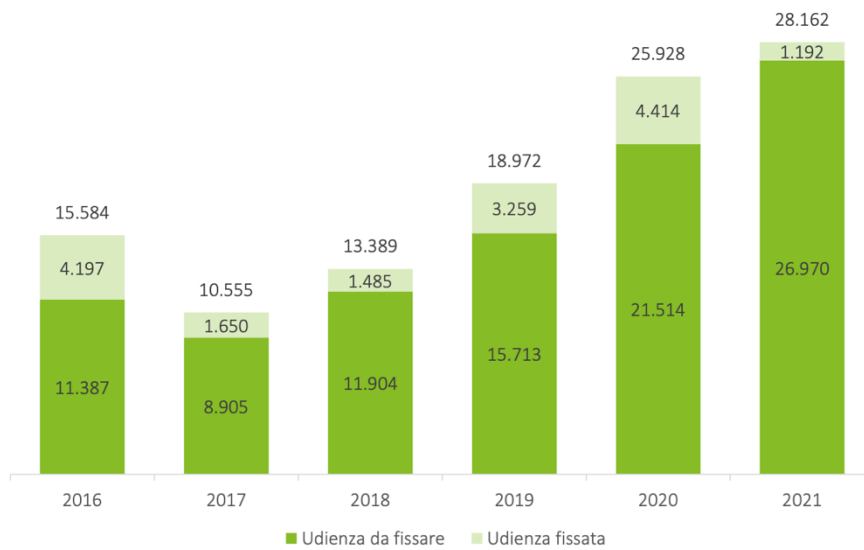

Figure 24 - Backlog Evolution (Deloitte, 2021)

The issue that aggravates the situation even more is the fact that about 86 percent of the pending cases still do not have a hearing set, thus, these files are not in the home stretch, but still need time to be processed before they are practically settled.

It turns out to be very interesting and explanatory to look at a forecast scenario on how the civil trials of the Supreme Court will evolve. Below are the forecast scenarios for disposition time and final pendency, respectively.
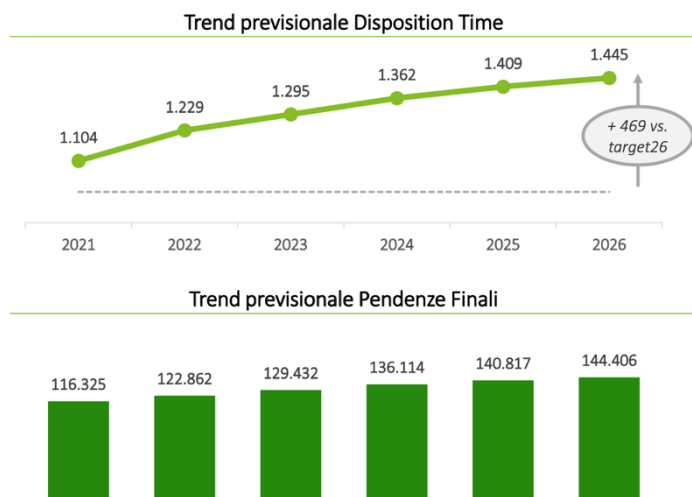
Figure 25 - Forecast scenario for DT and backlog
(Deloitte, 2021)

These forecast scenarios were set at a constant perimeter, in other words considering the current mode of execution of the Court's workflow, and on the assumption that the Offices of Merit will achieve disposition time targets. Based on the forecasting model, it is estimated that as a result of the absorption of the Sixth Chamber, the ordinary chambers will go into severe distress in the coming years with an increase in final pendency of about 90 percent.

Given the following assumptions, disposition time is also set to increase dramatically to 1445 days in 2026, about 33 percent more than the target set by the PNRR.

3.2.5. UPP

Actions to try to correct the situation in which the Supreme Court finds itself have been many, but so far, they seem to have been in vain as can be seen from the data explained above. The latest action taken in terms of timing is to establish a new office to serve as a wild card to give a boost to the Court's excessively long timelines.

According to DL 80/2021 implementing the PNRR, for the period 2021-2024, it has been decided to establish the Ufficio per il Processo (UPP), which is a staff structure to support judicial activity in the service of the office as a whole. Therefore, it is planned to recruit 200 adjuncts, who are to be employed within the UPP to enhance their contribution to judicial activity. The ultimate goal of such an office will be to create the conditions necessary to increase productivity in the various stages of processing to be a process accelerator.

The UPP will report directly to the First President of the Court and will be organized on a decentralized basis into three separate departments:

- Civil sector, the goals related to this service are to reduce the backlog and reduce disposition time by 25 percent;

- Criminal sector, the goal is to maintain the current disposition time considering a potential increase in incoming files as a result of the Cartabia reform.

- Cross-cutting sector, the objective is to oversee the implementation of cross-cutting, enabling actions to achieve what is specified in the PNRR, such as digitization and statistical monitoring.

UPP employees may be deployed along all stages of the file processing flow, to be supportive of the various actors involved in the various activities.

3.3.   Objectives and research question

The context of the Italian justice system is very intricate and complicated with many excellences, which have made this system avant-garde throughout the world, but with the presence of so many contradictions that impede its normal functioning and that, year after year, are causing society and businesses to lose confidence by undermining the economic system and the possibility of ensuring sustainable and prosperous future growth.

As revealed by the various studies related to Business Process Reengineering, it is possible to embark on a path of change with the aim of pursuing efficiency and effectiveness, precisely what the Supreme Court of Cassation is lacking. Obviously, there are many efforts to be undertaken, and it is only through the synergistic partnership of the various actors, from the Ministry of Justice to the figures present during the analysis of a file, that a season of reforms can be initiated to achieve the ambitious goals set by the PNRR.

In fact, never before has justice had the opportunity to lift its fortunes and get back in step with the times, filling all the gaps that have accumulated over the past decades.

From the data that emerged from the study carried out by Deloitte, the main problems related to the civil process in the SCC are highlighted, but probably not yet the full range of tools are available to carry out a detailed analysis.

From the BPR studies, it has become clear how important it is to have as a starting point a clear view of the processes, where all activities are clearly defined, and each actor has his or her precise role. So, the first challenge in embarking on a path of reform is to meticulously map every process and subprocess of the Court, so that no grey area is omitted. Clearly, the success of trying to map processes is not always guaranteed, especially those of a complex public body where proceedings from all over Italy convene and where decisions are made by multiple actors.

Should it be possible to map the varied activities carried out by the Court, it is absolutely essential to attempt to build a simulation model that having as input the resources used and the timelines related to each activity returns as output the time it takes to process a file from start to finish with the ultimate goal of performing a long-run simulation to examine the volume and efficiency of the Court.

Were the above model to be successfully constructed, it would provide an opportunity to understand on the basis of empirical data whether the goals set by the PNRR are possible to achieve with the current configuration of the Supreme Court or whether they are extremely pretentious, thus requiring profound organizational change.

Even the latter without a simulation model is impossible to delineate, as one would risk assuming ideas that are too theoretical but impractical that in the end would not lead to real improvement, risking the nullification of the large sum of public money invested and the efforts undertaken by all the figures involved.

The goals of this work will be precisely to try to address the need to have a detailed mapping of processes from which to build a dynamic model to simulate the performance of the Court.

Should these two very ambitious points be possible to achieve, the second phase of this project will be focused on a critical analysis of the data obtained in order to highlight the strengths, but above all to dampen, or rather eliminate, the weaknesses that obstruct the efficient conduct of legal processes.

All with the sole aim of understanding whether the goals of the PNRR are feasible or not and try to find a solution to achieve them so as not to jeopardize the efforts already made.

Therefore, practically, the objectives fixed form this document are the creation of the AS-IS mapping and simulation, then the analysis of criticalities in order to understand where the bottlenecks are placed and where the processes are not well organized bringing a lack of performance. In conclusion, this work will try to implement a number of corrective actions to present another work method with the aim of increasing the performances and eliminating the bottlenecks. So, the TO-BE mapping and simulation will be created, even with the aim of comparing the current processes with a different organization, that might be implemented by the SCC.

3.4. Methodology

3.4.1. Interviews

Before embarking on this challenging path, it was of paramount importance to have a base from which to focus attention so as to already possess the general information so as to have an overview.

This base is represented by Deloitte's document, which allowed us to possess a general representation on the macro-processes of the Supreme Court, the main stakeholders and the current performance of the justice system.

As stated in the previous section, these data are not sufficient for the purpose of thoroughly analyzing the situation in which the Supreme Court finds itself. That said, the goal was to meticulously map the processes and build a simulation model.

First, to define the detailed mappings, and achieve the first objective of this research, Deloitte documentation has been the starting point. However, the only way available to delve into and find out the individual steps a file takes was to schedule interviews with the actors involved, trying to get a sense of what a normal workday is like. Numerous interviews were scheduled with the various representatives of each stage and with the employees responsible for the main information systems currently in use.

The interviews included several people with different roles and consequently with different degrees of vertical and horizontal specialization to obtain as much information as possible, both detailing the strictly operational part and the organizational part. Generally, the participants were the section president, a general coordinator, a UPP officer, one or more councilors, and, if necessary, more operational employees.

During these interviews, respondents proceeded by starting with an analysis of the sizing of human resources in each office so as to get the first information about the people involved, then the Court representatives were asked to explain the articulation of the part of the process of which they were the owners. The more operational figures were able to provide a lot of detail about the practical conduct of activities, thus how files are handled, how they are compiled and how they are analyzed, while the more managerial figures defined the organizational framework with regard to the exchanges within the offices and how the phase in question fits into the general framework of the civil process.

Timely listening to the Court's stakeholders was performed not only for the purpose of mapping processes, but also to try to take cues on possible points to improve the current situation. A bottom-up approach was sought because frequently the most effective improvements come from those who are involved in the work on a daily basis because they know the operational strengths and weaknesses like no one else.

Clearly, these insights were considered only and exclusively if they were consistent with the guidelines set by the NRP and the goals defined by the Ministry of Justice.

The exchange with stakeholders also was relevant because it was also possible to receive valuable feedback on the proposals put forward to streamline processes. In fact, it happened that these were not well accepted because they were too far from the operational model or because they were definitely difficult to implement for a variety of reasons, either cultural or organizational.

Often times, the interviews were challenging to follow because the actors' expositions could come into conflict with each other or because there was little discipline during the meetings. In order to avoid losing relevant details each workshop was attended by more than one person so that everyone took notes and then unified them after the meetings and, moreover, all the interviews were recorded.

Precisely to avoid a loss of information, preparatory summary sheets were constructed for each interview in order to fix the main data learned. This system made it possible to structure a loosely standardized process and to make the discussions conducted in each call usable over time.

Each tab shows the date the meeting was held, and the section/office interviewed.

The first section attempts to provide a macroscopic quantitative snapshot as the numeric of appeals and staffing are reported, respectively. This first glance succeeds in immediately capturing the size of the office and its efficiency in operational terms.

Next is a timely description of how business is conducted, reporting in detail when explained by the Court's exponents so as to define what happens to a file from when it arrives to when it is handed over to the next office.

The next two sections relate to the information systems adopted, to get an overview of the degree of digitization and possible courses of action, and to any KPIs (key performance indicators) to be considered for the purpose of analyzing the performance of the section/office in question.

The section on critical issues that emerged aims to establish the preliminary issues that emerged during the interviews. In fact, it aims to fix what are the macroscopic critical issues that can be highlighted from the first steps of the project.

Finally, the last part relates to stakeholder requests and suggestions and aspects to be further investigated, i.e., the parts that turned out to be more nebulous and require more attention later so as to be finally ascertained.

In the annexes it will be possible to find some of the summary sheets of the interviews compiled during the preliminary stages of the project, in particular the sheets of the II, IV and V civil sections have been included.

The set of these sheets forms the foundation on which to build the detailed mappings, in fact the next step was to extrapolate individual activities and assign them to an actor in the process. At the same time, an attempt was made to identify and analyze the various exchanges between actors that take place in each process phase so as to understand which information exchanges and triggers initiate the activity of each office.

3.4.2. Process mapping

The language used for the representation of each phase is BPMN (Business Process Model and Notation), as it is the most intuitive and universal language for designing business processes and certainly succeeds in easily identifying both the information exchanges between the various actors in the process and the tools used by the activities and their respective outputs.

Initially these mappings were drawn on paper to have a first draft, then they were built through the Signavio tool. The latter is a very powerful and easy-to-use tool provided by the software vendor SAP, which allows, thanks to a rich and well-stocked library, to draw even the most intricate processes with ease. Thanks to this tool it was possible to draw in a standardized way the various conventions that are part of the BPMN language, such as lanes, activities, gateways and events.
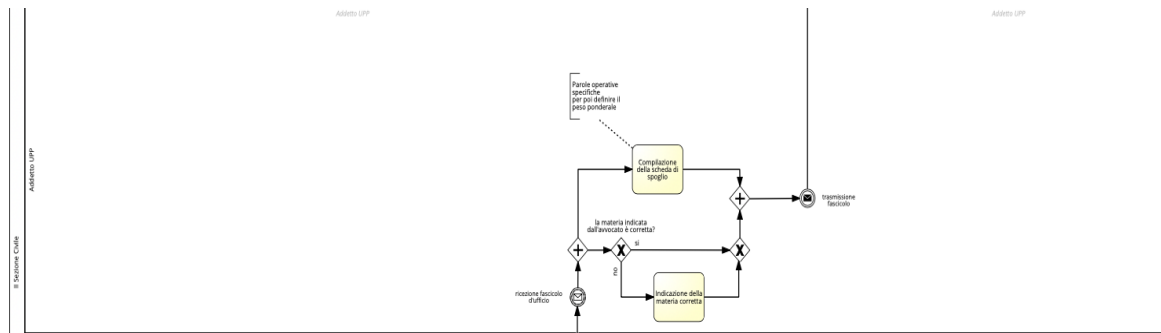
Figure 26 - Example of a BPMN diagram

Before going into detail, it is appropriate to explain how the maps are organized at the structural level, as shown in the figure above. Each map has a reference "pool" where the office of reference of the reported flows is indicated and within them are the "lanes," which represent all the actors who intervene during the macro phase and are those who carry out the activities assigned to them. Therefore, each lane is unique and no two lanes can exist with the same actor.

Activities are represented by the yellow rectangles with the name inside them, while throw events present a filled icon according to the type of event and catch events present an empty icon. Depending on the type of activity, one can find different icons or documents associated with it based on the use of specific software or the production of certain outputs. Finally, the other elements present within each mapping are gateways, which represent branches of the flows and can be "XOR," meaning either one branch is activated or the other, or "AND," meaning parallel gateways and represent situations in which activities can be executed simultaneously. It should be noted that the above, refers to the symbols used in these specific mappings, as the language of BPMN is much broader and thicker.

3.4.3. Simulation

Process mappings are the essential tools to understand how the SCC is working at the operational level, then to analyze the different information exchanges between offices and to clearly define the owners of each activity.

Obviously, this is not sufficient for the purposes of the objectives to be obtained from the study of this document, since it is necessary to have a view of the evolution of processes over time, to analyze how many resources are employed in each phase, and above all to define the time it takes for a file to be processed. All this with the sole objective of quantitatively establishing what actions need to be taken to achieve the timelines set by the NRP and to bring down the huge backlog that oppresses and worries the normal course of the Court's activities.

So, turning to the practical, the first step in defining a dynamic model that succeeds in providing a view of how process timelines will evolve under different corrective actions was to build a skeleton on excel.

The aforementioned model on excel is crucial as it allowed for activity-by-activity analysis for the purpose of identifying the exogenous and endogenous factors that impact the time for the operational performance of each activity.

Concurrently with the identification of the variables, which will be delved later, it was appropriate to fill in additional lacks about the processes in question, so six questionnaires were forwarded to the Court, one for each microphase, which are shown in the annexes, where questions regarding the average times to carry out certain activities, the percentages of activation of each subprocess so as to understand, for example, the volume of telematic or paper files, and the ways in which the different offices interact.

The starting point for the construction of the excel model was the process mappings, from which individual activities were extrapolated and assigned to the actor in charge of performing it.

The modus operandi has been to identify a standard time, i.e., an average execution time, for tasks that does not take into account possible surcharges due to external factors. *As-is* well known, it is impossible to define an unambiguous time for the performance of a task since interactions with colleagues, environmental factors and especially personal factors, such as physiological and psychological factors, heavily affect the normal functioning of the workday.

Therefore, it was decisive to identify endogenous variables, i.e., dependent on the process itself, and exogenous variables, i.e., from external factors, which impact the average execution time previously described.

Since the objective of this study is to provide objective data, these variables needed to be parameterized so that their impact could be calculated precisely.

The list of identified variables and their parameterization is provided below:

1. Queue Lawyers;

   This variable refers to the process triggered by the hand delivery of the file by the lawyer. As will be specified later, this variable will only impact as-is processes, as only in them is hand delivery of the file directly to the Supreme Court's filing office taken into account.

   The objective is to quantify the amount of time each lawyer has to wait to deposit the file, as it varies depending on the people contextually present in the deposit office and depending on the clerks present at the counters.

   The parameters that impact this variable are the number of active counters, i.e., the number of clerks who are able to process the file, the number of attorneys present in the office, and the standard time of activity, previously set through interviews and questionnaires.

$$if\left(\#lawyers > \#active\ counters;\ Std\ Time \times \left\lfloor \frac{\#Lawyers}{\#active\ counters}\right\rfloor;\ Std\ Time\ without\ line\right)$$

Equation 4 - Queue Lawyers

   Above is the formula used in the excel model, basically there are two activation scenarios: the scenario where lawyers in queue are greater than the number of active counters and the scenario where lawyers in queue are less than the number of open counters.

   In the first scenario, the standard time will be increased by taking into account the time required for a counter to become free and the turn of the lawyer in question to arrive.

   On the other hand, where there is at least one free counter, the time will be exactly equal to the standard time for the activity to be performed, as there do not appear to be any significant impacts.

2. Average operator handling speed;

   The purpose of this variable is to parameterize an operator's ability to process the information needed to perform the activity for which he or she is responsible. In fact, while holding constant the activity to be completed, the

execution time varies depending on the actor to whom it is assigned due to several factors, the impact of which can drastically alter the timing.

The parameters that impact this variable are exogenous factors, experience and the standard time associated with the activity.

$$\frac{Standard\ Time\ \times (1 + Exogenous\ factors)}{Experience}$$

Equation 5 - Average operator handling speed.

The first parameter takes into account all possible time losses due to breaks, distractions, and interactions with colleagues. Since these time losses are random, this parameter will consist of a random increment of between +0% and +10%.

The second factor takes into account the operator's own training, years of seniority and horizontal specialization, thus the number of tasks assigned to the operator. Consequently, the greater the experience the closer the time will be to the standard time to perform the task, as demonstrated by the experience curve.

It is necessary to specify that the experience parameter is unique for each operator, so each operator belonging to a specific lane will have a dedicated parameter.

3. Timing Delivery from Internal Offices;

The variable devoted to delivery time between offices has as its basis the assumption that delivery transitions between successive offices in the process occur by paper and that therefore the operator, after processing multiple files, periodically goes to the appropriate office to deliver the necessary information in order to trigger downstream activities.

The parameters that impact this variable are the delay in deliveries and the standard time associated with the activity.

$$Standard\ Time\ \times (1 + \%Delivery\ delays)$$

Equation 6 - Timing delivery from internal offices

The first parameter is a random variable that will be a surcharge for standard time.

This variable is critical for analyzing the time lag between activities due to poorly automated processes that rely primarily on paper.

4. Technological problems

Technological problems refer to all those issues that could occur due to the use of computer systems, e.g., service interruption, network problems up to difficulty of use by operators.

This variable, given the low prevalence of computer systems in as-is processes, will be less predominant in the first part of the project to become more utilized in the second phase when the hypothetical to-be processes will be studied, which will be more based on the existing technological tools for the purpose of greater efficiency.

The parameters that impact this variable are operator know-how, the type of problem, and the standard time associated with the task.

Operator know-how is a random variable that reflects the operator's ability to overcome technological problems in the shortest possible time. It depends on the operator's education, familiarity with the use of technological tools, and the length of time they have been working with a given management system.

The type of problem impacts the time to perform a given task, going to slow down its normal performance. 4 types:

Impact Type	Occurence Probability	Increased Time
Severe	1%	+ 100%
Medium	5%	+ 50%
Slight	20%	+ 20%
Null	74%	+ 0%

Table 2 - Type and quantification of impact

$$\frac{\sum Occurrence\ Prob\ \times\ Std\ Time\ \times Increased\ Time}{Know-how}$$

Equation 7 - Technological problems

The goal is to find a weighted average of the time to perform the task taking into account the various increments based on the impacts of each technological problem. The higher the operator's know-how, the closer the time will be to the standard time.

5. File Complexity

This variable is intended to quantify the impact that a very complex file to process has on the standard time frame for performing the task. In fact, it would be far too simplistic to assume that with the same operator but with files of different complexity, the time to perform the task at hand would not vary. On the other hand, *as-is* often the case, when faced with something more difficult than the standard, it is necessary to take more time to carefully evaluate all the data and, if necessary, compare with a colleague.

The parameters that impact this variable are the length of the file, the weighted weight and the standard time to do the task.

File length is a random variable between 0% and +25%. It is intended as a plus factor; in fact, the longer the file is, the more complex it will be to analyze.

Ponderal weight is an input variable and is the unit of measurement used by the Supreme Court to quantify file complexity. It takes into consideration various aspects, from nomofilactic to organizational, as a dossier that presents a case never seen before is much more difficult not only to study but also to categorize. In the Supreme Court, for the civil trial, the weighting is a value ranging from 1 to 5, where values 4 and 5 are very rarely used, just for very difficult files.

The quantification of this variable has at its basis the input value of the ponderal weight, in fact, according to it, there will be two possibilities of calculation:

- If the ponderal weight is higher than 3, then:

$$\big((Ponderal\ weight - 3) \times 0{,}1 + 1\big) \times Std\ Time \times (1 + File\ lenght)$$

Equation 8 - File complexity if ponderal weight is higher than 3.

The higher the weighted weight, the more complex the file will be, thus the longer it will take to analyze it. Note how a weighted weight greater than 3 will constitute a 10% increase over the standard time.

- If the weighted weight is lower than 3, then:

$$(1 - (3 - Ponderal\ weight) \times 0{,}1) \times Std\ Time \times (1 + Lenght)$$

Equation 9 - File complexity if ponderal weight is lower than 3.

The standard activity time will be less, as it will be more accessible to analyze the file.

6. Completeness of information

The completeness of information is a very important variable in the conduct of court proceedings. In fact, it not only takes into account the correctness of the information at the moment a lawyer submits the file, but also aims to quantify the possibility of data loss throughout the process, a very crucial aspect given the numerous and intricate steps of file delivery. Another aspect that this variable holds against is the loss of visibility of the work performed upstream when the next activity begins. In fact, it is often the case that the actor who starts his or her own relevant activity is unaware of what his or her colleague did previously and finds himself or herself having to make the same arguments all over again. This approach entails great operational risk, but it also spells disaster at the organizational level, since many steps turn out to be redundant and without added value.

Clearly, the more a file is managed digitally, the less risk there is of losing information and not keeping track of it.

The parameters that impact this activity are information correctness, the ponderal weight and the standard time.

Information correctness is a random variable, which depends on the timeliness of the information contained of the file. The ponderal weight, as analyzed in the previous point, is an input variable that quantifies the complexity of the file.

Based on the ponderal weight, the variable will be quantified as follows:

- If the ponderal weight is higher than 3, then:

$$\frac{\big((Ponderal\ weight - 3) \times 0{,}1 + 1\big) \times Std\ Time}{Information\ correctness}$$

Equation 10 - Completeness of information if ponderal weight is higher than 3.

The higher the ponderal weight, the longer it will take to analyze the file. The timelier the information, the closer the time will be to the standard activity time.

- If the ponderal weight is less than 3, then:

$$\frac{(1 - (3 - Ponderal\ weight) \times 0{,}1) \times Std\ Time}{Information\ correctness}$$

Equation 11 - Completeness of information if ponderal weight is lower than 3.

If the ponderal weight is less than 3, then the standard activity time will be less, as it will be more accessible to analyze the file. The timelier the information is, the closer the time will be to the standard activity time.

7. Waiting time before submission

The purpose of this variable is to analyze and, in turn, quantify the amount of time it takes before a file is handed over to the next activity for the downstream process to begin.

In order to quantify this variable, it was assumed that an operator does not forward file by file to the next office but waits to process a certain number of files before letting the file continue on its path. Obviously, this variable is used just in the AS-IS simulation, where can be found paper cases, instead in the TO-BE simulation it will not be taken into consideration since there will be just telematic cases.

The parameters that impact this variable are the standard activity crossing time (T), the batch size (Q) and the number of files processed (n).

The task *crossing time* (T) corresponds to the standard time required for the resource to perform all the tasks that make up the task block assigned to it.

The number of files (n) worked depends on the number of resources executing the set of tasks in parallel, in fact if two resources work in parallel, the task traversal time is not improved, but simply the output is twice as long for the same amount of time.

Finally, the *batch size* (Q) required recourse is the total amount of files that must be processed and collected before the next block of activity can be accessed.

Thus, this variable serves as a buffer between blocks of activity, especially in the transition part between receiving and filtering, as it is considered appropriate that to reduce travel time between offices, it is more efficient to collect a number of files together and then send them contextually to the next office.

It is calculated as an average storage time between the maximum waiting time ($\frac{Q \cdot T}{n}$) and the minimum waiting time.

To recap, under the assumption that the Supreme Court operates on a batch logic, that is, before sending files from one office to another, there is a time to collect n files before sending them to the next office so as to reduce travel time between offices. The waiting time between two mailings will then be the average time between the minimum wait and the maximum wait.

The formula for calculating the variable is given below:

$$\frac{\left(\left(CEILING\left(\frac{Q}{n}\right) * T\right) + 0\right)}{2}$$

Equation 12 - Waiting time before submission.

Once all the variables were well defined and delineated, it was time to create to create an excel model, which, for convenience in the subsequent study, was divided into stages.

The starting point was to unpack all the activities in each macro phase, reporting the typology, to keep track of whether that activity was a trigger activity or whether it was in parallel with another.

Where possible, multiple activities were merged, since they were either time-irrelevant when considered individually or very similar to each other and therefore by nature to be considered together.

Once the set of activities were listed and categorized, the variables, listed above, that could impact performance were assigned to them. Indeed, it is possible for an activity to have multiple variables or for an activity to have no relevant variables.

Finally, the estimated time was calculated, both in minutes and days, by applying to the standard time the variable increment identified in the previous step.

Type	Task	Variables	Standard Time (min)	Estimated Time (min)	Estimated Time (dd)
XOR	Caricamento atti mancanti	Velocità di gestione media operatore Correttezza informazioni	10	13,4	0,23

Table 3 - Extract of the excel model.

The table above is an example of what was previously explained. In this case the activity in question is "loading missing deeds" being part of the receiving macro phase. As can be guessed from the type, this activity at the flow is in an "XOR," so the flow where the activity is located will be activated only when a certain condition occurs.

Sheets from this model will be available in the annexes.

Through the construction of this model, it was possible to quantify the time it takes for a file to be processed from start to finish.

However, for the purposes of this research in order to be able to analyze the objectives set, it is necessary to have a dynamic model that allows to take into account the temporal evolution of the process, the resources involved and, above all, the queues that could be created due to a misalignment between the timing of the downstream and upstream activities.

All of this is crucial, not only to understand whether the civil process is able to reduce pendency and stay within the ranges set by the NRP, but more importantly to analyze directions for improvement to make processes more efficient and to eliminate, or at least dampen, bottlenecks.

The tool used to meet the needs previously discussed was Signavio Simulator, a professional tool made available by software vendor SAP. The tool in question, through the loading of process mappings written according to the BPMN language, allows the simulation of process flow by entering input data.

The input data required, in addition to the mappings, are the timing of individual activities, which can be extrapolated from the excel model, the percentage of activation of "XOR" flows, the resources employed in each lane, the number of files entering the processes in a fixed time frame, and the cost of these resources. Regarding the last point, it will not be considered in this study, as it is outside the scope set by the research questions and, therefore, will not be used. The resources used in each lane were found both from the questionnaires forwarded to the Court, from preliminary interviews, and from the analysis of confidential documents produced by Deloitte's study. The activation rates of "XOR" flows, such as file delivery methods, paper, postal, and electronic, were identified through the questionnaires forwarded to the Court. The number of incoming files in a set time frame is a figure made available from both analyses and forecasts made by the Supreme Court and Deloitte.

The power of this tool is twofold: the construction of a dynamic model, and the ability to create a sensitivity analysis, therefore going to investigate how the timelines might change as a result of a change in some input variable, such as an increase or decrease in resources to a given office, or a change in the activation rates of "XOR" flows. All of these analyses help to gain a deeper understanding of what corrective action might be implemented to achieve performance improvement, but more importantly it helps to identify bottlenecks.

The output provided by the tool is a dynamic visualization of how the file moves through the entire flow; in fact, it is possible to visualize the progress of each activity, the number of activations of each "XOR," and the queues that are created at the most critical activities. This simulation can be set up either on the individual activity, the individual flow or the entire process. Once the development of the simulation is finished, the tool provides a report, where a lot of relevant information is shown, such as the timing, workload of each activity, resource saturation and likely bottlenecks.

It is necessary to emphasize how complementary Signavio's excel model and dynamic model are; in fact, neither would make sense without the other. These two models were built to be updated at the same time, since the former model allows for analyses of how individual activities might vary as micro variables change, while the latter is useful for delineating the impact of macro variables on the entire process. Therefore,

the excel model focuses on a more detailed view and the dynamic model on Signavio is focused on providing a general view over time of the totality of processes.

It is specified that in order to be sure to use models are coherent with the actual processes, a validation of the two was carried out by exploiting historical data from the Supreme Court. Historical data was included in both simulations, excel model and Signavio simulation, with the aim of ascertaining that the results provided by each model was not greater than a 10% deviation. The results of the validation process argue that the models developed were in line with scenario of the Court and, therefore, could provide a model describing the Supreme Court processes and how they might operate in the future after the implementation of possible corrective changes.

4 Results

Having outlined the context that prompted the Italian State to call for a season of profound reforms, analyzed the world of Italian Justice and in particular the Supreme Court and introduced the tools necessary to carry out this work, it is now possible to observe and present the results of the study undertaken.

It is appropriate to emphasize that some issues are simplified with respect to the complex reality, otherwise it would have been almost impossible to produce such results. In fact, the goal of this project is to understand if and how the Supreme Court can improve its performance by implementing corrective actions and not to calculate precisely the time needed to carry out a single activity. Of course, all the results reported below are plausible and, despite some assumptions, are remarkably close to the actual data, as demonstrated through a historical validation of the simulations.

This chapter will first present the mappings of the processes in their current state and then show the simulation data of the same. Next, the processes will be put under the magnifying glass with a critical look so as to highlight the critical issues that do not allow adequate efficiency to be achieved and that will be the basis for identifying possibilities for improvement.

Finally, TO-BE mappings will be illustrated, i.e., mappings with those changes that could increase performance, supported by simulation data that will demonstrate the benefits that the hypothesized proposals could bring.

4.1. AS-IS Process Mapping

Thanks to the path undertaken, through the workshops organized with the Supreme Court and the questionnaires forwarded, it was possible to learn the organization of each macrophase, the flow of activities and the actors that are involved in each of them.

The starting point was the interview forms which provided an organized view of the enormous amount of information received during the meetings. Through the use of Signavio's tool, it was possible to construct process mappings according to the BPMN language.

The mappings of each macrophase can be found in the annexes A.2, and all the peculiarities related to each of them will be analyzed below.

4.1.1. Reception and Filter

The first mapping refers to the macrophases of receiving, i.e., the activities related to the receipt of the file by the Court of Cassation, and filtering, i.e., the activities related to the sorting of the files to the relevant sections to then be processed according to the matter at hand.

The decision was made to combine the two macrophases into a single mapping because there is no real division between the two processes, so in order to have objective continuity with the actual organization of activities they were merged.

The mapping in question, until December 2022, had twelve wools and the main offices are the Central Registry and the VI Section.

The process is initiated by the lawyer submitting the file to the Supreme Court, and this can be done through three distinct delivery channels: hand delivery, postal delivery, and telematic delivery. In the first two cases files will be received in paper format, while in the third case the files will be in digital format viewable through the "PCT" management system.

If the lawyer opts for hand delivery, he or she will go in person to the hand filing unit of the filing office and two separate streams will be activated based on whether he or she is filing a main appeal or a counter-appeal/cross-appeal. In the former case, the operator will book the roll number and generate the general registry number using the "SIC" management system. Completion of the appeal form and printing of the label can be carried out either by the operator himself or the file can be directly sent to the upload unit, which will complete these activities. If, on the other hand, the lawyer submits a counter-appeal, the operator, after searching the appeal through the roll number and entering the counter-appeal data into the system, will send the file to the temporary archive of the Central Civil Registry.

In the event that the file is received by the Court of Cassation through the postal channel, the operational procedure will be the same as described above with the only difference being that the operator handling it will be part of the postal filing unit of the filing office.

Instead, telematic delivery is handled by the operators of the filing office's uploads unit, who check every 24 hours for the receipt of new appeals and take action to open and take a new appeal. At this time an initial check of the information entered by the lawyer takes place, and if any fatal errors are present, the filing is rejected, and at the same time a notice is sent via PEC to the lawyer. Otherwise, the filing is accepted, sending a positive communication to the lawyer, and the general registry number is generated through the "SIC" management system with the subsequent creation of an empty folder with the printing of the label.

Up to this point, files from different receiving channels follow different routes and transit through different offices. From the moment the labels are printed, all files are

sent to the temporary archive of the Central Civil Registry and no more differences will be made on the operational mode of processing. The file, once it arrives in the temporary archive, must wait 90 days before being forwarded to the back office, also known as the PietroStefani Room.

The back office is responsible for reviewing the file prepared by the front office on SIC to possibly supplement missing documents and merge the file with possible counterclaims. It then analyzes whether the file is the jurisdiction of the united sections or whether it should be forwarded to the VI Section. This decision is made on the basis of the subject matter of the file, if it submits a question of principle of particular importance or a question of law decided differently by the simple sections (Lombardo, 2022).

If it is ordered that the Court rule in the United Sections, the file is transmitted to the Clerk's Office of the United Sections and the trial ends.

Otherwise, the file is forwarded to the office of perusal of the VI Civil Section, which is responsible for both extracting the fascicle for transmission to the relevant sub-section and forwarding it to the VI Section archives where it will be filed pending the hearing.

Once the file arrives in the plain subsection in VI Section, it will be taken over by a UPP officer who, after a data check and careful analysis, will indicate whether the file can be processed either in VI Section or whether it is the responsibility of the ordinary sections. Based on this report, the subsection stripping magistrate in VI Section, after a review of the file, will decide whether or not it will be finally settled in VI Section. If it is decided in VI Section, the reception process will end, otherwise the file is sent to the perusal office of the Clerk's Office of the VI Civil Section who will join the file to the civil file and then deliver it to the Clerk's Office of the Ordinary Section where the trial will end.

The digital tools used during these two phases are mainly the PCT, the SIC and the CSC which allow to achieve a partial, although low, digitization of the processes.

As it is possible to notice the reception and filtering process is far from linear and exchanges between offices are frequent.

4.1.2. II Section Examination

Following the filtering stage, if the stripping magistrate decides that the file cannot be processed in VI Section, the file is forwarded to the appropriate ordinary section. In this case, the examination phase related to the II Civil Section is processed.

The file arrives at the Section Registry and, in the first instance, will follow two different routes depending on whether it is paper or electronic. In the first case, a simultaneous check is made six whether all the data are registered correctly on SIC

and whether all the files indicated in the list accompanying the transfer are included. Once this double check has been carried out, the file is split into: office file, which is made available for examination, and the civil file, which will be filed pending the hearing by the section archive. If the file reaches the Clerk's Office in telematic format, the appeal is immediately searched on the SIC management system.

From now on, there will be no flow-level differentiation for dossiers in different formats. Before further processing, it is necessary to indicate whether or not the file is to follow the fast track, which is activated for files containing issues with nomofilactic relevance and appeals already processed in VI section. Files to which the fast track is assigned are merged pending a hearing and the trial ends. If the file does not enjoy the fast track, it is handed over to a UPP clerk who is responsible for both filling out the examination form, which is necessary for establishing the ponderal weight, and for verifying that the matter indicated by the lawyer is correct.

Finally, the file is forwarded to the examination magistrate, who, after verifying the examination carried out earlier, looks up the general ledger number and records the examination form on SIC so that he or she can file the file pending the hearing and have the trial terminated.

As can be seen, the only digital tool, which is sparsely used, is the SIC management system.

4.1.3. IV Section Examination

The IV Civil Section is in charge of processing files comprising labor-related matters. As previously described, once the file arrives in the Section Registry it will follow two different streams depending on whether it is paper or telematic. In the first case it is checked simultaneously six whether all the data are registered correctly on SIC and whether all the files indicated in the list accompanying the transfer are included. Once this double check has been carried out, the file is separated into office file, which is made available for examination, and civil file, which will be filed pending the hearing by the section archive. If the file reaches the Clerk's Office in telematic format, the appeal is immediately searched on the SIC management system.

From this point on, there will no longer be a distinction regarding file formats. The Clerk's Office is then responsible for skimming by sub-subject, which may be indicated at the docket entry stage or sometimes by the VI section stripping magistrate on the file cover. Depending on the sub-subject, the file may be sent to the welfare, public or private sub-section. In the former case, the file transits through the hands of the chairman of the welfare sub-section to be passed on to the UPP officer of the sub-section.

The latter is in charge of filling out the examination form, which can be done either through the magistrate's desk, SIC or in a hybrid mode (paper or PCT), so as to proceed to filing pending the hearing by having the process concluded.

In the case of a file reporting a related matter to the public, from the Cancelleria it is forwarded to the stripped magistrate of the public sub-section who will be in charge of filling out the stripping form, again through the three different modes previously described, so as to proceed to filing pending the hearing and bringing the process to an end.

If the private's flow is activated, the file is first sent to the private's sub-section archive to be filed in chronological order. It is then forwarded to the UPP clerk who must identify whether the file is interconnected by matter or issue to another. If it is interconnected to another a search is made on SIC by general registry number and abstract. If it is not, the clerk will be responsible for filling out the examination form, where he or she must report the subject matter, compliance or noncompliance of the court and the Court of Appeals, a description of the reasons for filing the appeal, incompatibility with counsel, and timeliness of the appeal and counter-appeal.

Once these activities are done, the UPP officer will prepare the files for the telematics hearing and the process will be finished.

The digital tools used at this stage may be the magistrate's desk, SIC or PCT.

4.1.4. V Section Examination

The Fifth Civil Section is in charge of processing files comprising tax-related matters. As previously described, once the file arrives in the Section Chancery it will follow two different flows depending on whether it is paper or telematic. In the first case, it is checked at the same time six whether all the data are registered correctly on SIC and whether all the files indicated in the list accompanying the transfer are included. Once this double check has been carried out, the file is split into office file, which is made available for examination, and the civil file, which will be filed pending the hearing by the section archive. If the file reaches the Clerk's Office in telematic format, the appeal is immediately searched on the SIC management system.

Subsequently, the file, before becoming the jurisdiction of the UPP, is also transmitted to the "Guardia di Finanza". The Process Office will perform the filing for the appeal and simultaneously proceed to the data entry and shared folder creation phase. During information entry, the grounds numbers and the ponderal weight are given. The opening of the shared folder is done taking into consideration the type of offense, direct taxes, harmonized tribunals or local tribunals, and other taxes.

Once these activities are completed, the file is sent back to the Guardia di Finanza, which is responsible for filing and forwarding it to the stripper of the relevant sub-section.

The stripper will be responsible for creating the hearing roles, assigning the relator, and issuing the fixation decree by which the trial will be terminated.

The digital tool used during this phase is only the SIC management system.

4.1.5. Hearing and Post-hearing

Once the examination phase is completed, the file is ready to be tried during the hearing phase. The hearing and post-hearing phases have been merged because they are successive phases and there is no clear and substantive differentiation, so, for continuity of the process, they have been combined.

At this stage of the process, the file is in the Section Chancery, which is responsible for entering the hearing roster into the SIC system and provide for sending the documents to the General Prosecutor's Office for the definition of the measures.

Once the measures have been defined, they are entered into the system by the Clerk's Office, which will also handle the filing of the documents by the attorneys before proceeding to send the file to the College and the rapporteurs. The latter deal with the definition of the outcomes, to the drafting of the orders and request the filing of the minute, which, after being filed in the Clerk's Office, is sent to the Section President for countersignature.

Once the minute is countersigned, the order signed by the President can be published by the publication office and then checked by the Clerk's Office, which at the same time will take care of telematically notifying the lawyers of the judgment. Finally, the file, after passing the check for completeness and correctness, is filed and the trial ends.

The digital tool used during this macrophase is only SIC.

4.2. AS-IS Simulation

As previously mentioned, the software used to dynamically simulate the *as-is* and *to-be* processes is Signavio Simulation. This tool is capable of, through receiving a variety of inputs, precisely and effectively point out the output of the process in terms of files. Moreover, it also defines the bottlenecks of the process, or section of a process, and the workload of each and every resource employed. Keeping in mind that, it was necessary to split the Macroprocess into four Sub-Processes. This was decided due to a combination of concurrent causes; for instance, focusing on the Sub-Processes allows

for a higher degree of precision in the establishment of bottlenecks and resources utilization. Indeed, while considering the Sub-Process, it is easier to spot criticalities, since data collected and analyzed are a lot more specific. The second reason instead, was a far more practical one; the simulation software was only able to process 10.000 queue instances before halting, due to a lack of processing power. Considering that the input files were in the order of magnitude of hundreds of thousands, it is therefore clear that producing such queue is rather easy, since in proportion it represents only 5-10% of the initial input.

However, focusing on the Sub-Processes has also its drawbacks. For starters, the focus on the globality of the Macro-Process is partially lost, since the focus is shifted from the process as a whole, to a number of sub-processes. As such, some information might get lost, and therefore after all the analysis are done for each stage of the process, it is required to collect all the data, and analyze the process in its entirety, focusing on whether the targets set have been achieved or not. Moreover, following the previous point, the target defined in the PNNR are all relative to the Macro-Process and not on the specific Sub-Processes, as such, once the analysis are completed, there must be an additional stage where data are aggregated as to be comparable with the targets set. :

- Reception. This phase goes from the activity of receiving the file from the lawyer to the dispatch of the file from the back-office to either the VI section or the United Sections. It was decided at this stage of analysis to separate the Reception and Filter due to the significant number of queue files that otherwise would have generated;

- Filter. This phase starts with the receiving of the file from the Civil Registry in the VI section to the sending of the file to the Registry in the ordinary section;

- Examination. Unlike the previous phases, and also the last one, this phase sees three different Sub-processes, based on the matter of competence of the file. Indeed, we differentiate the examination in II Section, in IV Section, and in V Section. Although having activities that are vastly different in nature, all of the sub-processes start with the receiving of the file from the Registry of section, and end with the scheduling for the hearing, also done by the Registry of section;

- Hearing and post-hearing. This phase starts with the insertion of the hearing role from the Registry in the ordinary section and ends with the publication and storage of the file within the Court's archive.

4.2.1. Scenario Creation

For each of the mentioned sub-processes, a work of data insertion has been carried out, and will be mentioned in the following chapter. Before doing so, it is crucial to

highlight that for all the phases four different types of scenarios have been produced, that only differ on the basis of the times entered. Indeed, one of our assumptions was to keep for all scenarios the same inputs in terms of resources and frequency, and only to play on the times. From this, the following scenarios have been created.

- A punctual scenario.

- A variable scenario.

- An optimistic scenario.

- A pessimistic scenario.

While the first was thought to be value adding only to the final user (i.e., magistrate, counselor, chairman), as it enables the user to acknowledge precisely how a process changes in terms of outputs generated when specific inputs are modified (i.e., resources, times, files in input…), the latter three are used by our end to conduct a sensitivity analysis that will be discussed further on.

Spoglio II sez	2	3	4	6	7	8	10	12	13	17	18	21	22:23	24	27	28	29	30	31	32
Velocità di gestione media operatore		79,82	59,28	11,97		59,28	11,97		11,97		7,15		112,25				39,19	19,59	14,80	14,80
Tempo standard attività		66,67	49,50	10		49,50	10		10		5		88,13				26,48	13,24	10	10
Fattori esogeni		17%	17%	17%		17%	17%		17%		15%		6%				18%	18%	18%	18%
Esperienza		98%	98%	98%		98%	98%		98%		80%		83%				80%	80%	80%	80%
Problemi tecnologici			49,50			49,50											26,48	13,24		
Tempo standard attività			30			30											20	10		
Knowhow operatore			76%			76%											94%	94%		
Attesa prima dell'invio					374,54									321,01						
Tempo attraversamento richiesta di ricorso					187,3									160,5						
Fascicoli lavorati					1									1						
Grandezza lotto richieste di ricorso					4															
Tempistiche consegna da uffici interni	36,20							41,92		36,59		48,25				33,80				
Perdita fascicolo	21%							40%		22%		61%				13%				
Tempo standard attività	30							30		30		30				30				
Complessità fascicolo													66,1			23,3				
Peso ponderale fascicolo													3			3				
Lunghezza fascicolo													22%			22%				
Tempo standard attività													85			30				
Completezza Informazioni		66,67											88,13			31,10				
Correttezza info		75%											75%			75%				
Peso ponderale fascicolo		3											3			3				
Tempo standard attività		50											66,1			23,3				

Figure 27 - Example of the Excel model

The punctual scenario is the simple transposition of the times obtained in the Excel file for each activity of the process, as we can see in the images below. As previously said it had to be a simple, yet effective, tool that a user with little-to-no IT knowledge can use to determine whether the changes brought to the organization have a positive or negative impact in terms of performances of the process.

6.	Registrazione provvedimenti anche con copia digitale	00:25:18	...
7.	Gestione del deposito degli atti da parte degli avvocati	00:12:54	...
8.	Aggiornamento del fascicolo	00:53:06	...

Figure 28 - Example Signavio simulation tool

The *variable scenario* was also created based on the Excel model, but instead of giving a single value of time to complete a task, it creates a range of time. In particular, said

range goes from the minimum possible time required to complete the action, to the maximum time, and it is distributed uniformly. As a result, due to the rule of large numbers, for each activity the median time is taken into consideration by the simulation software. Both the minimum and maximum time required by the task are calculated from the Excel file, since all of the parameters affecting the action are defined with elements of uncertainty (i.e., random variables). Whenever a task has two or more parameters that affect its time to completion, the variability of said action will increase proportionally to both the number of parameters (i.e., a task can be influenced by the expertise of the operator AND by the probability of encountering technological problems) and the index of variability of the parameter (i.e., the probability of encountering technological problems affects the time to completion in a much more serious way than the expertise of an operator).

6.	Registrazione provvedimenti anche con copia digitale	00:15:00 - 00:48:00	...
7.	Gestione del deposito degli atti da parte degli avvocati	00:10:00 - 00:16:00	...
8.	Aggiornamento del fascicolo	00:27:00 - 01:26:24	...

Figure 29 - Example Variable scenario

The *optimistic scenario* has been computed taking in consideration for each task only the minimum time required, and as such indicates the minimum cycle time for the sub-process, or in other terms, the maximum amount of output files achievable having fixed the resources.

Registrazione provvedimenti anche con copia digitale	00:15:00	...
Gestione del deposito degli atti da parte degli avvocati	00:10:00	...
Aggiornamento del fascicolo	00:27:00	...

Figure 30 - Example Optimistic scenario

The *pessimistic scenario* is the dual version of the former, as it has been created using the same logic, but with the maximum amount of time for each activity. The goal behind the creation of the latter two scenarios was to understand formally the variability of a subprocess in terms of outgoing files.

Registrazione provvedimenti anche con copia digitale	00:48:00	...
Gestione del deposito degli atti da parte degli avvocati	00:16:00	...
Aggiornamento del fascicolo	01:26:24	...

Figure 31 - Example Pessimistic scenario

4.2.2. Data Population

For all the sub-processes the same methodology has been followed to populate the simulations.

The first step requires plugging in the Signavio Simulation the process maps of the *as-is* situation. Automatically, the software allows to insert a number of input variables, of which much attention was focused on the resources, on the frequency, and on the time tabs.

Indeed, the second step was to enter the number of resources and their daily schedule of working hours. In this case, the assumption was that all resources work the same number of hours, independently of the job carried out; eight hours a day for five days a week, for a total of forty hours a week per each resource. Regarding the number of resources employed for a set of activities, the interview and internal documents of the Supreme Court have been employed to estimate at the best of the possibilities the precise amount for each group of tasks.

Thirdly, the frequency tab requires as inputs both the gateway distribution (how likely it is for a file to go to a branch of the gateway), and the input files. As a matter of facts, Signavio Simulation is a push tool simulation, where the user has to know a priori the number of input files that will go through the process. This also means that the productivity of the process will never exceed 100%. In practice, the gateway distribution was rather easy to obtain directly from the Court, while the input files were determined on the basis of past data, as to be as precise as possible.

	Decision: la materia indicata dall'avvocato è corretta?	
1.	no	25%
2.	si	75%

Figure 32 - Example of gateway distribution

Finally, for obtaining the times to plug in the simulation tool, for each scenario, it was firstly needed to enter in the Excel model the standard time for each activity. Said time was either given from the Supreme Court itself or has been estimated on the basis of past data. Indeed, the majority of the work conducted has revolved around the estimation of the standard time for the activities that the Supreme Court could not supply, either because these tasks were too specific, or because they were too inconsistent. In order to be as precise as possible regarding the estimation of the standard time, an historical approach has been followed. In fact, using data from the past, it was possible to feed the simulation with a similar number of files of a given year as input, and modify accordingly the standard times in order to have similar results in terms of output to what happened in reality. In this sense, the Excel model created originally has proved to be extremely consistent with the historical data, since only in very rare instances it was necessary to adjust the timings set. Indeed, the most critical part has been the Hearing phase, where more adjustments have been needed, especially on the variability of the model.

4.2.3. Simulation Results

The simulation for all of the stages of the process has been playing for 365 days, as effectively the Supreme Court does not have a closing period, and the simulation tool allows to take into consideration holidays. However, the Reception and the Hearing and post-hearing stages included time events in their processes, that effectively block the process for a defined amount of time. Since the simulation is not a continuous process, but rather one specific instance of it, these events compromise significantly the efficiency in the simulated case, as after the 365 years have elapsed, a good number of files are still blocked by the time event, while in reality since files continuously enter in the system, there is no issue whatsoever. For this reason, it was opted to prolong the time horizon of the simulation of the amount specified in the time event, in order for the simulation tool to have a grasp of what really happens in reality.

In the Reception phase, the software showed that on average 42.653 files were managed by the sub-process in the face of 44.370 files received as output, granting a productivity level, defined as output generated over input received, of 96.1%. Of the 42.653 handled files, 21.054 will go to the United Sections, 19.072 to the Ordinary Section and 2.077 will be shipped back to the lawyer because of fatal errors. Unsurprisingly, in the optimistic scenario there is an increase in the productivity, setting at 99.1% with 43.987 handled files, of which 21.507 will be deposited in the United Sections, 20.403 in the Ordinary Section, and 2.077 not accepted because of critical errors. Regarding the pessimistic scenario instead, there is a significant drop in the received files as input. As it will be later discussed, the main reason behind it has to do with the simulation computational power, as too many queue instances were

generated, and as such the simulation has halted preemptively. As such also the productivity level has resented; indeed, while its relative performance (calculated as
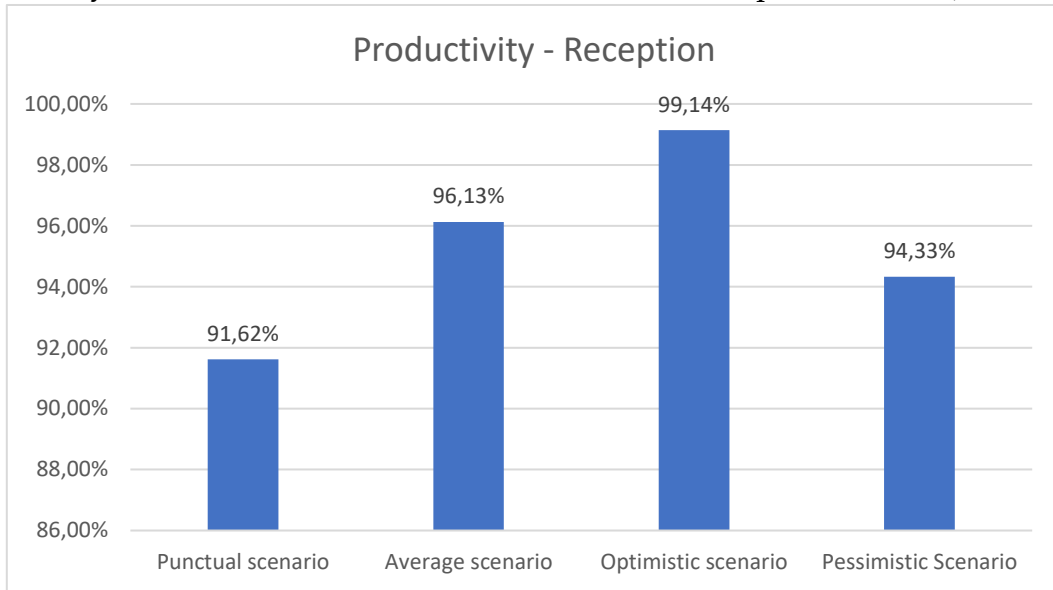
Graph 1 - Productivity level Reception

input files of the scenario divided by the output files of the scenario) is around 94.3% with 37.193 handled files over 39.428 received files. However, this percentage drops to 83.8% when the output files are compared to the input files of the optimistic and variable scenario. As such, this scenario is relatively efficient, but comparatively inefficient. Finally, also the punctual scenario was tried. As expected, its productivity fell between the optimistic and pessimistic scenario, leaning in this specific case more towards the latter, as its productivity stands at 91.2% with 38.573 handled files over 44.370 received files. In the graphs below, it is possible to look at the productivity levels and the distribution of handled files.
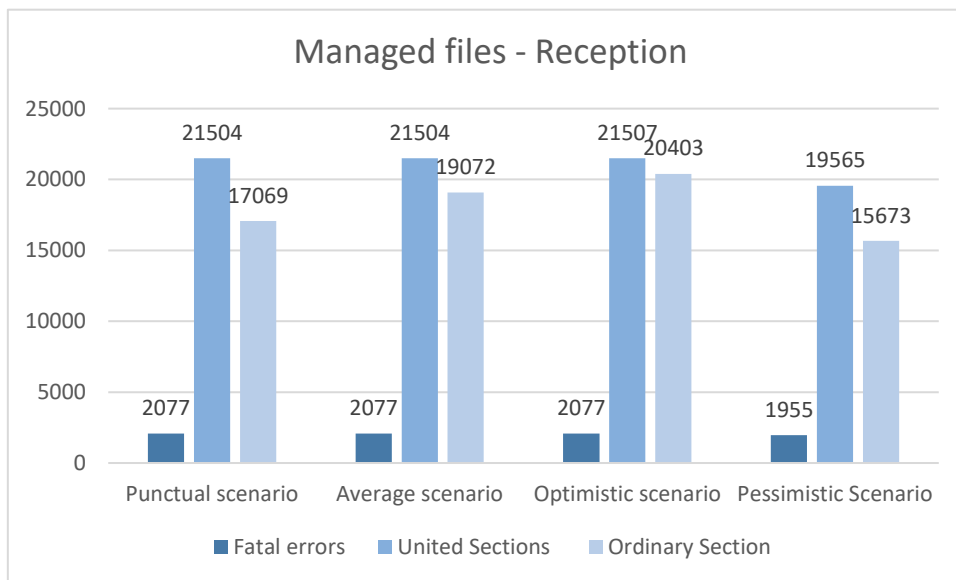
Graph 2 - Files managed Reception

Regarding the Filter phase, even though this phase will cease to exist in the to-be solution, due to the suppression of the VI Section, results are shown below for the sake of completeness. The variable scenario reached a productivity level of 99.8% which is very close to the optimistic scenario, standing at 99.9%. Indeed, the variable scenario was able to process 37.784 files, while the optimistic 37.806. The pessimistic scenario on the other hand processed only 6.969 instances. This result can be explained by an over-exaggeration in the estimation of the standard time in the Excel model, although, as stated before, it brings no real threat to the integrity of the model, nor it poses threats to the creation of a *to-be* solution. As such, we report it in the limitation section. The punctual scenario's productivity stands at 95.6% with 36.169 instances completed. Below the graph shows the results.
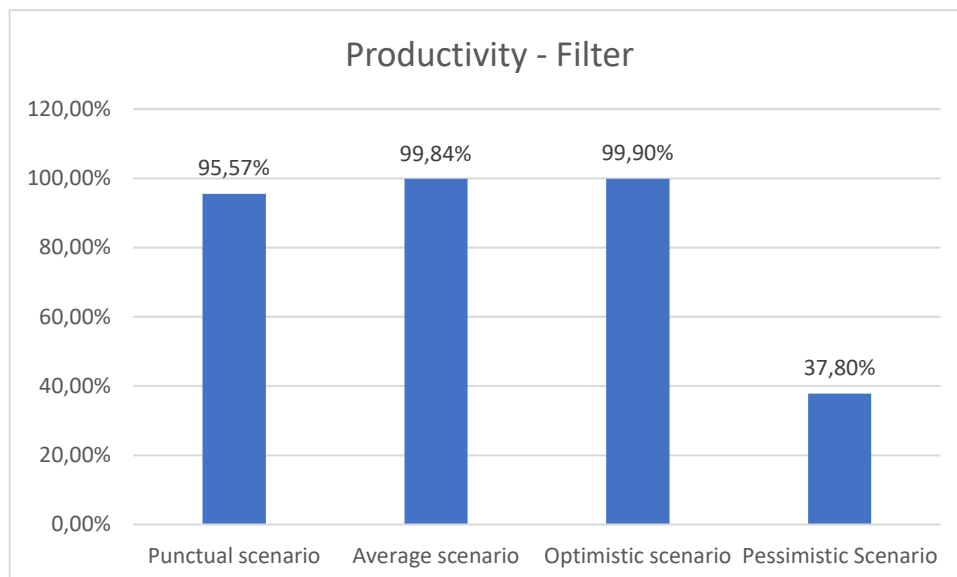
Graph 3 - Productivity level Filter

Following, the results of the Examination are shown. Starting with the Examination in II Section, the average scenario sees a productivity level of 83.7%, with 4.150 handled files over 4.959 received files. Intuitively, the pessimistic scenario reached a much worse level of performance, around 49.83% with 2.471 handled files over the same 4.959 received files. Despite the significant drop in performance, where results are far from ideal, the pessimistic scenario was not too far from the historical data. On another note, the optimistic scenario cleared 4.949 files, with a productivity of 99.8%. Finally, the punctual scenario had an intermediate performance, leaning towards the average scenario, with a performance level of 74.1%. Following, the graphs of this specific phase of the process can be consulted.

Productivity level - II Section Examination
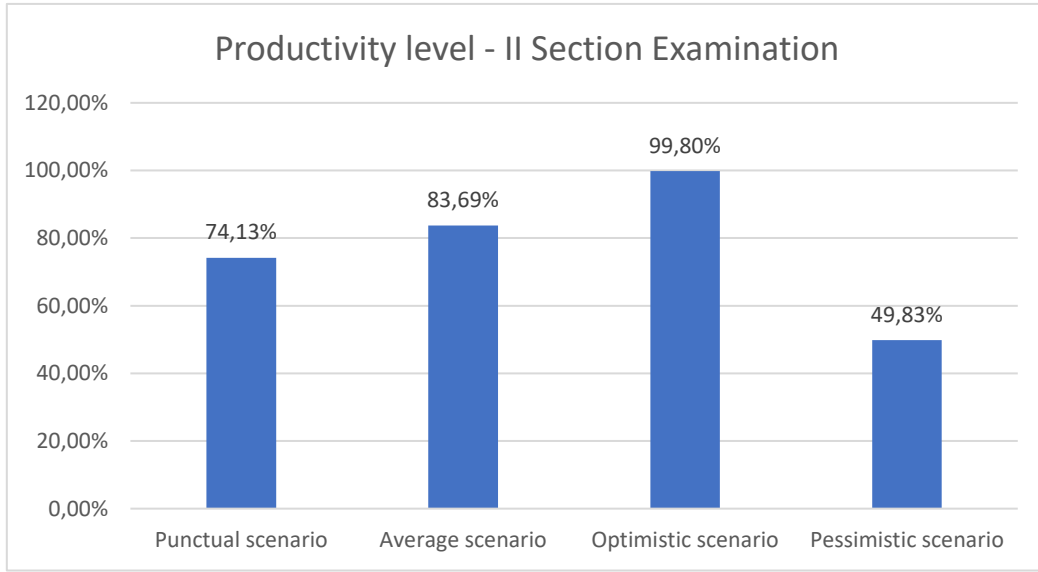
Graph 4 - Productivity level II Section Examination

The Examination in IV Section carried out similar results to the II Section, although less variable. Indeed, the variable scenario had a relative productivity level of 87.1% with 4.321 handled files over 4.959 received. The optimistic scenario once again scored very close to the 100% mark, with a productivity of 99.3% and 4.925 handled files, while the pessimistic scenario as above mentioned, was far more productive than the previous Section. Indeed, the performance level was at 76.1% and carried out 3.777 files. Lastly, the punctual scenario was closer to the optimistic scenario, carrying out 4.900 files, with a productivity of 98.8%. As per usual, results are shown in the graph below.

Productivity level - IV Section Examination
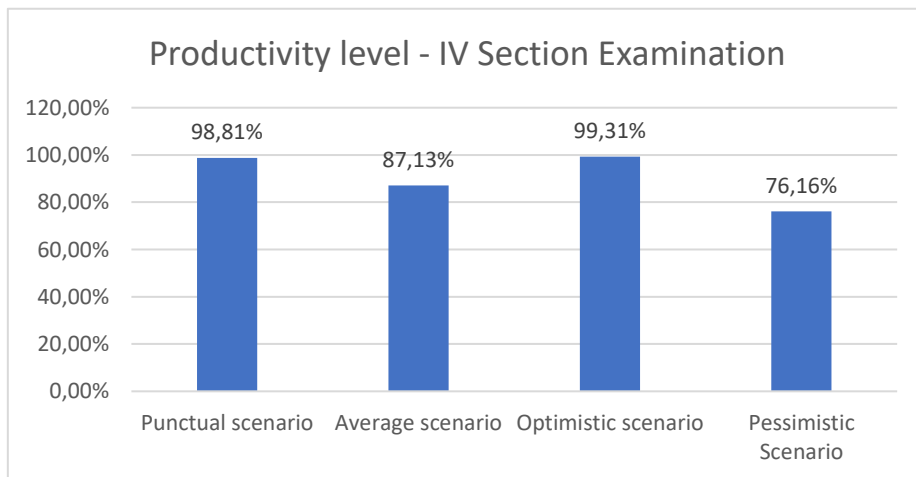
Graph 5 - Productivity level IV Section Examination

The V section had the most files to work on, according to historical data. In fact, considering the variable scenario, 12.048 files were managed against 13.050 received, with a 92.3% productivity rate. This is sensibly higher, in terms of raw number, compared to the previous sections. It is therefore reasonable expecting a sensibly higher drop in performances during the pessimistic scenario, as higher number of files implies directly more possibilities ofbottlenecks. Indeed, the pessimistic scenario shows a drop in performance to 49% with 6.392 files handled. The optimistic scenario on the other hand shows comparable level of performances of the previous sections, having managed 13.022 instances with a productivity of 99.8%. Finally, also in this case, the punctual scenario leans towards the optimistic scenario, having a productivity of 99.7% and managing 13.011 files.
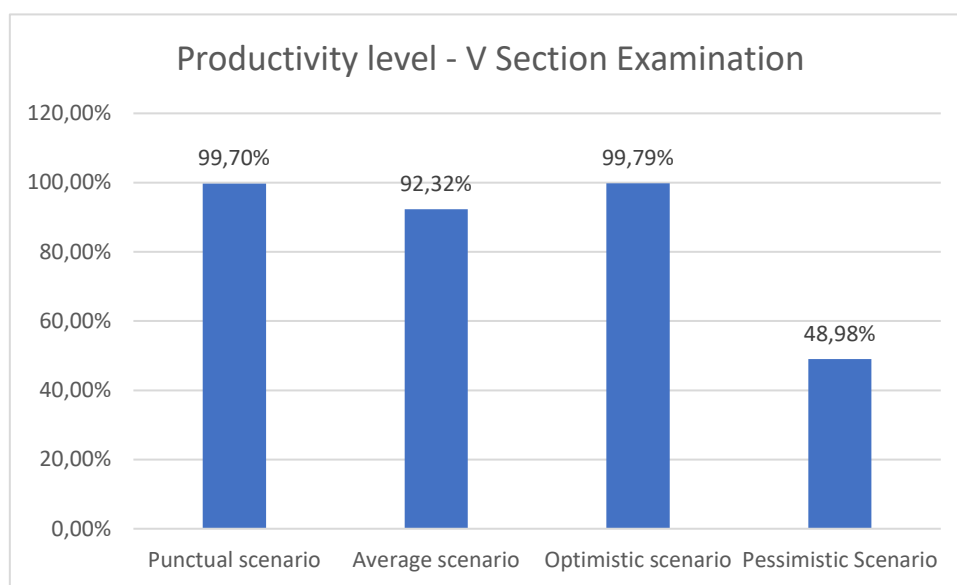
Graph 6 - Productivity level V Section Examination

Lastly, the hearing and post-hearing phase proved to be particularly intensive to model, especially regarding the pessimistic scenario. This was mainly due to the uncertainty of timings to assign for each activity, as process mapping was higher level, and the Supreme Court was not able to provide precise values for the timings. Moreover, the working hours set for the Magistrates have been considered as eight hours, while in reality they do not have a precise timesheet. Nonetheless, the variable scenario gave 16.018 files against the 19.863 fed to the simulation, with a productivity of 80.8%. The optimistic scenario instead was able to complete 99.6% of the instances that travelled the scenario, completing 19.748 files, while the pessimistic scenario was only able to process 3.284 instances. Acknowledging that this last result is particularly worrying, it was decided that, given that this phase of the process is particularly problematic already, and that data is rather unclear for the reasons above, we decided to keep the data as it is, and to stress it out in the limitations section. Finally, the

punctual scenario was closer to the average scenario and reports a productivity of 77.1% and 15.296 files managed.
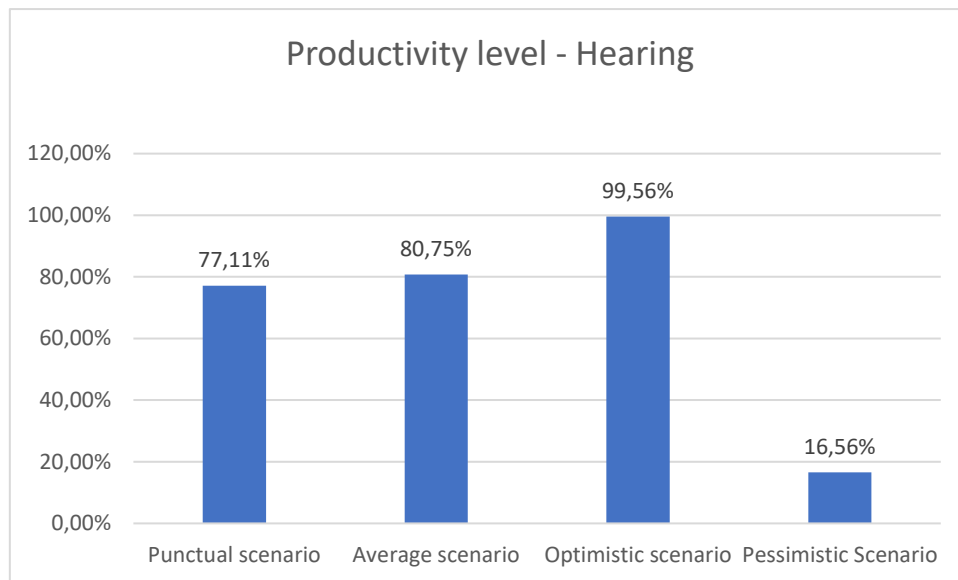
Graph 7 - Productivity level Hearing

4.3. Criticalities

As it was possible to deduce from the data from the simulation, the changes made in the AS-IS processes during the last few years certainly are paying off, in fact the disposition time, in the forecast made, has a decreasing trend as well as the pending cases.

Without going into the merits of the previously reported data, which will be commented on critically in the next chapter, it can certainly be said that the Supreme Court processes are far from being linear and simple and have numerous inconsistencies. Therefore, it is impossible to think of a substantial improvement in process performance without systemic change, where important decisions are made that may allow certain inefficiencies to be dampened.

Only through an in-depth analysis of process mappings, accompanied by a review of simulation data, is it possible to identify the major critical issues that often prevent normal business performance. These critical issues, in fact, should be understood as obstacles, certainly not blockers, that make the process of activities more cumbersome and less smooth and make it more difficult to manage.

Listed below are all the critical issues that emerged:

- **Modes of receiving the file**

As was analyzed during the macro stage of receiving and filtering, the lawyer can submit the file to the Supreme Court in three different ways, through hand delivery, postal delivery, and sending via PEC. Surely this triple delivery option was designed so that all lawyers could start from the same conditions, as only with hand delivery all lawyers whenever they had to deliver an appeal or a counter-appeal would have to go to Rome. Subsequently to the hand delivery mode and the postal mode, the mode via PEC was added, which is currently the only digital possibility.

Of course, while the triple mode of delivery facilitate the lawyer, it also creates important managerial consequences for the Supreme Court. In fact, the Court must necessarily preside over the three channels and, therefore, the filing office is divided into three units respectively for the three modes of delivery. Each of these units performs the first activities on the file, uploading to the SIC management system the first information and, because of this, the operational management is distinctly complicated. In addition, it often happens that both the hand deposit unit and the postal deposit unit handle only a couple of activities and then transmit the not-yet-completed file to the uploading unit, which, in addition to handling the incoming files, must also handle the uploading of information from the sister units. This creates the presence of two tracks that actors operating in the uploading unit must necessarily manage.

The fact that the hand deposit and postal deposit units may not take charge of the uploading to management of the data is a distortion of the process, since it is not linear and straightforward; in fact, this modus operandi creates a major slowdown because the uploads unit, despite the file has been received and summarily analyzed by other units, has to start the activity from scratch, when the activities could be carried out directly by the relevant units.
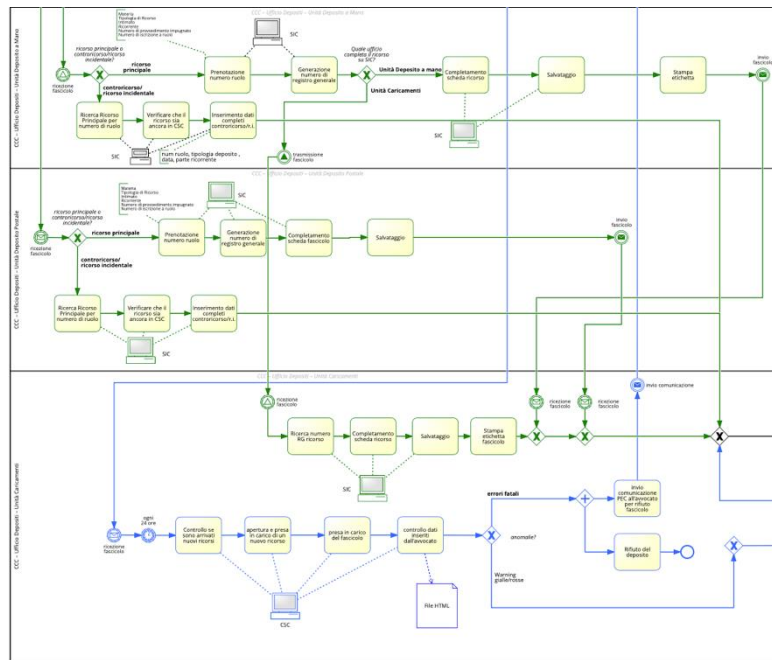
Figure 33 - Process Mapping of the Reception phase

- **Redundant activities**

While the above criticality is specific to a macrophase, the criticality in question is common to all the processes of the Court of Cassation. In fact, as it was learned during the workshops organized, it often happens that the actors in charge of carrying out the activities often find themselves having to repeat certain activities due to a lack of visibility of the processes.

The glaring example of this critical issue is the numerous times that the file is checked so that all the necessary information is present. These activities are implemented by almost all the actors to whom the file reaches. Each of them is forced to repeat the point of the situation with regard to the documents needed, the matter entered by the lawyer, the payments needed, and so on because there is no visibility such that the next plaintiff knows for sure what the previous plaintiff carried out.
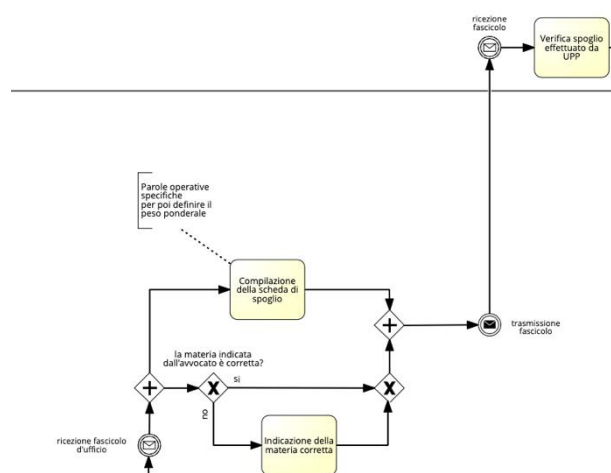
Figure 34 - Example of redundant activities

The above flow detail was extrapolated from the macro-phase of the perusal in Civil Section II and refers to the lane of the UPP clerk and the stripping magistrate. This detail is emblematic of the criticality in question, in fact, despite the fact that we are at a rather advanced stage of the processes, in that the macro-phase of receiving and filtering has been completed and we are in correspondence to finish the perusal phase, the UPP clerk is in charge of checking whether the matter entered by the lawyer is correct or not. This activity has been repeated over and over again during previous activities, but the claimant has no visibility of what has happened in the past. Subsequent to this activity, the file reaches the stripping magistrate, who as a first activity has to verify that the stripping has been done in the correct way, basically he has to start from scratch and check if all the information matches with the documents available. All this leads to a not inconsiderable time dilation.

Moreover, as openly expressed by the Supreme Court actors during interviews, it is now the practice that each person working on the file to carry out his or her work rightly studies the general situation, but does not report any notes on it, so the detailed and meticulous work done by these professionals is thwarted.

The criticality previously analyzed can also be understood as a set of redundant activities, in fact all three units of the filing office perform exactly the same operations with the only difference being the mode of receiving the file.

The presence of redundant activities is not only an issue that impacts process timelines, but also risks eroding the professionalism of the actors, who, aware that they are performing absolutely no value-added activities, might perform these tasks with less concentration and more superficially, risking losing focus. This would be a major problem as it has huge implications, not only on processes, but also on actors' personal satisfaction. Moreover, by eliminating

non-value-added tasks, actors would also have the opportunity to focus on other issues important to the Supreme Court. The set of interventions to be carried out to try to solve this critical issue aims, not only to make processes more efficient, but also to reduce resource saturation.

- **Lack of human resources**

  As repeatedly highlighted, the Supreme Court suffers from a serious undersupply of resources necessary for the purpose of improving trial performance. This is not only related to the number of judges, which, as seen in the second chapter of this research, is decidedly low, but also refers to the number of presidents, magistrates and clerks. A number of actions have been implemented over the past few years, including the creation of the Trial Office, which has allowed for the recruitment of new competent figures to join the figures already present so as to give a boost to a compromised situation. In addition, substantial plans have been made for hiring and generational change within the Court.

  In this document, the possibility of hiring new staff, which certainly could help, will never be discussed, since it is an exogenous variable, therefore, it cannot be modified. The only goal is to improve the processes by taking advantage of the resources that are available at this time by trying to lighten their workload as much as possible, making them concentrate only and exclusively on the activities that are competent to them.

- **Poor digitization**

  One of the major problems of the Supreme Court is precisely its technological backwardness, as digital systems are few and far between. It is safe to say that the paper mode is still the preferred way to organize and carry out all the various operations. In fact, even if the file is delivered to the Court in telematic format, an empty physical folder is still created where the label is printed.

  The most common tool is the SIC, "Court Computer System," which is a simple register where only the main data of the file and its movements are recorded.

  Even communications with the lawyer do not take place through an automated portal, which is able to alert him or her in real time of developments regarding the analysis of the file, but are handled through PECs, which, although they are emails, take valuable time away from the actors involved.

  The loss of information caused by excessive paperwork is substantial; in fact, as previously analyzed, the visibility that an actor has over the entire process is very low and, often, an actor's notes, once the file is processed, are not placed

within the folder, being lost forever. This is in contrast to what would happen if the file management were completely digital, where the file would always be available to those who need to consult it and each plaintiff would have a way to jot down his or her observations without them having to be lost, facilitating the work of the next colleague.

Not only the management of the file, is done mainly by paper, but also the management of the scheduling of hearings, which is organized through a paper "clipboard." Obviously, this mode creates quite a few problems for operational management, as it makes it difficult to find the set date and to change it if necessary. Concomitantly with the scheduling of hearings through paper means, the recording of the same is also done in paper form, which exposes the Court to a constant possibility of loss of crucial information that, if lost, could frustrate all the efforts made are to that point.

Poor digitization is the primary cause of the existence of a dual route through which to manage telematic and paper files, where the latter is significantly more prevalent than the former. In fact, if the deployment of digital tools were widespread and effective, the creation of a dual route could be obviated, the reception mode could be unified, and redundant activities could be eliminated.

Moreover, through digitization, the impact of non-value-added activities, which could be carried out mainly by IT tools, could be eliminated or at least reduced.

Transitions between offices would also be less intricate and difficult, both in terms of logistics, where there would no longer be a waiting time and thus the time lag between one activity and another would be eliminated, and in terms of information security, as the probability of file loss during transport would be reduced to zero. The same argument can also be extended to the filing phase of the file, which would be greatly facilitated through the creation of a database, which would allow for quick file management and immediate search of past appeals.

Certainly, the actions that could be implemented today in terms of technology are limitless, however, it is necessary to take into account the culture that pervades the organization and therefore, briefly, whether people are willing to open up and learn a new way of working, since otherwise technology would not bring any kind of benefit.

- **Lack of standardization**

One problem that impacts the processes of the Supreme Court is precisely the lack of standardization of processes and procedures., It is difficult to achieve

comprehensive standardization because the world of justice does not allow for it, since depending on the subject matter of the file this must be handled in a particular issue or it is necessary to go to the united chambers because of the nomofilactic characteristics of the file.

Standardization in this case must be understood as the standardization of procedures, as it occurs at the reception of the file, where, regardless of the manner in which it reaches the Court, the repeated activities are always the same.

An example of non-standardization of procedures is the absence of a single template for perusal, whereby perusal is not done through a standard template, but depending on the actor performing it, a template is created. This is a mode that leads to numerous problems, both on a managerial level, as it requires additional time for those who have to evaluate or view the perusal as it is not a single and always the same template that also allows them to identify the necessary information at first glance, and on an operational level, as its storage, in digital systems, not being unique, could be more cumbersome.

Another example of the lack of standardization of procedures can be extrapolated from the stripping magistrate's lane present in the stripping phase of the IV Civil Section.
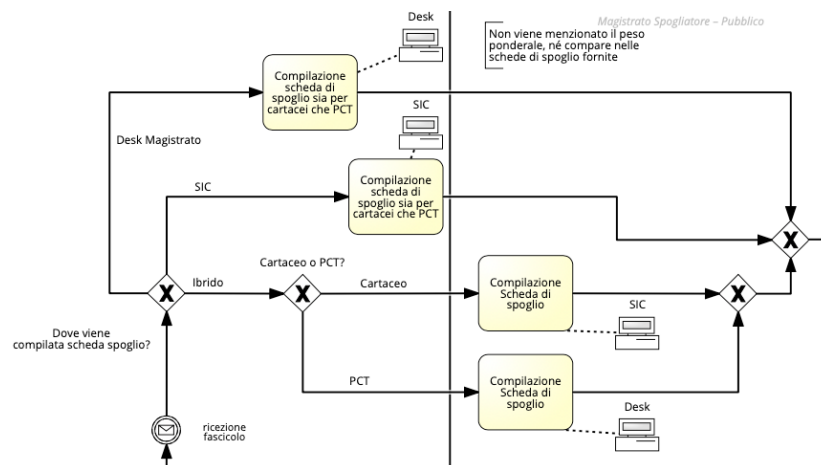
Figure 35 - Example of lack of standardization

As can be seen from the detail above, at some point in the process the stripping magistrate, a relevant and frequently overworked figure, has to decide by which means to fill out the perusal sheet. There are, in fact, as many as four different ways to fill out a perusal form. This modus operandi greatly complicates the normal course of business, since a person who needs to consult the file must go in search of it by checking all possible channels through which the sheet was filled out. Thanks to the standardization of procedures, these

multiple ways could be eliminated and only one could be kept active, concurrently with the creation of a single model. All this would lower the management complexity and cut down the time frame.

Finally, the lack of standardization results in a huge effort at the level of coordination of resources, since there is no clear and unambiguous model, they need to have to consult each other to analyze what is done and be aligned. This is not only true for actors operating within the Court, but that for stakeholders such as the substantive authorities and lawyers.

- **Absence of an internal control model**

The Supreme Court currently lacks a tool that allows it to assess performance in real time and make long-term forecasts. This lack at the management level is a potential problem because it becomes almost impossible to readily identify which are the areas to take corrective action on because of their underperforming and, consequently, to manage resources dynamically, moving them according to demand to the department that needs them.

Certainly, the control model has not only the function of keeping the organization's performance under control, but also of being able to instill the policy of continuous improvement. In fact, no process is perfect and there is always opportunity to improve and make it efficient, this would be made easier if there was a dashboard of indicators that charted the way forward.

The control model should not only and exclusively be used to evaluate the performance of processes, but also of the people working within the system, in fact there could be additional objective data for evaluating the actors.

- **Shutdown of the VI Section**

According to the plan drafted as a result of the PNRR, at the same time with the various legislative reforms that will be put in place in order to be able to achieve the set goals, it was also stated by the Legislative Decree No. 149 of October 10, 2022 to shut down the VI Civil Section, which played a crucial role in the trials of the Supreme Court. In fact, as seen above, it has the task of performing a filtering of incoming files, so as to reduce the burden on the various sections, specializing in a particular matter.

Following the reception phase, the file is delivered to the VI Civil Section, which is in charge of examining it with the aim of defining whether the latter may be

within its jurisdiction or whether it is unable to process it and, therefore, forced to send it to the ordinary section.
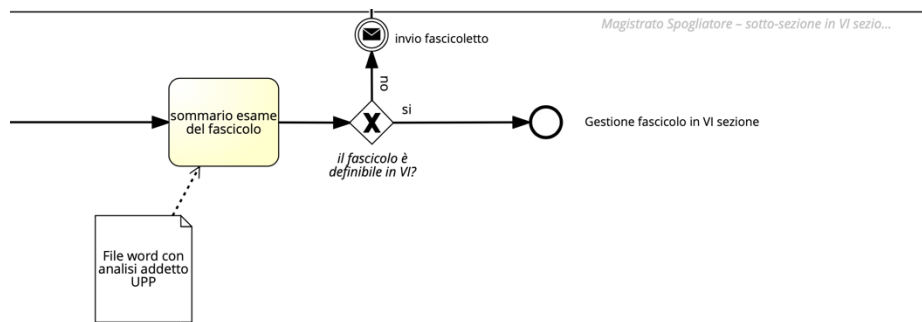
Figure 36 - Example of shutdown of the VI Section

As can be seen from the image above, the choice of whether or not to process the file in VI Section, after appropriate verification, is up to the subsection's stripping magistrate.

In recent years, the support of this section has been relevant, as all minor, i.e., inadmissible cases, files were processed directly within it without activating the perusal process of the ordinary sections and, as a result, greatly reducing the workload of the latter.

On the other hand, however, this additional control proves to be redundant, since in the event that the file is processed by the ordinary sections, it has to be scanned again to correctly identify the reporting matter and the work done at the VI Section was not recorded and, therefore, jeopardized.

Downstream of the decision to eliminate the "filter" section, the Supreme Court must necessarily reorganize its processes with the aim of fairly and strategically distributing the workloads that previously fell to the Sixth Civil Section. Certainly, this turns out to be a major challenge as one must try to find a way so that trials, which are already struggling, manage, not only to make up for this lack, but also to improve their performance.

In conclusion, the new trials will have to provide for someone to do an initial summary analysis of the file received by the court and then hand it over to the relevant ordinary sections, which will have to take charge of the perusal of all the files, even the minor ones.

4.4.   TO-BE Process Mapping

Following the analysis of the various critical issues that emerged from the study of the state of the art of the processes of the Supreme Court, thanks to all the information in possession it is now possible to theorize possible ways of working that would enable the processes to achieve the required performance and that could relieve the burden of the relevant issues noted above.

The goal of process redesign aims to alleviate the critical issues, simplifying the processes by trying to make them as straightforward as possible yet with the understanding that they should not be disrupted. In fact, the risk of radically changing something that has long had a certain conformation is that of obtaining the opposite results from those forecasted. The risk that is being faced and must be promptly averted is that the actors in the processes will oppose the changes and, despite the redesign, continue to work in the same ways as in the past. This is precisely why the processes that will be presented below do not present disruptive changes but seek to follow in the footsteps of those of the past.

Before analyzing the new mappings in detail, it is worth highlighting the common features of them. The major changes were applied to the reception, filtering and perusal stages, which had the greatest room for improvement, while the hearing and posthearing stages were not modified, as they present peculiarities specific to Italian law and, therefore, were kept in their current state. In addition, they have not been subject to redesign also because a justice reform is currently under consideration, which could significantly change the hearing modalities and, as a result, could frustrate the efforts made if the proposed changes were implemented.

The critical issues on which the changes were most focused were the mode of receiving the file, for which it was decided to keep only the telematic one both to simplify the delivery to the lawyers and to reduce the management complexity of the receiving phase, the elimination of redundant activities, for which the additional values contributed by each activity were analyzed in order to identify those that were superfluous; the shutdown of the VI Section, for which the process flow of the filter phase was modified so that the elimination of this function could be addressed; and finally, the poor digitization, for which its widespread use within the Court was definitely expanded.

Obviously, the other critical issues have also been taken into account, in fact, thanks to the new processes, many activities, previously carried out at the discretion of the actor, have been standardized and made unambiguous so as to ease the consultation even by those who do not do the work directly. Moreover, thanks to the creation of simulations, the processes will be monitored constantly both for better control of current performance and for possible future forecasts.

4.4.1. Reception, Filter and Examination

As far as these macrophases are concerned, the most impactful changes were the unification of the modes of receipt, for which the telematic mode was imposed by law, and the elimination of VI Civil Section.

Before analyzing in detail the mappings, which will be available for consultation in the annexes A.3, it should be noted that for the perusal phase it was decided to create a generalized procedure without going into the details of each section, unlike what was done for the mappings of the AS-IS.

The process is activated the moment the lawyer telematically sends the appeal or counter-appeal to the upload unit of the filing office, which periodically checks for the arrival of new files. Once the file has been taken over, the plaintiff first makes sure it is not already being processed, checks the data entered by the lawyer, generates the role number, and uploads everything to the SIC management system and then transmits it to the central archive.

The clerk in the Pietrostefani Room receives the file 90 days, average time for completion of activities, after it arrives at the central archive. Once it is received, the clerk, after a careful review of what the front office has uploaded, merges the file with any appeals or counter-appeals and then identifies the appropriate simple section. Following the unbundling of the file, the clerk's office is responsible for submitting the file to the section clerk's office and submitting the entire file to the section archive, where it will be filed pending the hearing.

In the section clerk's office, they make sure that the file is available on SIC and forward it to the expert adviser, who is in charge of doing the perusal and checking whether the matters entered by the lawyer are correct or not.

The last actor in the process is the stripping magistrate, who is in charge of uploading the perusal file to SIC and filing it pending the hearing.

4.4.2. Hearing and Post-hearing

As specified in the introduction of this paragraph, the macro-phase of hearing and post-hearing have remained unchanged from what is in place, as it is impossible at present to make changes considering that legal laws are being studied and could make numerous changes in the way legal processes are conducted.

4.5. TO-BE Simulation

As discussed in the *to-be* process mapping chapter, several changes have been made from the *as-is* process in terms of activities and workflow. Indeed, the VI section ceased to exist, and as such, the Filter phase will be incorporated by the sectional Examination, and therefore carried out by the Examination phase of the relevant section. As a matter of fact, the macroprocess will still be divided into phases, but in the *to-be* solution, there will only be two distinct phases:

- *Reception and Execution*, which starts from the receiving of the file from the lawyer to the scheduling of the hearing, carried out by the Registry of Section

- *Hearing and post-hearing*, that commences with the insertion of the hearing role from the Registry in the ordinary section and ends with the publication and storage of the file within the Court's archive.

Moreover, as already mentioned, the Supreme Court will only receive telematic files through their CSC software, and as such, most of its internal activities have changed to reflect it. Not only that, but in the population of data in the simulation, it was decided to reduce the standard times of all the activities of 10%. In the authors opinion, indeed, the adoption of a single input channel will induce economies of learning that will significantly decrease the standard time for each activity.

Apart from the points above mentioned, the methodology used to create the *to-be* simulation was exactly the same as for the *as-is*. In fact, without repeating what already said, four different scenarios have been identified: a *punctual scenario*, a *variable scenario*, an *optimistic scenario*, and a *pessimistic scenario*. For each scenario, data were inserted as described in the data population paragraph of the *as-is* simulation.

4.5.1. Simulation Results

In the following section, we will present the main results of the *to-be* simulation. Starting with the Reception and Execution, the simulation was fed 28.710 input files and was able to complete 97% of the instances in the variable scenario. Of the 27.852 managed files, given that now the Execution phase carries out also the former Filter phase, 2.259 were inadmissible, 5.015 will be discussed in the Assembly, and 20.578 will go through the hearing and post-hearing phase. The optimistic scenario on the other hand carried out 2.329 inadmissible files, 5.134 files to be discussed in the Assembly, and 21.000 files to be taken to the Hearing and post-hearing, for a productivity of 99.1%. The pessimistic scenario had a productivity of 67.9% and created 2.329 inadmissible instances, 5.007 to be defined in the Assembly, and 12.227 to be taken into the Hearing and post-hearing. Finally, the punctual scenario leaned towards the optimistic scenario, carrying out 28.413 files, of which 2.311 inadmissible, 5.111 to be discussed in the Assembly, and 20.991 to be carried out in the Hearing and post-hearing. In the graph below, the information just discussed are summarized.
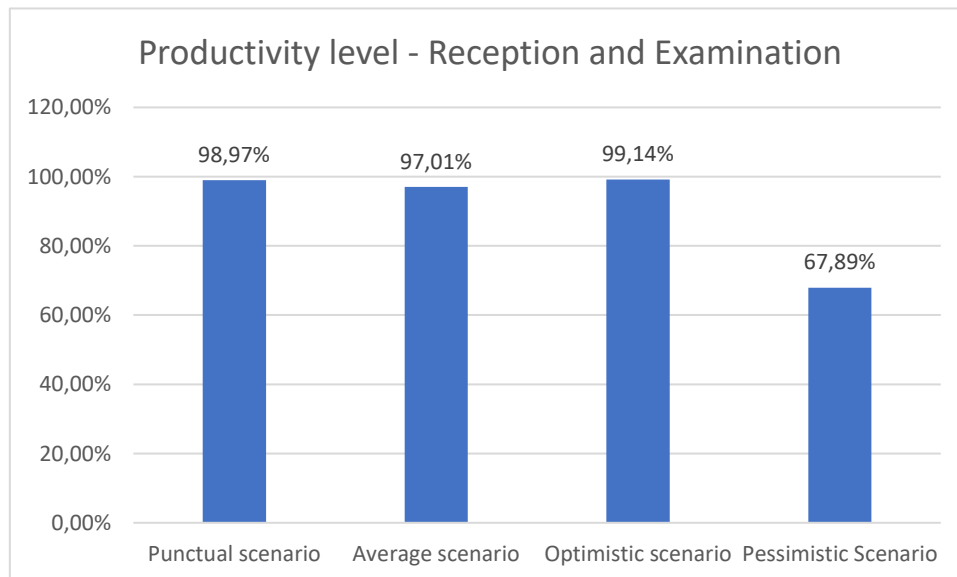
Graph 8 - Productivity level Reception and Examination *TO-BE*

Finally, the results of the Hearing and post-hearing are presented. In this case, results do not differ that much from what already presented in the previous chapter. Indeed, since this phase of the process is rather standardized, there are limits as to what can be reengineered. Indeed, the variable scenario was capable of handling 17.833 files while receiving as inputs 19.863, with a productivity of 89.9%. The optimistic scenario was effectively the same compared to the *as-is*, given that it carried out 19.795 instances with a productivity of 99.8%. On another note, the pessimistic scenario has greatly improved. The reasons will be further discussed in the following chapter, but for now, it had mainly to do with the forecasted economies of learning mentioned previously.

As a matter of facts, the pessimistic scenario handled 52.4% of the input files, for a total of 10.393 instances managed. Finally, as in the *as-is* case, the punctual scenario leaned towards the pessimistic. Indeed, it managed only 10.575 files with a productivity of 53.3%.
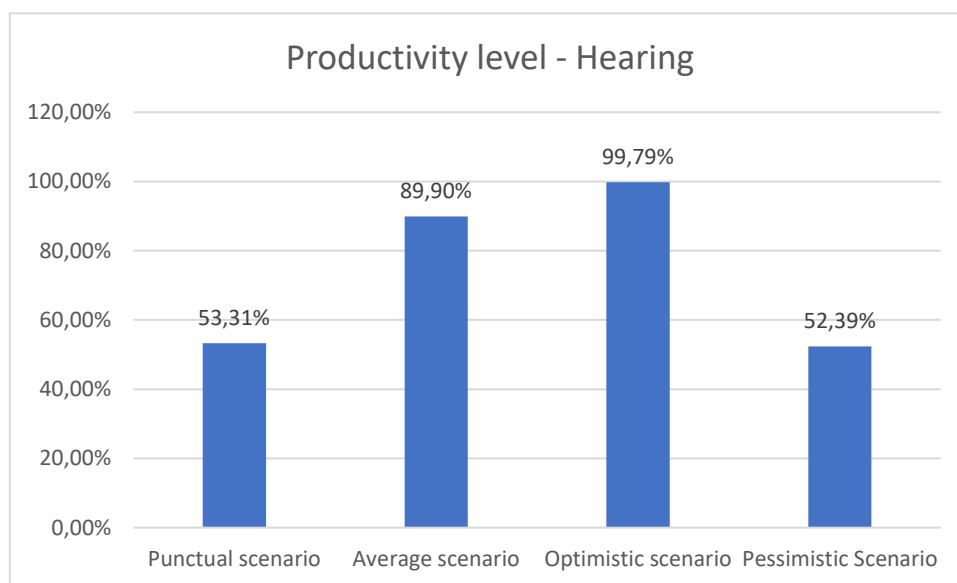
Graph 9 - Productivity level Hearing TO BE

5 Discussion of the Results

In the previous chapter, general results of the simulations have been brought out. However, no comment was made as to whether those results were comparable to what historically had happened. Indeed, those data were decontextualized, and the scope of this chapter is to give context for the results previously obtained. As a matter of facts, the following section will be organized as follows.

- Historical data comparison and workload analysis with the simulation results for the *as-is* process.

- Sensitivity analysis for the *as-is* process.

- Aggregated results obtained by the *as-is* process.

- Historical data comparison with the simulation results for the *to-be* process.

- Aggregated results obtained by the *to-be* process.

5.1. Historical analysis – *as-is* process

As a first step, for each phase of the process, the results in terms of managed instances obtained through Signavio Simulation, were compared to the historical files managed by the Supreme Court. To do so, we have defined the Simulation Efficiency as managed files by simulation, divided by the registered or superseded files. The Simulation Efficiency obtained, was then compared to the Court's Efficiency, defined as historically managed files over the registered or superseded files, to give a sense of whether the simulation was outperforming, underperforming, or keeping up with the historical data. Moreover, for each phase of the process, a workflow analysis has been carried out in order to acknowledge where the bottlenecks of the process are located, and how big of an impact they have in terms of crossing time.

Starting with the *as-is* process, in the *Reception* phase is possible to acknowledge that the simulated process is, on average, slightly outperforming the historical data. This can be seen as the variable scenario is around 3% more efficient than the historical data suggest. Another crucial insight to be highlighted is the low value of the pessimistic scenario, at a staggering -14% from the historical target. However, as we will see further in this section, this is a result that is extremely encouraging, as for instance the pessimistic scenario is a very unlikely scenario, given that each and every activity simulated has to take the maximum amount of time. Moreover, even in the case of this scenario happening, it is still able to not only process all the incoming files, but also attack some of the pending ones, which is one of the most compelling goals for the Supreme Court as it stands for now. Further on, this result is in line with the tolerance level that was internally set. Indeed, it was agreed to make the results of the simulation fall between the range of +25% to -25%. The optimistic scenario shows little improvements with the variable scenario, as in this phase the standard times used as inputs were small, as it was assumed that this is a rather standardized phase of the process, where there is no significant difference between nature of files, and as such there are big economies of scale and learning.
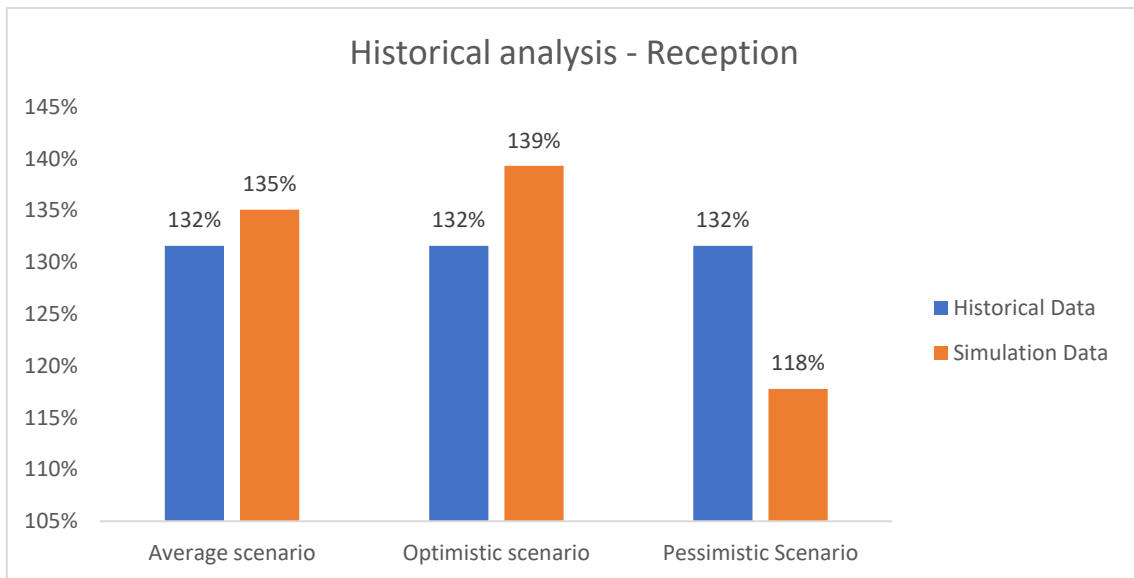
Graph 10 - Historical analysis - Reception

In order to understand the drop in efficiency in the pessimistic scenario, a workload analysis was conducted. As it is possible to acknowledge, the explanations above provided find a match with the empirical data. In fact, regarding the pessimistic scenario there is a significant increase in the workload of the resources, particularly of the Uploading Unit, that is moving closer to the full saturation. As a result, some of the activities carried out by the resource will be slowed and, consequently, the crossing time will drastically increase. On another note, there is no significant improvement between the variable and the optimistic scenario in terms of workload. In fact, the resources are both mildly saturated in both scenarios, which explains why the productivity gap between the two is not so prevalent as with the pessimistic scenario. Despite that, of course, a decrease in the saturation of resources in matched with an increase in the efficiency of the phase, and a decrease in the crossing time.
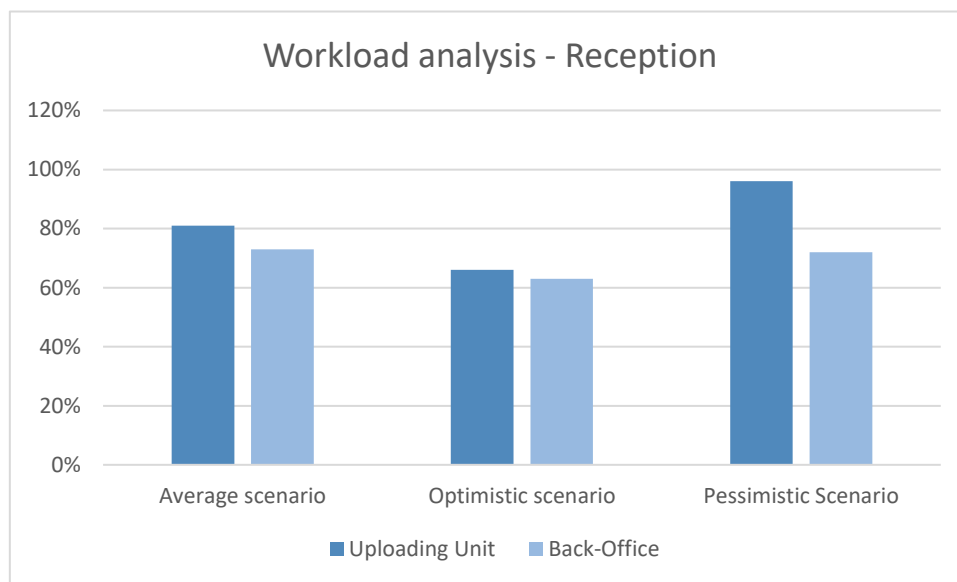
Graph 11- Workload analysis - Reception

In the *Filter* section, the situation is slightly different, as the average scenario is still outperforming the historical data, however there is a significant gap in productivity between the pessimistic scenario and the past data. Indeed, diving in the workload analysis, it is possible to see that the sudden drop of performance is to be attributed to the creation of a new bottleneck within the process. As a matter of facts, in Graph 12 the magistrate in charge of the examination is fully saturated, and as such the simulation is significantly slowed to the point of halting due to a lack of processing power.
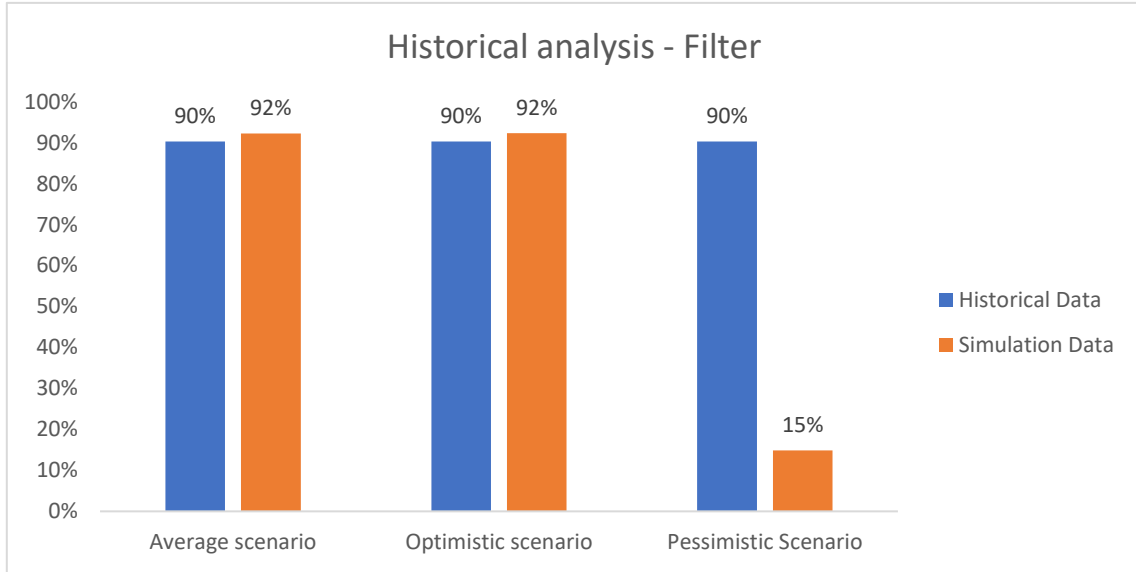
Graph 12- Historical analysis - Filter

Graph 13 also helps to understand why both the variable and the optimistic scenario have the same productivity level. In fact, due to the assumption of having the same number of entering files for all scenarios, it was necessary to undersize the capacity in the optimistic scenario, that has very unsaturated resources. However, if it was decided to increase the input files, a significant worsening of both the variable and pessimistic scenario would have happened and given the already extremely poor performance of the latter, combined with the relatively low relevance of this phase of the process, it was decided to carry on with these results.
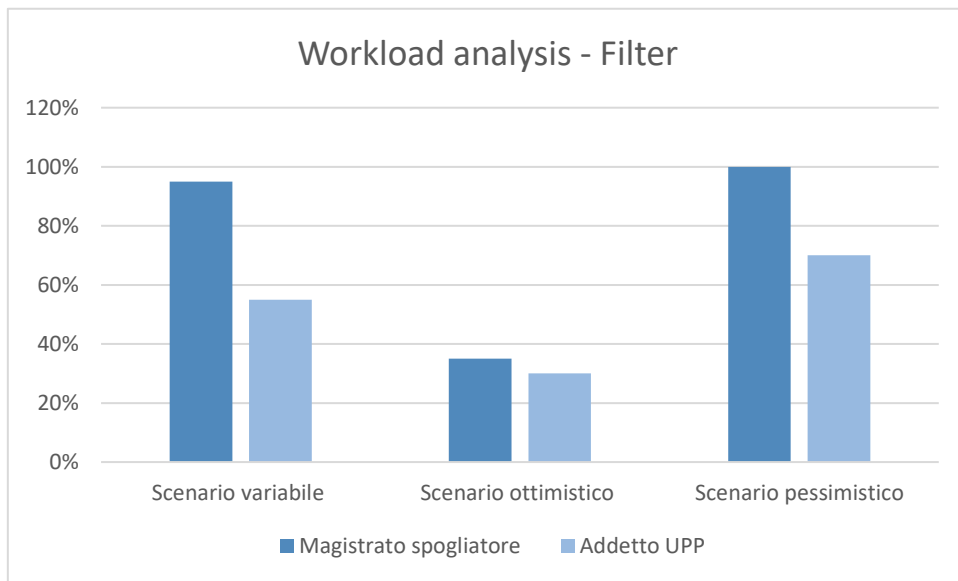
Graph 13- Workload analysis - Filter

The *Execution* discussion will then be presented, and results will be presented for each section. Starting with the second section, the average scenario once again shows that the simulation is roughly 8% more efficient than what historical data suggest, meaning that most likely the timings have been underestimated in this specific phase of the process. As far as the optimistic scenario is concerned, there is a sensible improvement in the productivity level, while in the pessimistic scenario there is a significant but controlled drop, signaling that the variance of the process timings are most likely to be on point.
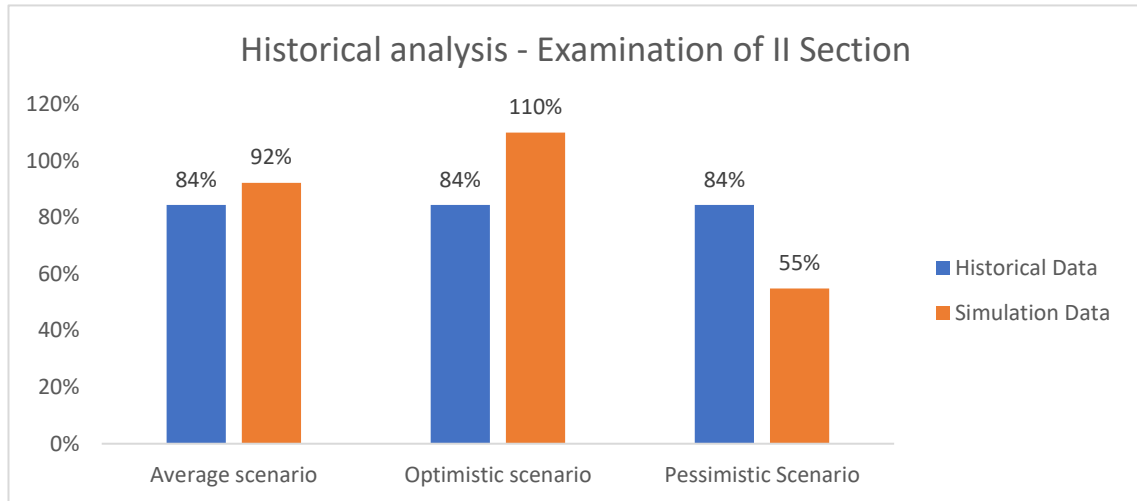
Graph 14- Historical analysis - Examination of II Section

Comparing the results with the workload analysis, it can be clearly seen that the resources, particularly the office workers, are fully saturated. This comes with no surprise, as this section is not able to manage all the files and already creates backlog, given that its efficiency is lower than 100%. The drop in efficiency seen in the pessimistic scenario can be explained by the fact that the simulation has halted before all the input files have been managed, and as such the efficiency of the process has suffered.
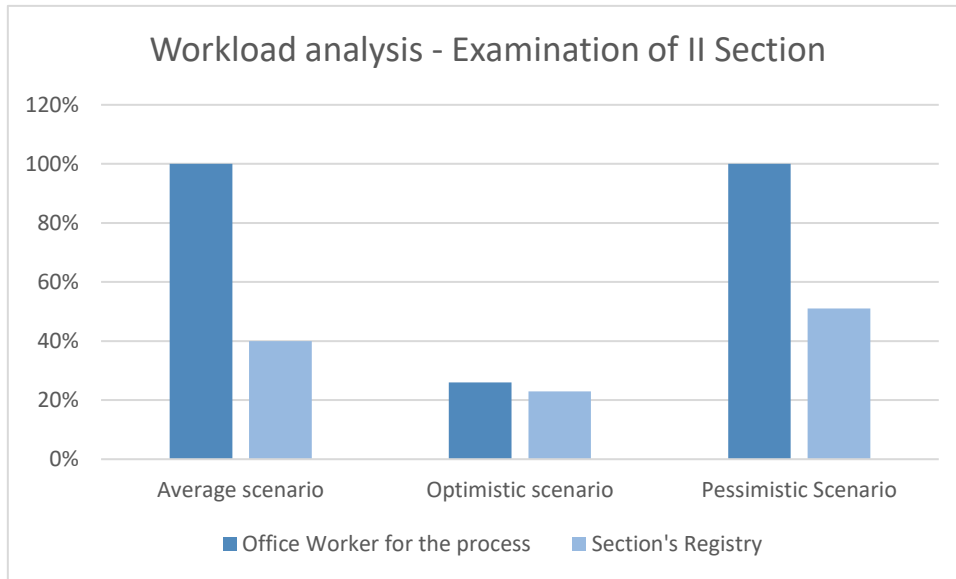
Graph 15 - Workload analysis - Examination of II Section

The *Execution in IV Section* shows very different results. For instance, the average scenario is around 6% less efficient than the historical data, leading to think that in this scenario the timings have been overestimated. However, similarly to the previous case, both the optimistic and pessimistic scenario demonstrate that the variability of this phase of the process is rather under control, as they both fall within the tolerance constraints of -25% and +25%.
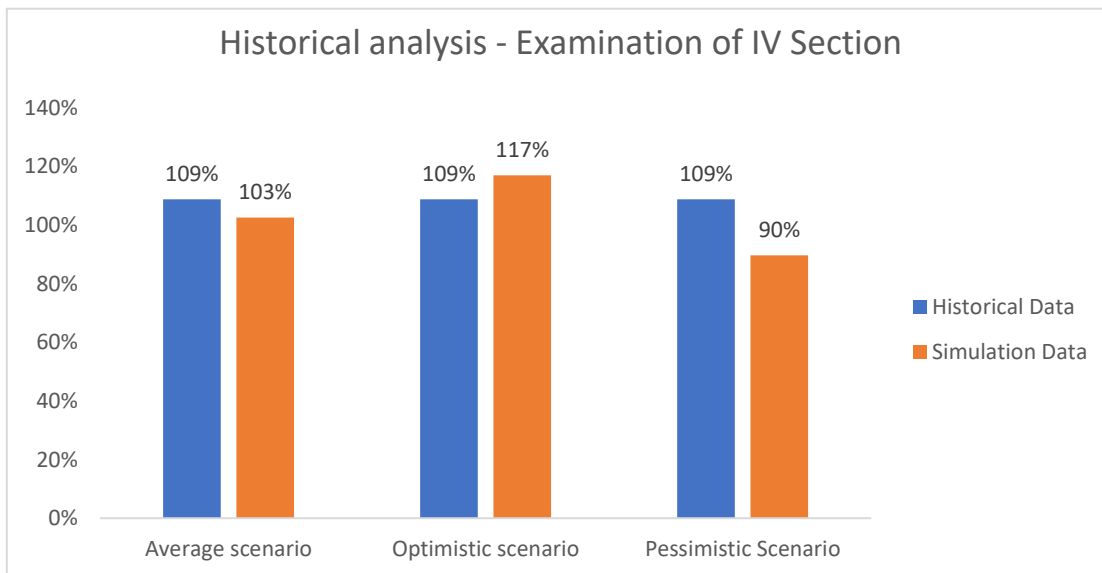
Graph 16 - Historical analysis - Examination of IV Section

While conducting the workload analysis, the main challenges for this step was the number of critical resources. As a matter of facts, the *Examination in IV Section* had 4 critical resources that are in order:

- The Section's Registry

- Pension Fund's President

- Office Worker for the process, subsection Pension Fund

- Office Worker for the process, subsection Private Law
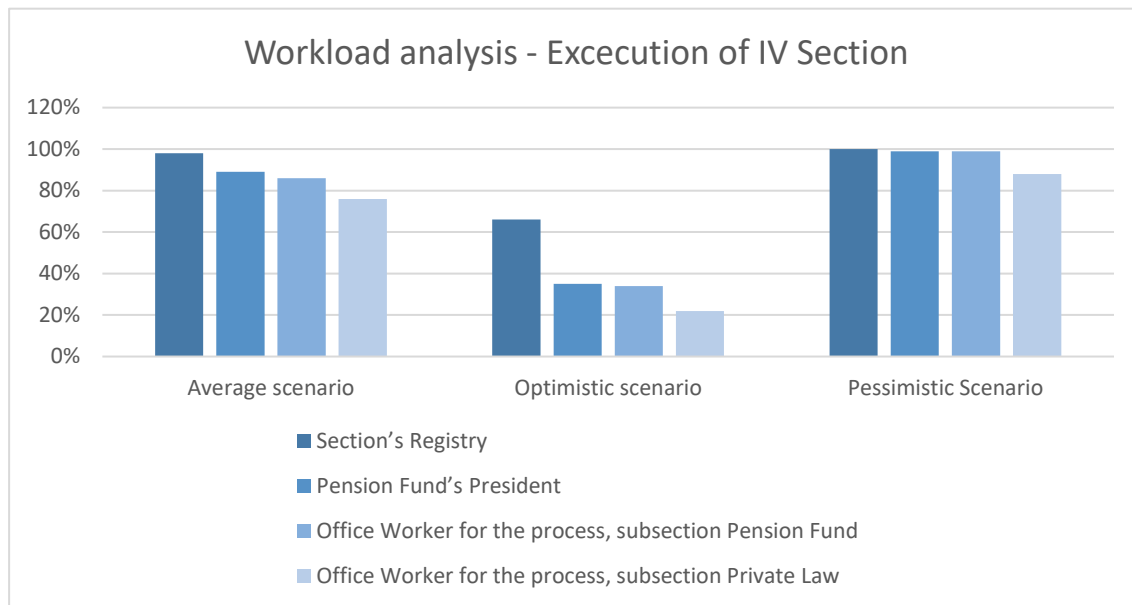
Graph 17 - Workload analysis - Examination of IV Section

As shown in the graph above, all the critical resources are very much saturated in the pessimistic scenario, while in the optimistic and in the pessimistic scenario only the Section's Registry can be considered a critical resource to monitor, as the other three are rather unsaturated.

To wrap up the Examination phase, the results concerning the V Section are presented. Similarly to the II Section, also the V Section is, on average, less efficient than the historical data. The explanation for this phenomenon is the overestimation on the timings estimations, which results in a longer cycle time and thus a reduce in performance for the phase as a whole. The pessimistic and optimistic scenario on the

other hand are consistent with the expectations, as the latter is around 7% more efficient, while the former is significantly less efficient than the historical data.
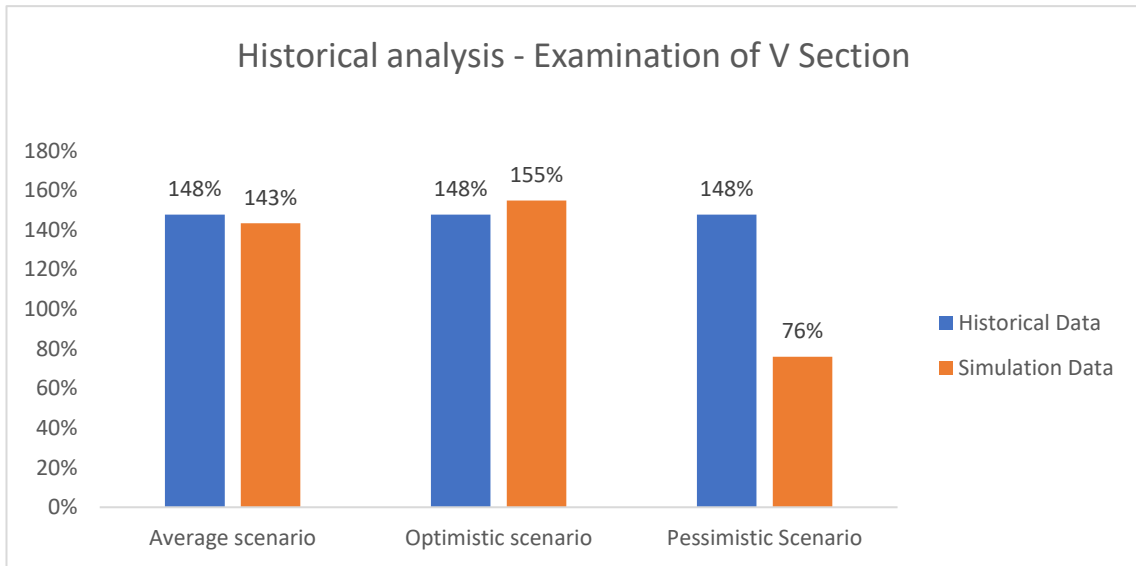
Graph 18 - Historical analysis - Examination of V Section

To dive deeper as to why the pessimistic scenario is so inefficient, a workload analysis was conducted. The results show that the drop in performance registered in the pessimistic scenario finds its explanation in the increase in saturation of both the Registry and the Office Worker. This results into an increase in the cycle time that consequently results in fewer files coming out of the process, as graph 19 shows.
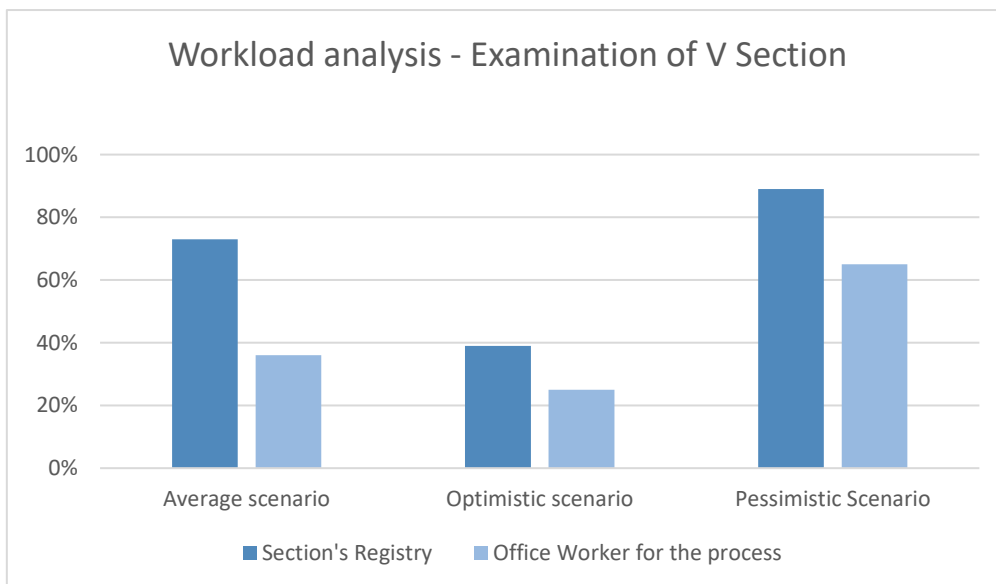
Graph 19 - Workload analysis - Examination of V Section

Lastly, the *Hearing and post-Hearing phase* was compared. As mentioned in the previous chapters, this is the most problematic phase of all, given its complexity and the number of players involved. As such, despite the best efforts in the modelling and simulation creation, there are several limitations that will be further discussed in the limitations section further on. For starters, the simulation shows that the average scenario is around 7% less efficient than the historical data, which already create backlogs (given that it is less than 100%). This implies that even more backlogs will be generating, and that an already problematic phase of the process will become even more so.
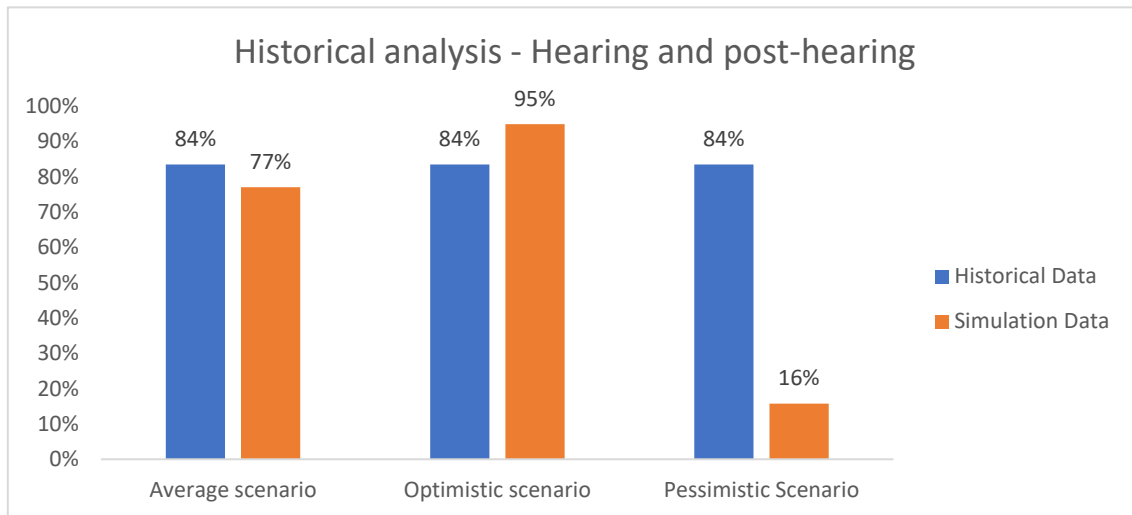
Graph 20- Historical analysis - Hearing and post-hearing

Regarding the pending generation, there is no substantial deviation between the historical data and the simulation data, as graph 21 shows. As a matter of facts, most of the simulation backlogs are generated at the end of the *post-Hearing* phase, when the
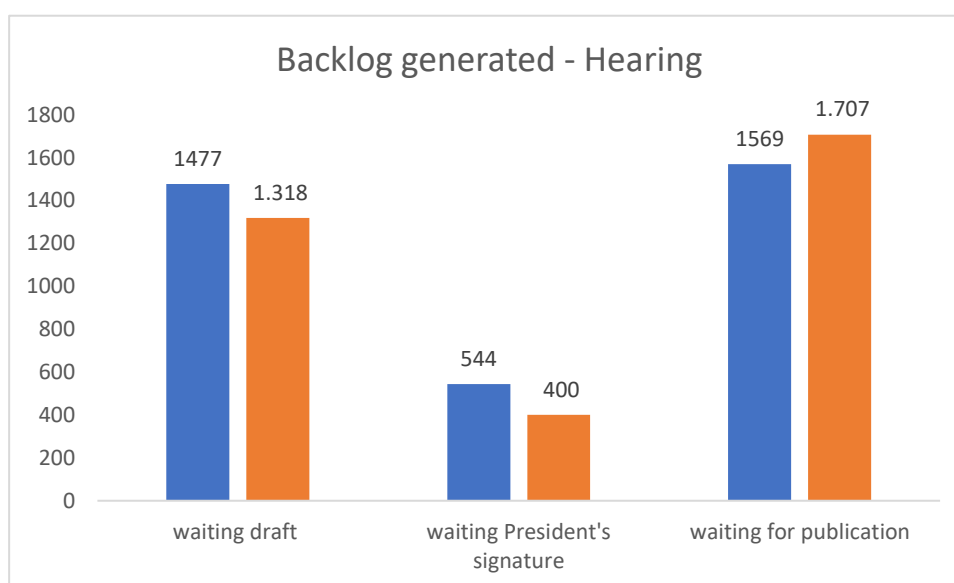
Graph 21 - Backlog generated - Hearing

files need to be archived, most likely due to an underestimation of resources in said activity. As shown in the graph 21, the pending are extremely close to the historical data, varying only of 0.76% in the draft waiting, 0.69% in the signature from the President waiting, and 0.66% in the publication waiting.

Lastly, the workflow analysis shows a rather unique instance, where the resources in the average scenario are more saturated than in the pessimistic scenario. The explanation for it is the fact that the simulation in the pessimistic scenario has halted due to a lack of processing power of the simulation tool, and as such only the first bottleneck (board and spokesmen) is fully saturated, while the others are not because the input files are sensibly lower. Another observation is that in all scenarios, the resources are (almost) fully saturated. This comes with no surprise as it was previously mentioned that this phase produces backlogs, and as such, its resources must be fully saturated.
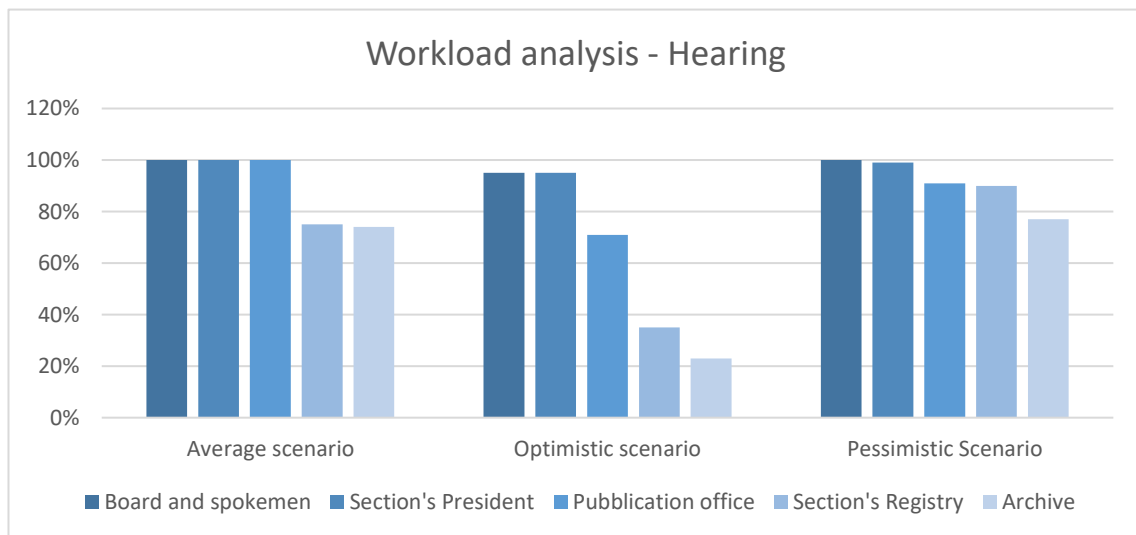
Graph 22- Workload analysis - Hearing

5.2. Sensitivity analysis

Given the results above mentioned, there were still doubts on the solidity of the model, especially regarding the pessimistic scenarios, which were far from ideal. Indeed, while creating the simulation scenarios, it was clear that certain phases of the process were far more variable than others. To understand whether the model created was indeed feasible in reality, or it was too variable and required a number of resources too high to become more stable, a sensitivity analysis on the resources was made. The objective of such analysis are to

- Have an efficiency range of -25% to +25% compared to the historical data for all scenarios.

- Acknowledge how increasing/decreasing the number of resources impacts the efficiency of the process.

- Verify the acceptability of the results obtained, especially in the pessimistic scenario, in the case of a correct sizing of resources.

- Verify that the sizing of resources to meet productivity constraints is realistic.

The sensitivity analysis was made for each phase of the *as-is* process, starting with the *Reception*. In this phase, the simulation already fits the constraints requirements, however, for the sake of curiosity, the key resources have been incremented of 10%. In particular, the Central Civil Registry operators have been increased of 2 units, and the results are shown in the graph below. As it can be seen, the efficiency jumps from 118% to 127%, and with the increase of only 2 resources it is possible to be only 7% less efficient than in the average scenario, limiting considerably the variability of this phase of the process.
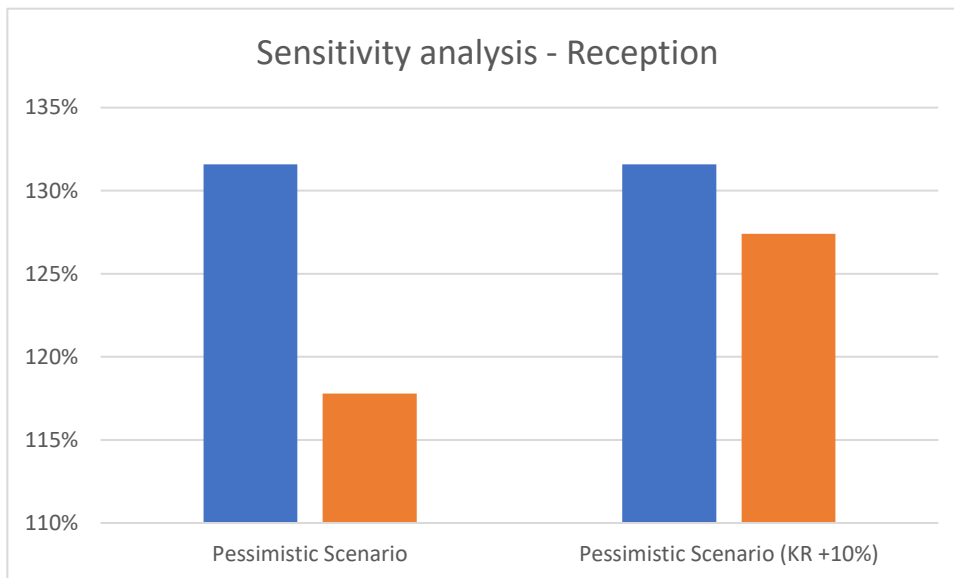
Graph 23 - Sensitivity analysis - Reception

Regarding the *Filter*, the situation in more complex. Indeed, the pessimistic scenario starts at a productivity level of -75% compared to the historical data. However, if the key resource (Examination magistrate) is increased by only one unit, the results are staggering. As a matter of facts, the relative efficiency increases by 87% for the first increase, and if the resource is incremented by 3 units in total, the simulation data is only 13% less efficient than historical data and 15% less than the average scenario.
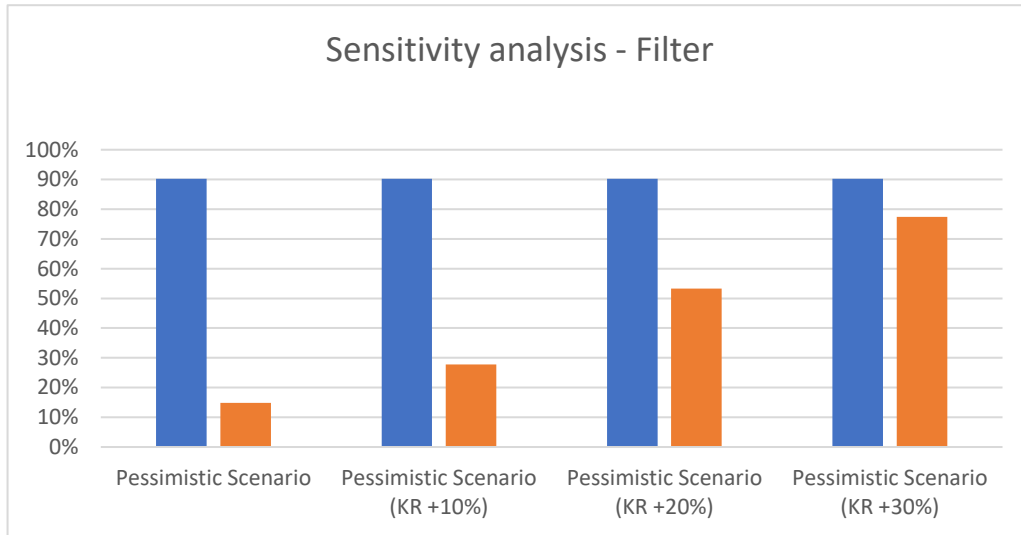
Graph 24 - Sensitivity analysis - Filter

As far as the *Examination* phase is concerned, all the Sections examined behave in the same way, with the exception of the *II Section*. Indeed, as it can be seen in the graphs below, while the *IV and V Sections* require only an increment of 10% of the key resource (respectively 2 units of office worker for the process and 3 units of Section Registry) to
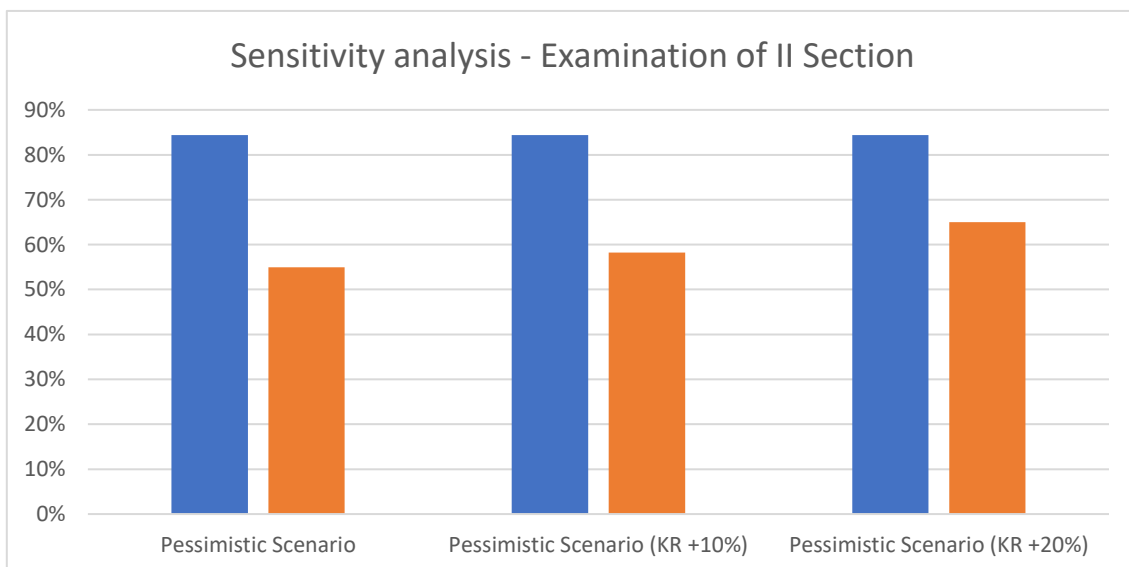
Graph 25 - Sensitivity analysis - Examination of II Section

keep up with the constraint, while the *II Section* requires an increment of 20% of the key resource (4 units of office worker for the process).

Sensitivity analysis - Examination of IV Section
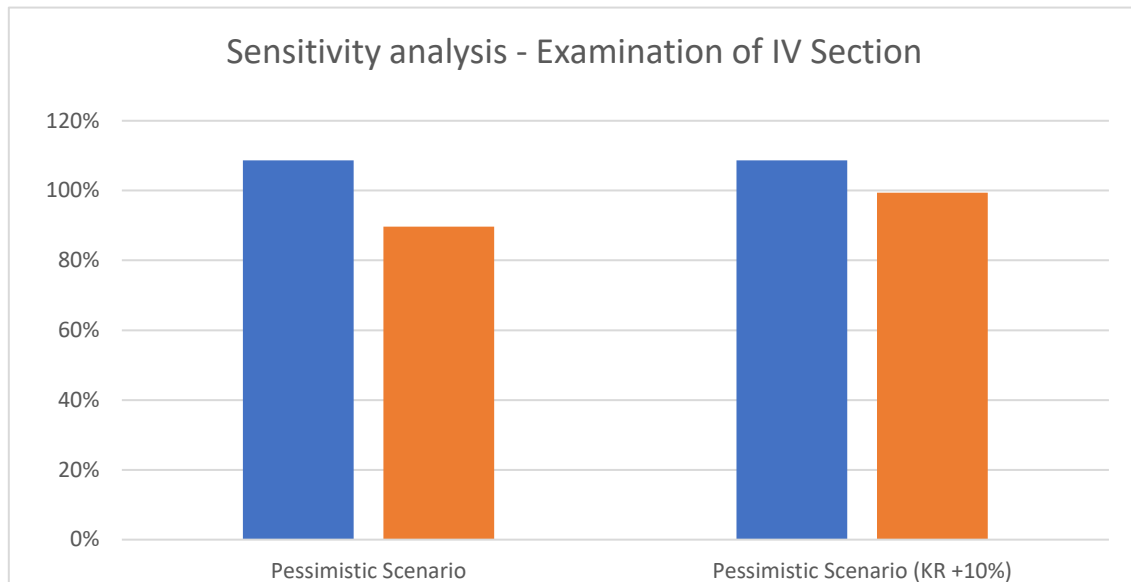
Graph 26 - Sensitivity analysis - Examination of IV Section

Sensitivity analysis - Examination of V Section
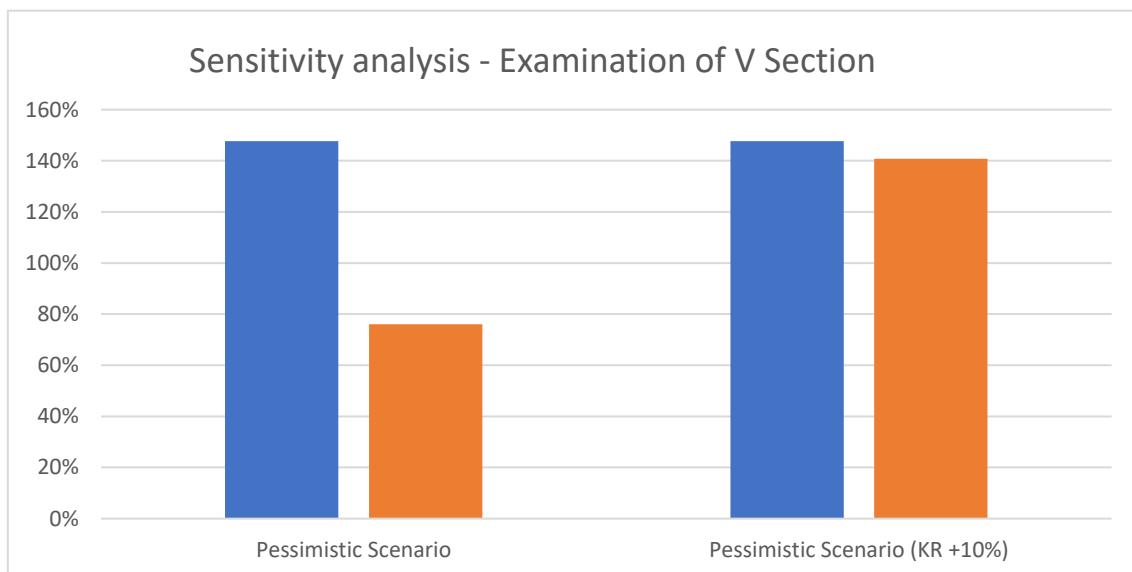
Graph 27 - Sensitivity analysis - Examination of V Section

Lastly, the *Hearing and post-hearing* proves once again to be the most problematic phase of the process, as the key resources are multiples and fully saturated as previously mentioned. For this reason an increment of 10% is not sufficient, and more effort in that sense are required. As It is possible to see in the graph below, increasing the resources leads to better efficiency, but it requires increasing the key resources of 30% to be within the range constraints. This implies increasing the number of presidents of

the section by 2 units, the pubblication office employees of 3 units, the board and spokesmen by 3 units and the Sectional Registry by 3 units.
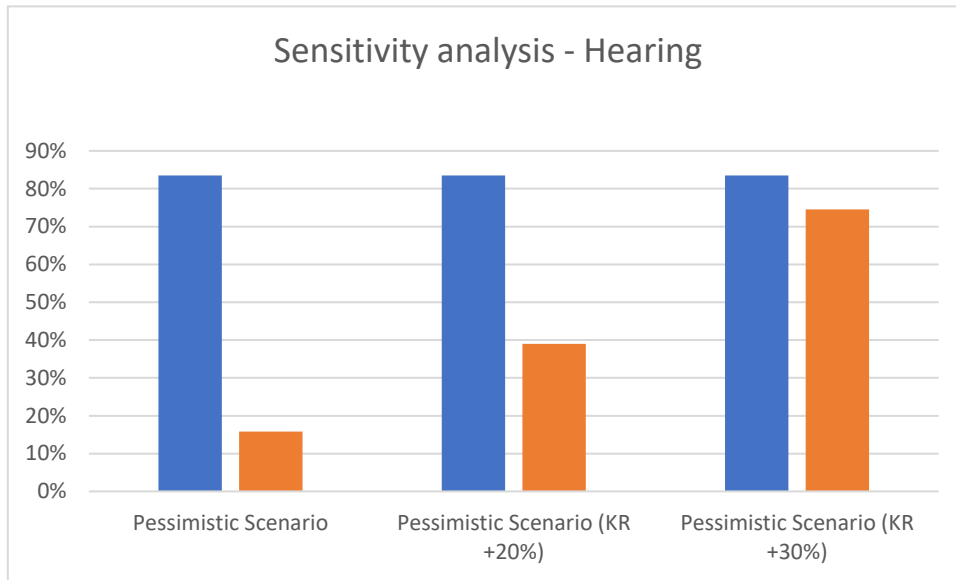
Graph 28 - Sensitivity analysis - Hearing

5.3.   Aggregated results – *as-is*

In the following section, the results concerning the process as a whole will be discussed. Indeed, as mentioned before, while it is important to analyze separately each phase of the process to have a higher degree of precision in the analysis, it is also crucial to draw conclusions on the process as a whole, as the target set by the PNNR are not referred on the single phases. In particular, the targets are focused on the backlog generation and on the disposition time, or the turnover ratio of the Supreme Court, defined as following:

$$DT_t = 365 * \frac{Final\ Pendings_t}{Managed\ files_t}$$

Equation 13 - Disposition Time

As such, the scope of this section is to discuss wheter the targets formulated in the PNNR have been achieved by the simulation model proposed, comparing those of the *as-is* with the *to-be* and see wheter substantial improvements in terms of DT have been achieved.
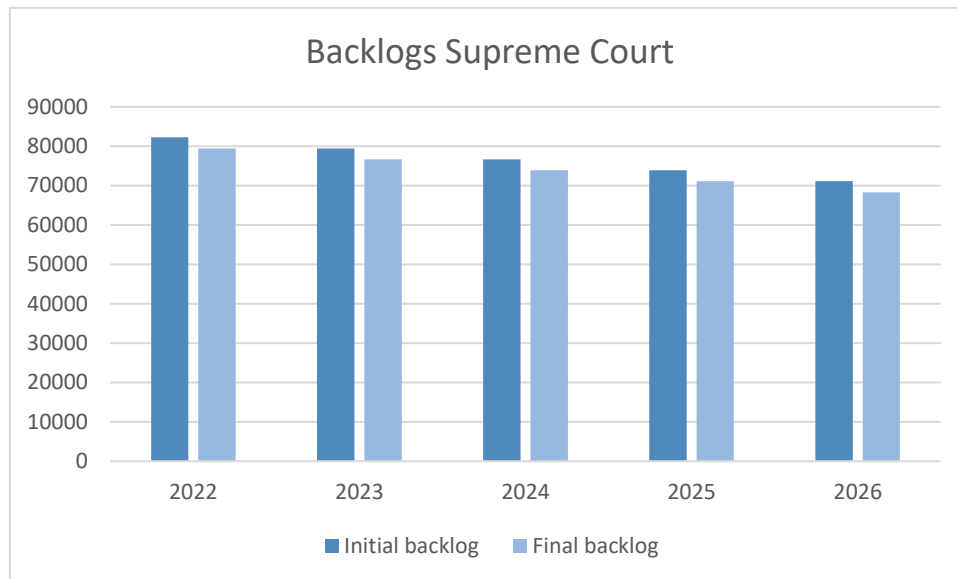
Graph 29 - Backlogs Supreme Court

 Starting with the pendings, it is clear that the simulated process is able to attack the backlog, since the pendings are slowly but steadily decreasing, starting at 82.230 in the year 2022 and ending in 2026 at 68.304 with a decrease of roughly 27% as seen in the graph below.

In order to be sure of the calculation, in spite of the top-down approach just mentioned, it was decided to follow also a bottom-up approach to verify the numbers. Indeed, using historical data it was possible to acknowledge the distribution of pendings among the entirety of the process. As it is shown in graph 30, the backlog was divided by nature into seven classes:

- Waiting hearing but not examined
- Waiting hearing examined
- Hearing scheduled but not examined
- Hearing scheduled and examined
- Waiting draft
- Waiting signature
- Waiting publication

For each of the classes above-mentioned, the calculation was made using a combinatio of the historical data and simulation data to determine the value for each year. The results are shown in the graph below. As it is possible to notice, the Execution and Reception phases in the simulation are as efficient that are able to attack the backlog, resulting in a decrease of the pendings. The Hearing phase on the other hand proves, once again, that it is a problematic phase, where pendings increase throughout the

years. However, the increase seen in the Hearing phase is comparatively less than the decrease shown in the other phases of the process, which is why at the end of the day the backlogs are decreasing considering the process as a whole.

Finally, having an insight into the pendings generation and distribution, it is possible
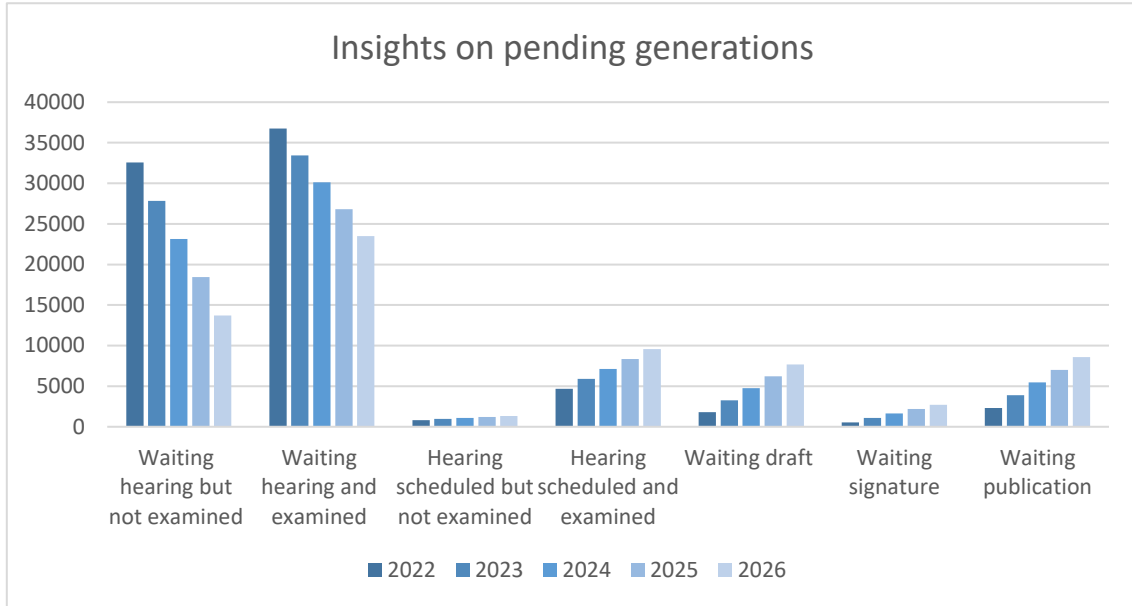
Graph 30 - Insights on pending generations

to determine the disposition time and compare it to the final target of the PNNR, set to 976 days. As shown in Graph 31, the results carried out by the simulated process are not capable of achieving the target, as the goal will be reached only at the year 2030. Moreover, while considering all of the above, only the average scenario was considered, meaning that there is also the possibility of worsening the disposition time and thus, achieving the goal even further in the future. For these reasons, it was doomed necessary to develop a *to-be* solution in order to significantly decrease the DT.
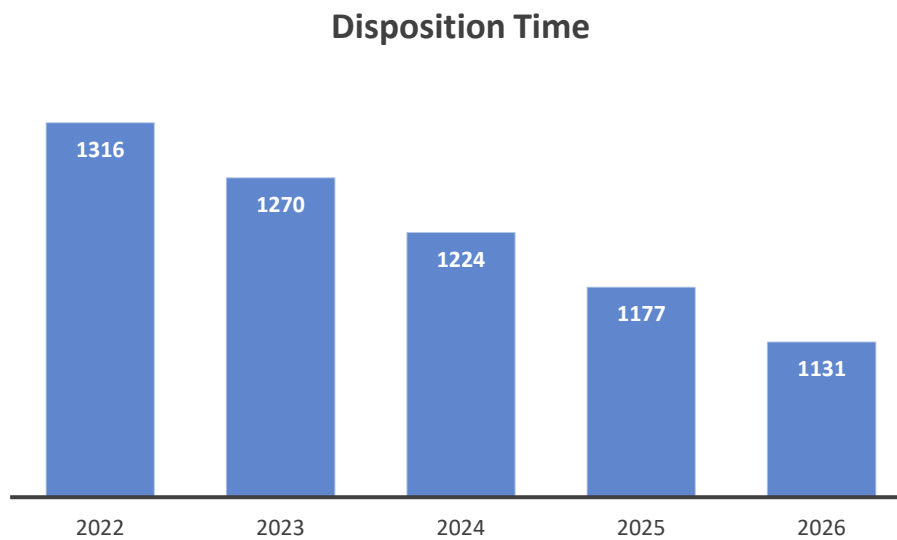
Disposition Time

Graph 31 - Disposition Time as-is process

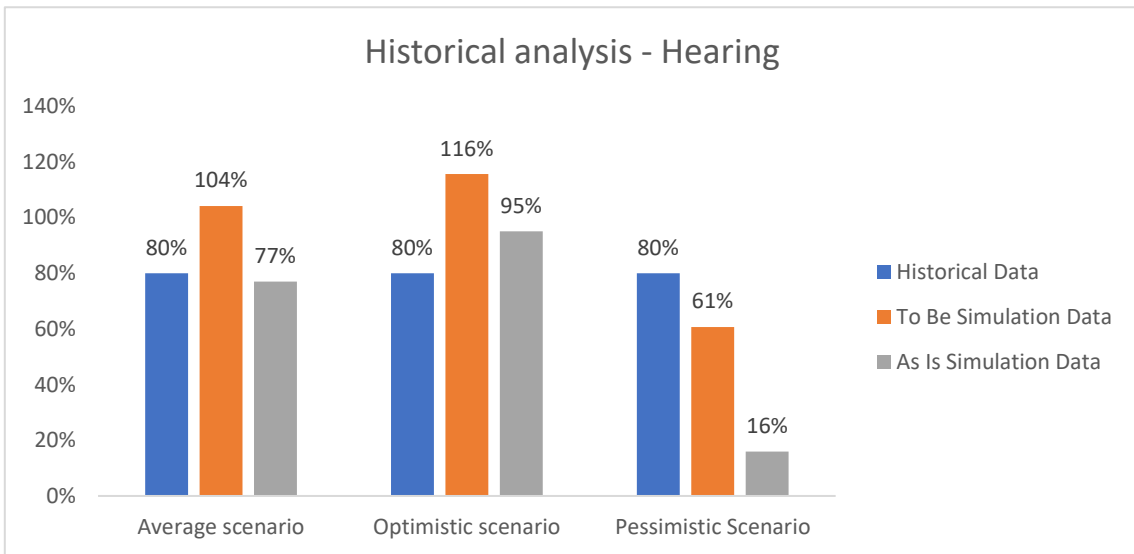## 5.4.   Historical analysis – *to-be*

As mentioned in the previous chapter, in the *to-be* process the *Filter* phase was incorporated into the *Examination*, and given the strict connection of the *Filter* with the *Reception*, it was decided to create one unique sub-process, containing all of the three phases. While comparing the simulation data with the historical data, it emerged that the average scenario was around 8% more efficient than the historical. Not only that, but this *to-be* phase was also, on average, 30% more efficient than the *as-is* counterpart. Also the optimistic and pessimistic scenario saw improvements, increasing respectively of 24% and 30%. The main explaination as to why such drastic results have emerged has to do with both the adoption of only electronic files and the elimination of the bottlenecks present in the VI Section.
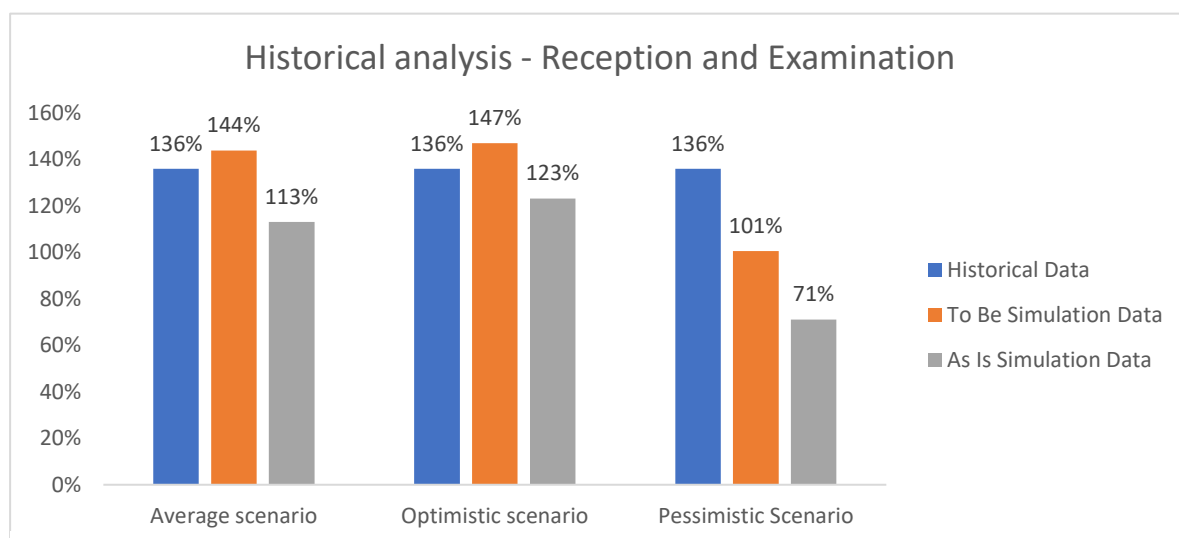

Graph 32 - Historical analysis - Reception and Examination

Also the *Hearing and post hearing* has brought some convincing results. Indeed, especially in the pessimistic scenario, improvements in terms of efficiency can be seen, allowing this phase to become for once non-problematic. As a matter of facts, the optimistic and pessimistic scenario fall within the boundaries of variability, and such a rapid improvement has to be attributed on the unique source of entering files. Indeed, if before files could enter in different ways (electronic, paper,..), now only electronic files will be accepted. As a consequence, the cycle time of the phase will be sensibly reduce thanks to both the economies of learning and the natural reduced cycle time of the electronic file.

Graph 33 - Historical analysis - Hearing

The improvement of this phase can also be seen in terms of backlogs generated. In fact, there is a definite reduction in the pendigs derived from the draft and signature, however there is a slight increase in the publication. This will be further discussed in the limitation section, but for now it can be said that the publication phase is rather ,
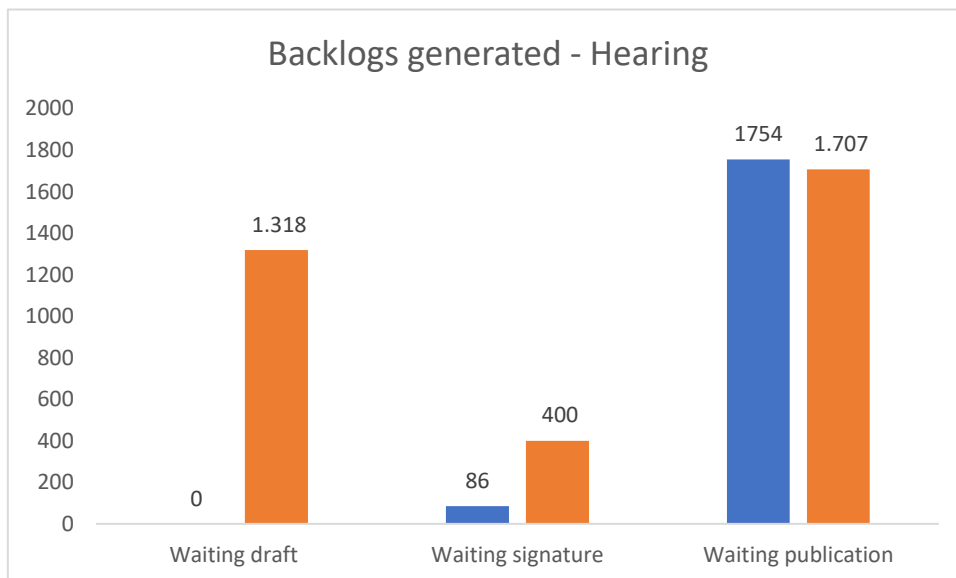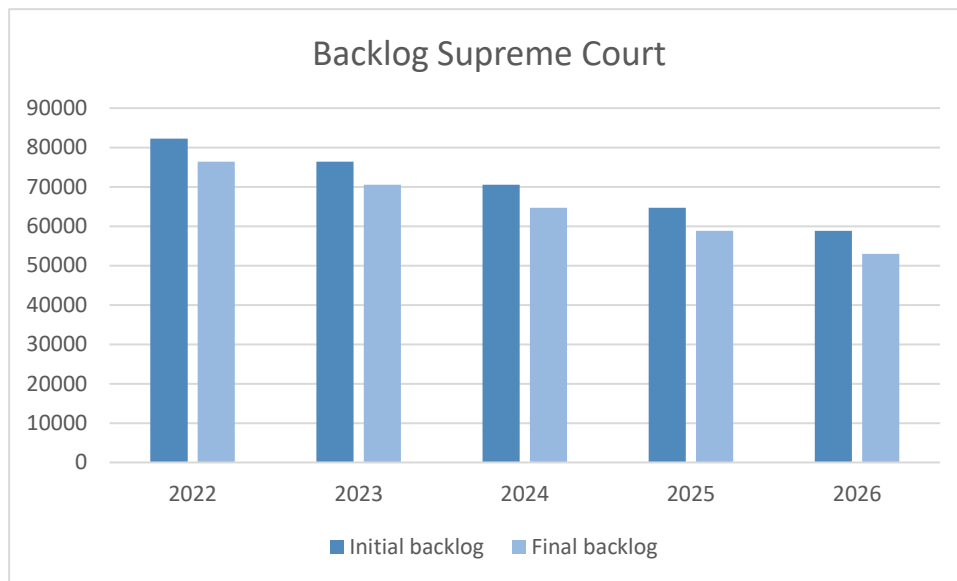

Graph 34 - Backlogs generated - Hearing

both in terms of timings and of resources employed, and as such it is likely that an error computing either has happened.

## 5.5.   Aggregated results – *to-be*

 Finally, the backlog results will be presented. As for the *as-is* process, also in the *to-be* there is a significant decrease in the backlog, as in 2026 the Court will have to deal with

Graph 35 - Backlog Supreme Court

52.955 files against the 68.304 of the *as-is* process. Indeed, the *to-be* process is able to manage on average 25.107 files against the 22.037 of the *as-is*.

Taking a deeper look at the detail of the pendings, it is clear that, like for the *as-is*, the *Examination and Reception* phases are very much efficient, while the novelty consists in
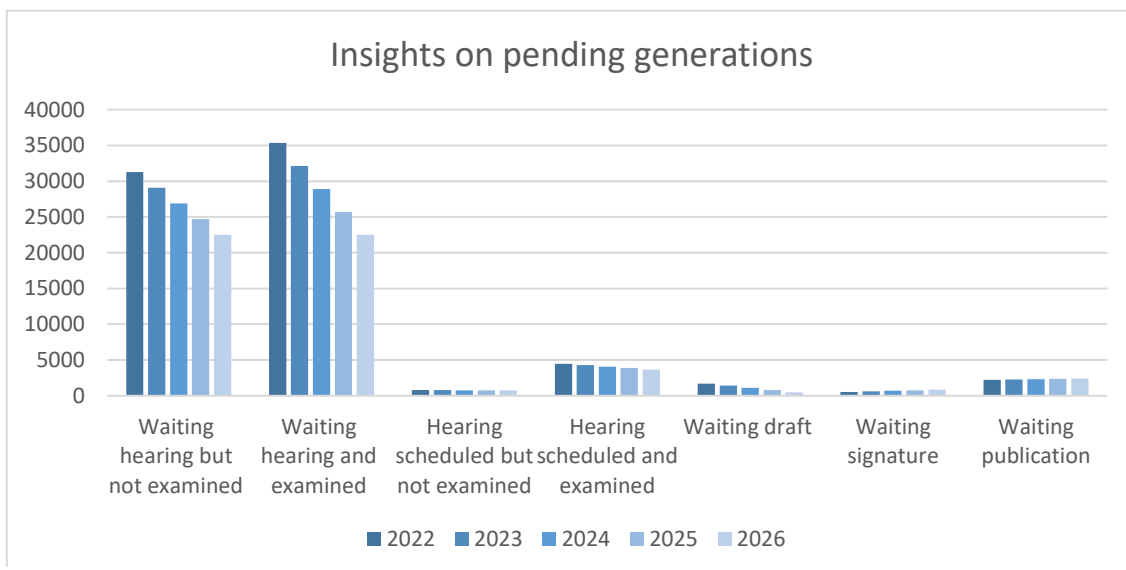
Graph 36 - Insights on pending generations

the *Hearing* phase to be much more productive. Indeed, as stated above, the only bottleneck of the process seems to be the publication phase.

Lastly, having data regarding the backlogs, it is possible to define the Disposition Time as the Equation 1 explains. The results are shown below, and this time the target is fully reached from the year 2024. In the authors opinion, the results of the *to-be* process are rather satisfactory, as they are calibrated on the average scenario, the most likely to happen, but leave a margin of 2 years for unpredictable events to happen, which in the planning for reengineering is crucial to the success of the implementation plan.
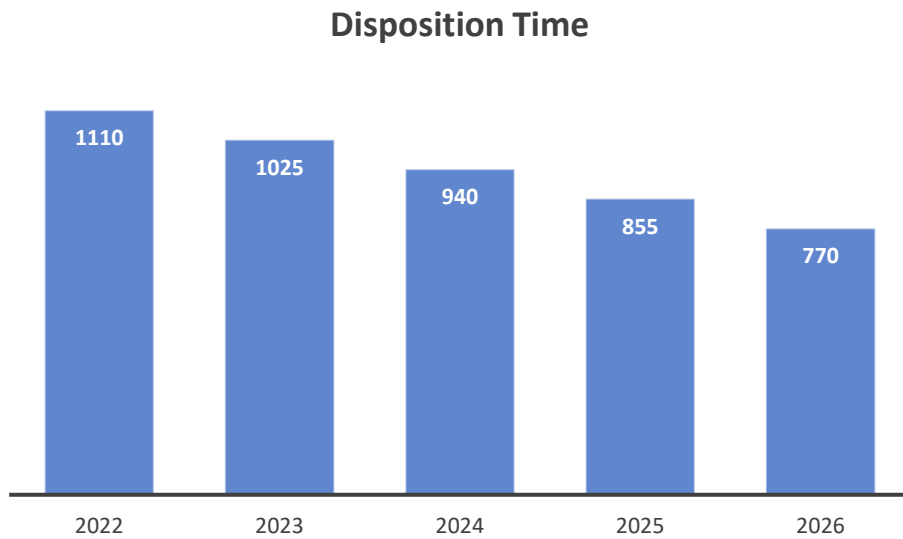
Disposition Time

Graph 37 - Disposition Time

6 Conclusions

The analysis conducted by Deloitte, jointly with several interviews with the Supreme Court, allows to map the macro-processes of the *as-is* situation, from which an Excel model was constructed. Indeed, for each activity present in the process mapping, a task was created in the Excel file. For each task, a standard time was estimated, and a set of variables was assigned. The logic behind the variable assignment was to increase, or sometimes decrease, the standard time set, in order to arrive at the estimated time for each task.

Once data was populated for each task, we calculated the range of possible time values for each activity, then, using the Signavio Simulation Software, we fed as input the time ranges obtained for each activity. We then proceeded with data population in the simulation software, giving as inputs the number resources assigned to the phase of the process, their work schedule, and the number of entering files in the system. This last information was obtained through historical data analysis, given by the Supreme Court itself.

After that, we let the simulation tool run, and then analyze the results provided, both in terms of output files, and workload of the resources with historical data. If the results were unsatisfactory in terms of throughput, a fine-tuning stage would start, where data in the Excel file would be modified until results were more in line with the past, and reiterate for each phase of the process.

Finally, results have been collected and aggregated, to better represent the process. Since the *as-is* process is not able to achieve the target within the temporal boundaries set in the PNNR, a *to-be* process had to be realized. In the realization of such, two key aspects had to be taken care of: the *Filter phase*, present in the *as-is* process ceased to exist, was incorporated into the *Examination phase*, and the files that once came in via mail, paper, or telematic, now only come in as telematic.

Having considered this, the *to-be* process was realized following the same steps: firstly the process mapping were created, then the Excel model, than the Signavio Simulation model, and finally results were compared with the historical data and, if comparable in the order of magnitude, then aggregated and we calculated the backlog generated and the Disposition Time.

As demonstrated by the graph below, the solution proposed is capable of respecting the boundaries set by the PNNR in terms of time, and the result is achieved within the year 2024. This was achieved through the elimination of bottlenecks, creation of economies of learning and simplification of the entire process, with significant cycle time reduction, increase in the productivity of the process and decrease in the backlog generation, which are all objectives of the PNNR.
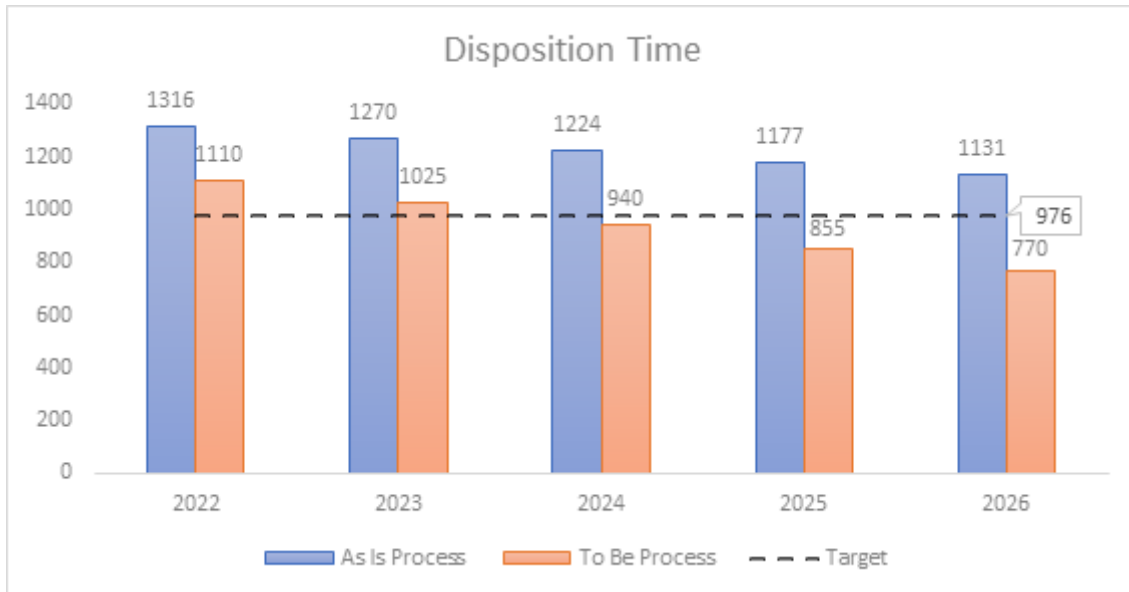
Graph 38 - Disposition Time comparison

6.1. Theoretical contribution

As far as the literature is concerned, the BPR literature is already saturated with case studies and methodologies that are applicable to reengineering. However, while extensively researching, there were very little instances of reengineering works on the public sector, even more so in the Law field, where only two relevant studies can be cited (Ciaghi et al., 2010; Winkelmann & Weiß, 2011). Therefore, the level of innovativeness of our lies is the field in which reengineering is applied, and thus the challenges approached.

Indeed, despite using tools that per se were extensively cited and described in literature, what brings a theoretical contribution in our opinion is the unique combination of said tools. For instance, process mappings are a tool that has been greatly researched on and is not intrinsically innovative, however, a combination of process mapping and the creation of an Excel model, to function as a database for a proper simulation model is an instrument that is much more unique. The Excel file served as data source for the simulation model and, with few modifications, it can be adapted to basically any variation of the process (i.e., other justice systems, other Italian Courts, other *to-be* process of the Supreme Court of Cassation).

6.2. Managerial contribution

The creation of process maps, both for the *as-is* and *to-be* process, had never been done by the Supreme Court. Indeed, while it may not be an innovative solution if the literature is taken into account, it is most definitely an innovation in the Court's eyes. While several attempts have been made in the past to increase the efficiency of the Supreme Court, to the authors memory, no other attempt has been so drastic in terms of changes in the process and targets set, as the one of this study.

The solution proposed in this study has proved theoretically to drastically reduce the Disposition Time, and achieve the target within reasonable time. However, we reckon that rather than the *to-be* process, the contribution that brings the more value added is the simulation itself of the *as-is* process.

Indeed, specifically the punctual scenario was a tool thought expressly for the Court's decision actors (i.e., President, Magistrate, Counselor), as it enables the user to freely modify both the resources employed and the timings in a specific phase of the process, and intuitively understand how the process changes in terms of productivity. This tool not only supports the decision maker in the sizing of resources and time, but also enables further reengineering processes to happen, as the user is capable of simulating the changes before implementing them in the process.

6.3. Limitations and further research

Several assumptions have been needed in order to model and simulate both the *as-is* and the *to-be* process. Starting with the Excel model discussed in the methodology section, the main assumption has to lay within the standard time estimation, that are for sure imprecise despite our best efforts. Indeed, despite having used a historical analysis to fine tune the simulation on Signavio Simulation, it is most likely that the time of certain activities have been underestimated or overestimated. This does not compromise the effectiveness of the simulation as a whole, as the results for the macro-process obtained through simulating are in line with historical data, but specific results such as bottlenecks and evaluations on the single activity might be imprecise. In this sense, a questionnaire had been designed (Appendix B*)* to be submitted to the Court, with the aim of better understanding the timings. However, due to time constraints and given the huge amount of information required, the results are not already available. Therefore, these feedbacks can be used to further develop and consolidate this study. The same argument can be made for the resources employed in the process. However, in this sense, more data were available and thus less assumption needed to be made.

Concerning Signavio Simulation, several times throughout the study it has been mentioned that the tool had some major flaws that impeded or modified our course of action. For instance, the tool halted every time an activity reached or surpassed 10.000 queue instances, or in other terms, whenever a bottleneck blocked more than 10.000 entities. As it is imaginable, such number can be easily achieved, especially in the first phases of the process, as the input are in the order of magnitude of the hundreds of thousands.

Other limitations concerning the assumptions made can be seen calculation of the backlog throughout the years, as we considered only historical data. Indeed, in the calculation of the final pending the files received for each year have been considered constant, which it is a strong assumption, as they most likely vary each year. Also, the managed files have been considered constant while, as in the case of the received files, they are likely to be varying.

As for further research, the first step the authors have identified is to integrate the simulations with the empirical results in terms of timings that the SCC have not supplied yet. Indeed, as stated many times through the study, a significant portion of the times inserted in the

simulation tool have been estimated, and it would be relevant to verify with concrete numbers whether those assumptions hold not only with the past data, but also with the present ones.

Moreover, the extension to the other section of the Civil Section, but also to the Criminal Sector are possible developments to both verify the robustness of the model, and support other decision makers, that in this specific were beyond the target, as if we focused on too many sections the results would not have been so precise, and the value added by this study would have been much less.

Finally, further analysis with the scope of repeating the simulation in the coming years to see if reality fits the model or if it needs to be refined must be considered, as we imagine that with an evolving scenario, the robustness of the model hereby described might be partially compromised.

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A Appendix A

A.1. Excel Model

Hereby, the Excel model used to calculate the timings to feed in the simulation tool is presented.

A.1.1 Reception and Filter

Ufficio Depositi - Unità deposito a mano	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da avvocato	Coda avvocati	5	41,3
Ricerca ricorso per numero ruolo			
Verifica ricorso presente in CSC	Problemi tecnologici	10	14,3
Inserimento dati completi controricorso	Velocità di gestione media operatore		
Prenotazione numero ruolo	Velocità di gestione media operatore	5	7,1
Generazione numero di registro generale	Problemi tecnologici		
Completamento scheda ricorso	Velocità di gestione media operatore	10	14,3
Salvataggio su SIC	Problemi tecnologici		
Stampa etichetta	Velocità di gestione media operatore	5	14,3
	Correttezza informazioni		
Invio fascicolo a unità caricamenti			
Trasmissione fascicolo a unità caricamenti			

Ufficio Depositi - Unità deposito Postale	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da avvocato		15	55,0
Ricerca ricorso per numero ruolo			
Verifica ricorso presente in CSC	Velocità di gestione media operatore	10	19,7
Inserimento dati completi controricorso	Problemi tecnologici		
Prenotazione numero ruolo	Velocità di gestione media operatore	5	9,9
Generazione numero di registro generale	Problemi tecnologici		
Completamento scheda ricorso	Velocità di gestione media operatore	10	19,7
Salvataggio su SIC	Problemi tecnologici		
Invio fascicolo a unità caricamenti			

Figure 37 - Reception and filter 1/3

Ufficio Depositi – Unità di caricamento

Attività	Descrizione	Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da avvocato	Problemi tecnologici	1	2,5
Attesa		240	240,0
Controllo arrivo nuovi fascicoli			
Apertura e presa in carico nuovo fascicolo	Problemi tecnologici	15	28,1
Presa in carico del fascicolo	Velocità di gestione media operatore		
Controllo dati inseriti da avvocato			
Invio comunicazione rifiuto fascicolo	Problemi tecnologici	2	3,7
Rifiuto del deposito	Velocità di gestione media operatore	1	
Accettazione deposito			
Invio conferma PEC all'avvocato			
Generazione numero di registro generale	Problemi tecnologici	20	37,4
Caricamento automatico su SIC tramite CSC	Velocità di gestione media operatore		
Aggiunta eventuali informazioni			
Creazione cartellina vuota e stampa etichetta	Velocità di gestione media operatore; Correttezza informazioni	5	76,5
Ricezione fascicolo cartaceo da deposito a mano non salvato su SIC	Tempistiche consegna da uffici interni	30	50,8
Ricerca numero RG ricorso	Velocità di gestione media operatore; Problemi tecnologici	10	18,7
Completamento scheda ricorso			
Salvataggio su SIC			
Stampa etichetta	Velocità di gestione media operatore; Correttezza informazioni	5	17,5
Ricezione fascicolo da deposito a mano o postale precedentemente salvat	Tempistiche consegna da uffici interni	30	50,8
Invio fascicolo a archivio temporaneo Cancelleria Centrale Civile	Attesa prima dell'invio		70,0

Archivio temporaneo Cancelleria Centrale Civile

Attività	Descrizione	Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da unità di caricamento	Tempistiche consegna da uffici interni	30	48,9
Attesa		43200	43200,0
Trasmissione fascicolo a back-office (sala Pietrostefani)			

Sala Pietrostefani

Attività	Descrizione	Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da archivio temporaneo Cancelleria Centrale Civile	Tempistiche consegna da uffici interni	30	41,0
Verifica e sistemazione fascicolo redatto da front-office	Velocità di gestione media operatore	20	22,6
Caricamento atti mancanti	Velocità di gestione media operatore; Correttezza informazioni	10	13,8
Accorpamento del fascicolo con eventuali controricorsi	Velocità di gestione media operatore	15	16,9
Decisione destinazione fascicolo	Complessità fascicolo	10	6,0
Invio alla cancelleria delle sezioni unite			
Invio fascicolo a cancelleria VI sezione			

Figure 38 - Reception and Filter 2/3

Cancelleria VI sezione Civile – Ufficio Spoglio

		Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da back-office	Tempistiche consegna da uffici interni		10,2
Archiviazione fascicolo civile	Velocità di gestione media operatore	5	5,5
Trasmissione fascicolo in archivio IV sezione	Attesa prima dell'invio		31,4
Estrazione fascicoletto	Complessità fascicolo	15	14,0
Smistamento fascicoletto per sotto-sezione	Velocità di gestione media operatore		
Invio fascicolo ad addetti UPP in VI sezione			
Ricezione fascicoletto da Magistrato spogliatore	Tempistiche consegna da uffici interni	30	42,2
Unione fascicoletto con fascicolo civile	Velocità di gestione media operatore	5	5,5
Trasmissione fascicolo in Cancelleria Sezione Ordinaria			

Archivio VI sezione

		Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da Ufficio Spoglio	Tempistiche consegna da uffici interni	30	45,6
Attesa udienza			

Addetto UPP VI sezione civile

		Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da Cancelleria VI sezione civile	Tempistiche consegna da uffici interni	30	41,8
Valutazione caratteristiche fascicolo	Complessità fascicolo	45	45,6
Segnalazione se fascicolo pertinente a rimanere in VI sezione	Velocità di gestione media operatore		
	Problemi tecnologici	10	18,6
Creazione file word della segnalazione	Velocità di gestione media operatore		
Invio fascicolo con segnalazione al presidente coordinatore della sottosezione in IV			

Magistrato spogliatore della sottosezione in VI

		Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo con segnalazione	Tempistiche consegna da uffici interni	30	42,9
Esaminazione sommaria fascicolo e segnalazione word	Problemi tecnologici / Velocità di gestione media	20	39,0
Decisione Presidente se fascicolo definibile in VI sezione	Complessità fascicolo	5	4,2
Invio fascicolo a consigliere sottosezione ordinaria in VI			
Gestione fascicolo in VI			

Cancelleria Sezione Ordinaria

		Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo da Ufficio Spoglio	Tempistiche consegna da uffici interni	30	37,2
Fascicolo elaborato in sezioni unite			

Cancelleria Sezioni Unite

		Tempo Standard [min]	Tempo Stimato [min]
Ricezione fascicolo	Tempistiche consegna da uffici interni	30	30,9
Fascicolo elaborato in sezioni unite			

Figure 39 - Reception and Filter 3/3

A.1.2 Spoglio II Sezione

Cancelleria di sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Gestione del fascicolo in sezione ordinaria	Tempistiche consegna da uffici interni	30	44,5
Controllo inclusione per il trasferimento di fascicoli cartacei	Completezza informazioni / Velocità di gestione media operatore	50	94,6
Verifica registrazione su SIC fascicoli emessi	Velocità di gestione media operatore / Problemi tecnologici	30	56,3
Messa a disposizione del fascicolo per lo spoglio			
Archiviazione in attesa di udienza	Velocità di gestione media operatore	10	14,2
Invio fascicolo a archivio sezione	Attesa prima dell'invio		419,1
Ricerca ricorso su SIC	Problemi tecnologici / Velocità di gestione media operatore	30	56,3
Trasmissione fascicolo ad addetto UPP			
Raggruppati in attesa di udienza (corsia preferenziale)	Velocità di gestione media operatore	10	14,2
Attesa udienza			
Ricezione fascicolo da Magistrato Spogliatore	Tempistiche consegna da uffici	30	37,9
Calendarizzazione per l'udienza	Velocità di gestione media	10	14,2
Attesa udienza			

Archivio sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione da Cancelleria di sezione	Tempistiche consegna da uffici interni	30	38,1
Archiviazione	Velocità di gestione media operatore	5	6,0

Addetto UPP	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da cancelleria	Tempistiche attesa da uffici interni	30	41,4
Compilazione scheda di spoglio	Completezza informazioni / Velocità di gestione media operatore / Complessità fascicolo	85	119,2
Controllo materia inserita dall'avvocato			
Trasmissione fascicolo a magistrato spogliatore	Attesa prima dell'invio		321,3

Magistrato Spogliatore	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo di ufficio da addetto UPP	Tempistiche attesa da uffici interni	30	30,7
Verifica spoglio effettuto da UPP	Completezza informazioni / Complessità fascicolo	30	33,8
Ricerca del numero di registro generale su SIC e individuazione del fascicolo	Velocità di gestione media operatore / Problemi tecnologici	20	35,7
Registrazione della scheda di spoglio su SIC	Velocità di gestione media operatore / Problemi tecnologici	10	17,8
Individuazione e assegnazione del relatore	Velocità di gestione media operatore	10	12,6
Creazione del ruolo d'udienza	Velocità di gestione media	10	12,6
Invio fascicolo a Cancelleria per calendarizzazione			

Figure 40 - Examination II Section

A.1.3 Spoglio IV Sezione

Cancelleria di sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Gestione del fascicolo in sezione ordinaria	Tempistiche consegna da uffici interni	30	44,6
Controllo inclusione per il trasferimento di fascicoli cartacei	Completezza informazioni	25	40,6
	Velocità di gestione media operatore		
Verifica registrazione su SIC fascicoli emessi	Velocità di gestione media operatore	15	25,9
	Problemi tecnologici		
Messa a disposizione del fascicolo per lo spoglio			
Archiviazione in attesa di udienza	Velocità di gestione media operatore	5	6,1
Invio fascicolo a archivio sezione	Attesa prima dell'invio		234,3
Ricerca ricorso su SIC	Problemi tecnologici	15	25,9
	Velocità di gestione media operatore		
Scrematura iniziale per sotto materia	Complessità fascicolo	150	154,3
	Velocità di gestione media operatore		
Trasmissione fascicolo ufficio Pubblico			
Trasmissione fascicolo ufficio Privato	Attesa prima dell'invio		297,4
Trasmissione fascicolo ufficio Previdenza			
Ricezione da Presidente, Magistrato Pubblico o Addetto UPP Priva	Tempistiche consegna da uffici interni	30	47,5
Organizzazione del calendario udienza	Velocità di gestione media operatore	10	12,2
Attesa udienza			

Archivio sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione da Cancelleria di sezione	Tempistiche consegna da uffici interni	30	47,4
Archiviazione	Velocità di gestione media operatore	5	6,9

Magistrato spogliatore Pubblico	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da cancelleria	Tempistiche attesa da uffici interni	30	32,2
Compilazione scheda di spoglio sia per cartacei che PCT	Completezza informazioni	600	770,5
Compilazione scheda di spoglio sia per cartacei che PCT	Velocità di gestione media operatore		
Compilazione scheda di spoglio cartaceo	Complessità fascicolo		
Compilazione scheda di spoglio PCT			
Individuazione ed assegnazione del relatore	Velocità di gestione media operatore	25	28,5
Creazione del ruolo d'udienza	Velocità di gestione media operatore	25	28,5
Invio a Cancelleria di Sezione			

Archivio sottosezione Privato	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo di ufficio da cancelleria	Tempistiche attesa da uffici interni	30	44,6
Archiviazione fascicolo in ordine cronologico	Velocità di gestione media operatore	5	6,1
Trasmissione fascicolo Addetto UPP - Privato			

Figure 41 - Examination IV Section 1/2

Addetto UPP - Privato

		Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo di ufficio da Archivio sottosezione Privato	Tempistiche attesa da uffici interni	30	35,4
Attesa del proprio turno			
Compilazione scheda di spoglio	Completezza informazioni / Velocità di gestione media operatore / Complessità fascicolo	600	880,5
Ricerca su SIC di fascicoli interconnessi	Problemi tecnologici / Complessità fascicolo / Velocità di gestione media operatore	120	193,3
Fascicolo viene individuato su SIC tramite RG e estrato (se fascicolo interconnesso ad un altro)	Problemi tecnologici / Velocità media operatore	5	9,2
Compilazione scheda di spoglio seguendo il fascicolo interconnesso	Completezza informazioni / Velocità di gestione media operatore	120	200,9
Preparazione dei fascicoli per udienza telematica			
Individuazione ed assegnazione del relatore	Velocità di gestione media operatore	25	31,4
Creazione del ruolo d'udienza	Velocità di gestione media operatore	25	31,4
Invio a Cancelleria di sezione			

Presidente sottosezione Previdenza

		Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo di ufficio da cancelleria	Tempistiche attesa da uffici interni	30	40,8
Smistamento dei fascicoli per materia	Completezza informazioni / Velocità di gestione media operatore / Complessità fascicolo	60	75,8
Trasmissione fascicolo Addetto UPP - Previdenza	Attesa prima dell'invio		233,1
Ricezione da Addetto UPP-Previdenza	Tempistiche attesa da uffici interni	30	35,0
Individuazione ed assegnazione del relatore	Velocità di gestione media operatore	25	27,0
Creazione del ruolo d'udienza	Velocità di gestione media operatore	25	27,0
Invio a Cancelleria di Sezione			

Addetto UPP - Sottosezione Previdenza

		Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da Presidente Addetto UPP - Previdenza	Tempistiche attesa da uffici interni	30	46,7
Compilazione scheda di spoglio sia per cartacei che PCT	Completezza informazioni / Velocità di gestione media operatore / Complessità fascicolo	600	781,3
Compilazione scheda di spoglio sia per cartacei che PCT			
Compilazione scheda di spoglio cartaceo			
Compilazione scheda di spoglio PCT			
Archiviazione dei fascicoli separati per materia	Velocità di gestione media operatore	5	5,6
Invio a Presidente Sotto-sezione Previdenza			

Figure 42 - Examination II Section 2/2

A.1.4 Spoglio V Sezione

Cancelleria di sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Gestione del fascicolo in sezione ordinaria	Tempistiche consegna da uffici interni	30	43,4
Controllo inclusione per il trasferimento di fascicoli cartac	Completezza informazioni / Velocità di gestione media operatore	25	48,8
Verifica registrazione su SIC fascicoli emessi	Velocità di gestione media operatore / Problemi tecnologici	15	33,0
Messa a disposizione del fascicolo per lo spoglio			
Archiviazione in attesa di udienza	Velocità di gestione media operatore	5	7,3
Invio fascicolo a archivio sezione	Attesa prima dell'invio		265,1
Ricerca ricorso su SIC	Problemi tecnologici / Velocità di gestione media operatore	15	33,0
Trasmissione fascicolo ad addetto UPP			

Archivio sezione		Tempo Standard (min)	Tempo Stimato (min)
Ricezione da Cancelleria di sezione	Tempistiche consegna da uffici interni	30	32,5
Archiviazione	Velocità di gestione media operatore	5	6,4

UPP		Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo	Tempistiche attesa da uffici interni	30	33,1
Schedatura fascicolo	Complessità fascicolo / Completezza e correttezza informazioni / Velocità di gestione media operatore	20	28,8
Inserimento dati	Problemi tecnologici / Velocità di gestione media operatore	10	20,2
Salvataggio			
Apertura cartella condivisa			
Indicazione sottosezione	Problemi tecnologici / Velocità di gestione media operatore	10	20,2
Apertura cartella "imposte condivise"			
Apertura cartella "tributi armonizzati"			
Apertura cartella "tributi locali e altri tributi"			
Apertura cartella "ricorsi da fissare"			
Salvataggio file			
Trasmissione fascicolo a GDF			

GDF		Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da UPP	Tempistiche attesa da uffici interni	30	30,177
Archiviazione fascicolo	Velocità di gestione media operatore	5	5,56
Attesa del proprio turno			
Trasmissione fascicolo a spogliatore e UPP			

Spogliatore e UPP		Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da GDF	Tempistiche attesa da uffici interni	30	35,56
Creazione ruoli di udienza	Complessità fascicolo / Completezza e correttezza informazioni / Velocità di gestione media operatore	60	74,07
Assegnazione del relatore			
Decreto di fissazione			
Attesa udienza o adunanza			

Figure 43 - Examination V Section

A.1.5 Udienza e post-udienza

Cancelleria di sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Attesa Udienza			
Inserimento a sistema del ruolo di udienza	Problemi tecnologici / Velocità di gestione media operatore	10	18,2
Prelievo fascicoli dall'archivio			
Consegna carte regolamentari	Velocità di gestione media operatore	30	41,6
Invio atti alla PG			
Ricezione provvedimenti PG	Tempistiche consegna uffici interni	30	46,5
Registrazione provvedimenti	Problemi tecnologici / Velocità di gestione media operatore	15	27,3
Gestione del deposito degli atti	Velocità di gestione media operatore	10	13,9
Aggiornamento del fascicolo	Velocità di gestione media operatore / Complessità fascicolo	45	54,7
Invio fascicolo a Collegio e relatori			
Ricezione richiesta deposito ruolo	Tempistiche consegna uffici interni	30	0,0
Accettazione deposito ruolo	Velocità di gestione media operatore	10	13,9
Ricezione richiesta deposito della minuta			
Accettazione deposito minuta	Velocità di gestione media operatore	10	13,9
Invio minuta a Presidente di Sezione			
Ricezione minuta da Presidente di Sezione	Tempistiche consegna uffici interni	30	43,2
Controllo di rispondenza	Velocità di gestione media operatore / Complessità fascicolo / Completezza e correttezza info	30	48,6
Invio provvedimento firmato dal Presidente a Ufficio di Pubblicazione			
Ricezione provvedimento da Ufficio di Pubblicazione	Tempistiche consegna uffici interni	30	48,7
Controllo correttezza dati	Completezza e correttezza info / Velocità di gestione media operatore / Complessità fascicolo	30	48,6
Pubblicazione del provvedimento	Velocità di gestione media operatore	10	13,9
Notifica agli avvocati	Problemi tecnologici / Velocità di gestione media	5	9,1
Invio fascicolo a Archivio			

Procura generale	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione atti da Cancelleria di Sezione	Tempistiche consegna uffici interni	30	45,2
Definizione provvedimenti	Velocità di gestione media operatore / Complessità fascicolo	10	10,3
Invio procedimenti a Cancelleria di sezione			

Collegio e relatori	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione atti da Cancelleria di Sezione	Tempistiche consegna uffici interni	30	44,2
Definizione esiti	Velocità di gestione media operatore / Complessità fascicolo	15	14,3
Invio richiesta di deposito ruolo a Cancelleria di sezione			
Stesura provvedimenti	Velocità di gestione media operatore	45	48,8
Invio richiesta di deposito minuta a Cancelleria di sezione			

Presidente di Sezione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione minuta da Cancelleria di Sezione	Tempistiche consegna uffici interni	30	31,3
Controfirma della minuta	Velocità di gestione media operatore	30	41,3
Invio minuta a Cancelleria di sezione			

Figure 44 - Hearing 1/2

Ufficio Pubblicazione	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione provvedimento da Cancelleria di Sezione	Tempistiche consegna uffici interni	30	39,5
Predisposizione della minuta	Velocità di gestione media operatore	30	38,4
Invio minuta a Cancelleria di sezione			

Archivio	Variabili	Tempo Standard (min)	Tempo Stimato (min)
Ricezione fascicolo da Cancelleria di Sezione	Tempistiche consegna uffici interni	30	41,2
Attesa		14400	14400,0
Controllo correttezza e completezza	Velocità di gestione media operatore Complessità fascicolo Correttezza e completezza info	45	64,7
Archiviazione	Velocità di gestione media operatore	10	12,3

Figure 45 - Hearing 2/2

A.2. *As-is* mappings

In the following section, the *as-is* mappings are provided.

A.2.1. Reception
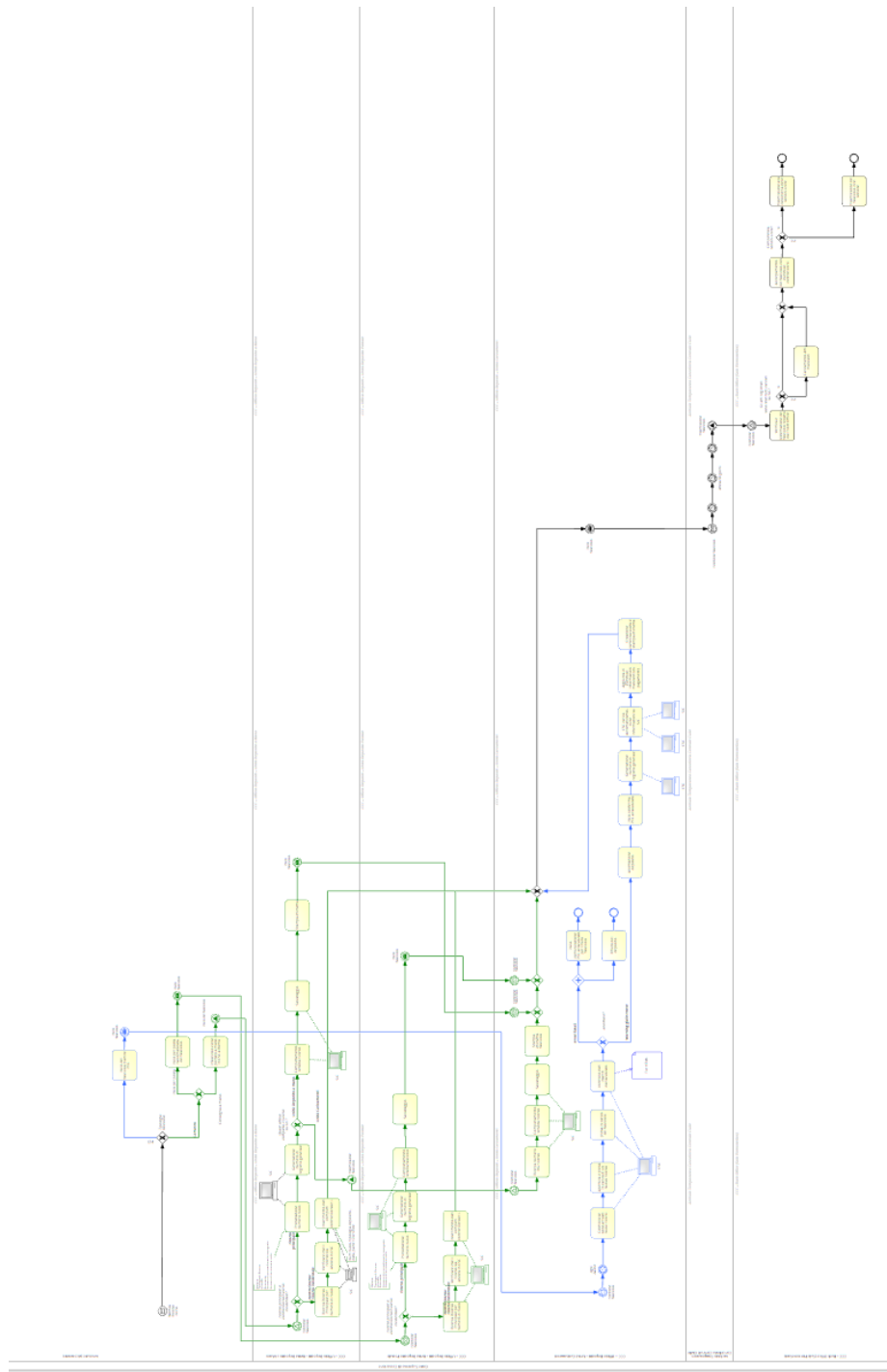
Figure 46 - as-is Reception

A.2.2. Filter
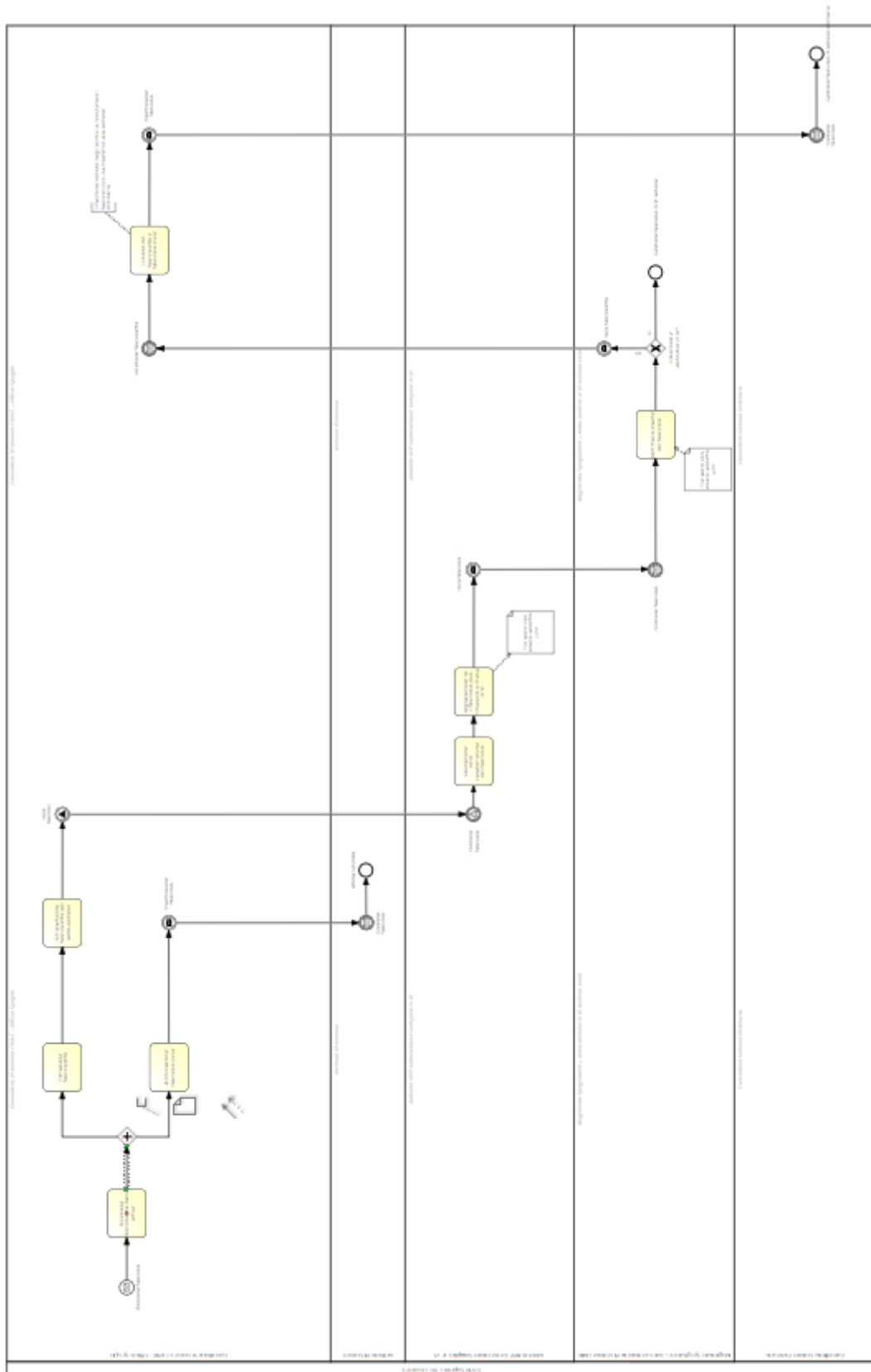
Figure 47 - as-is Filter

A.2.3. Examination II Section
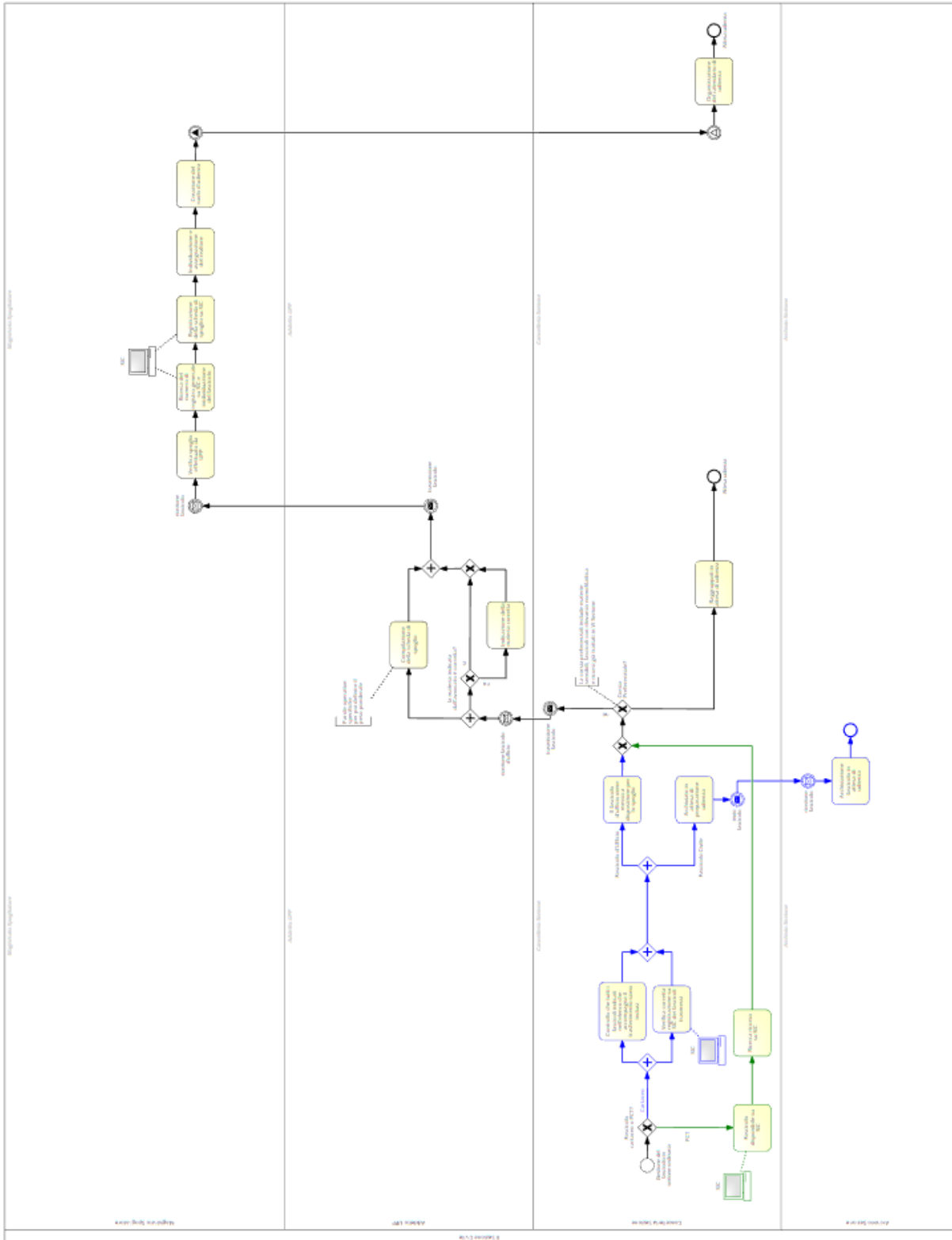
Figure 48 - as-is Examination II Section

136

A.2.4. Examination IV Section
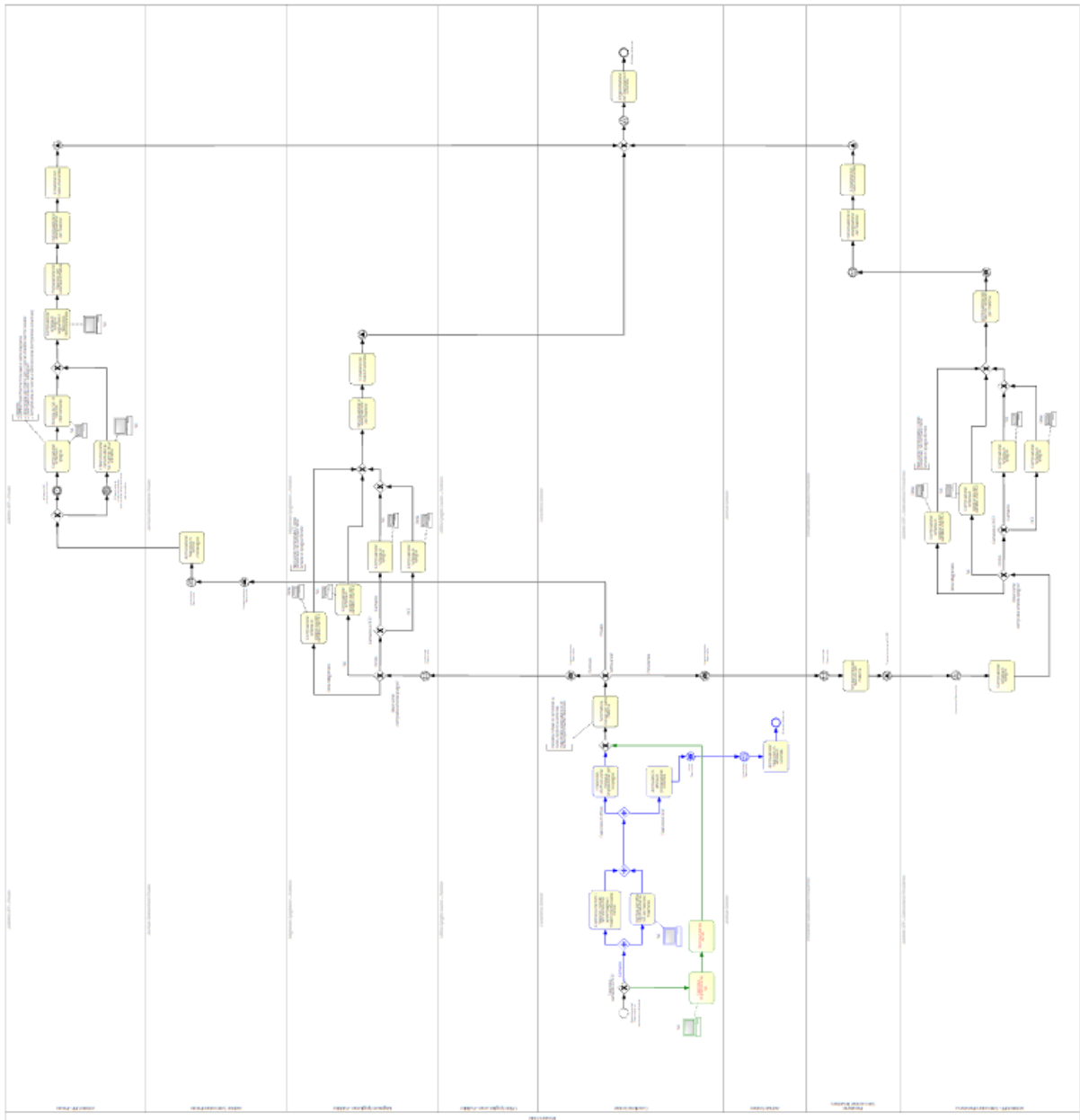
Figure 49 - as-is Examination IV Section

A.2.5. Examination V Section

Figure 50 - as-is Examination V Section

A.2.6. Hearing and post-Hearing
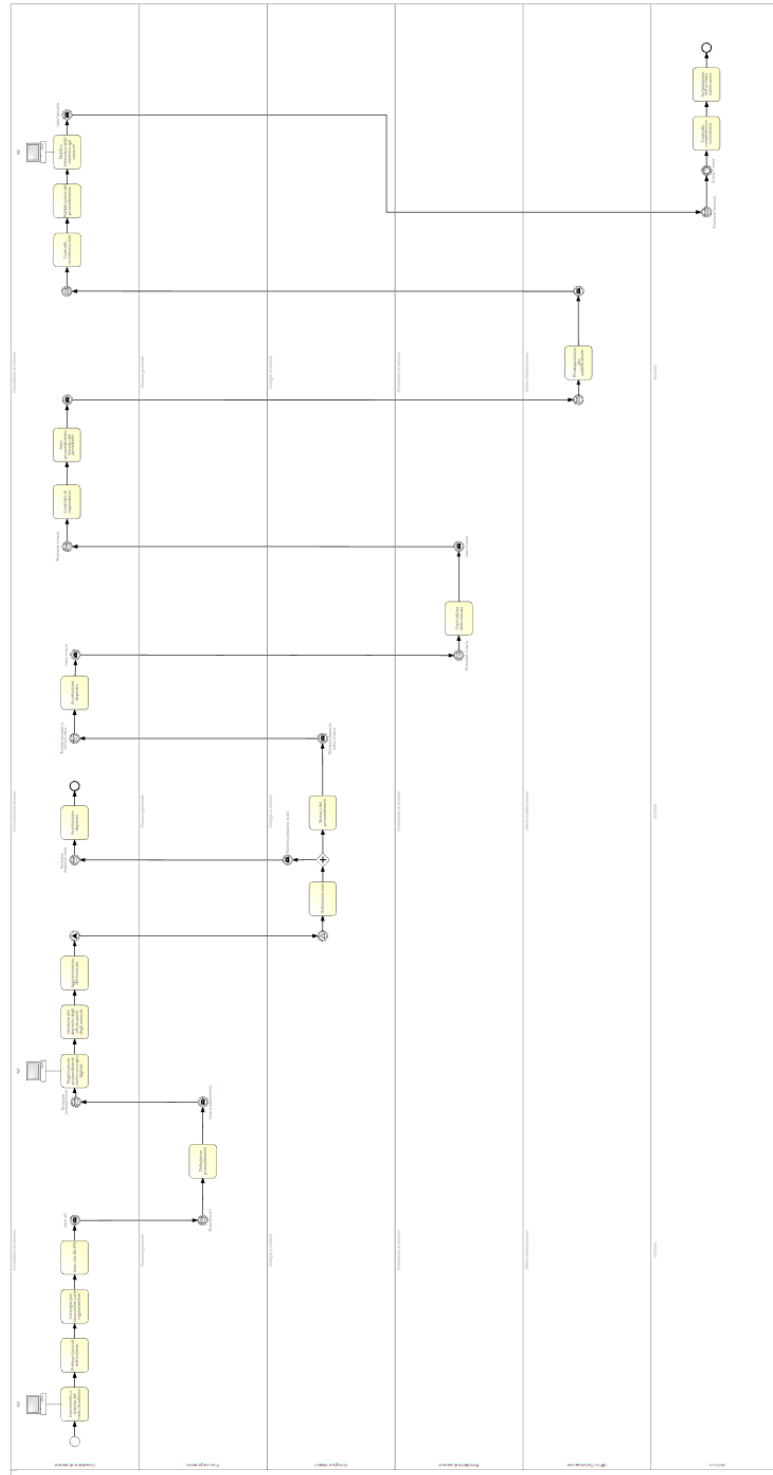
Figure 51 - as-is Hearing

A.3. *To be* mappings

In the following section, the *to-be* mappings are provided.

140
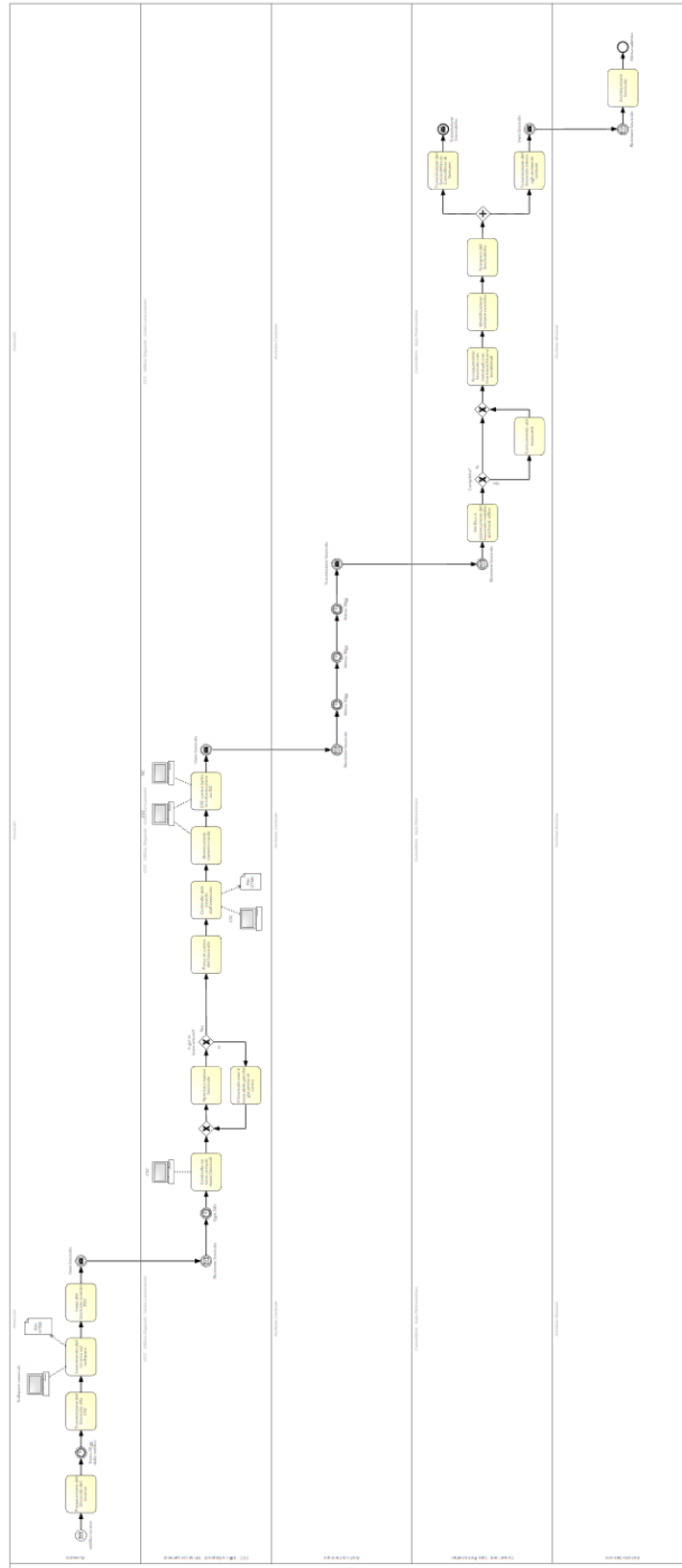
A.3.1. Reception

Figure 52 - to-be Reception

A.3.2. Examination
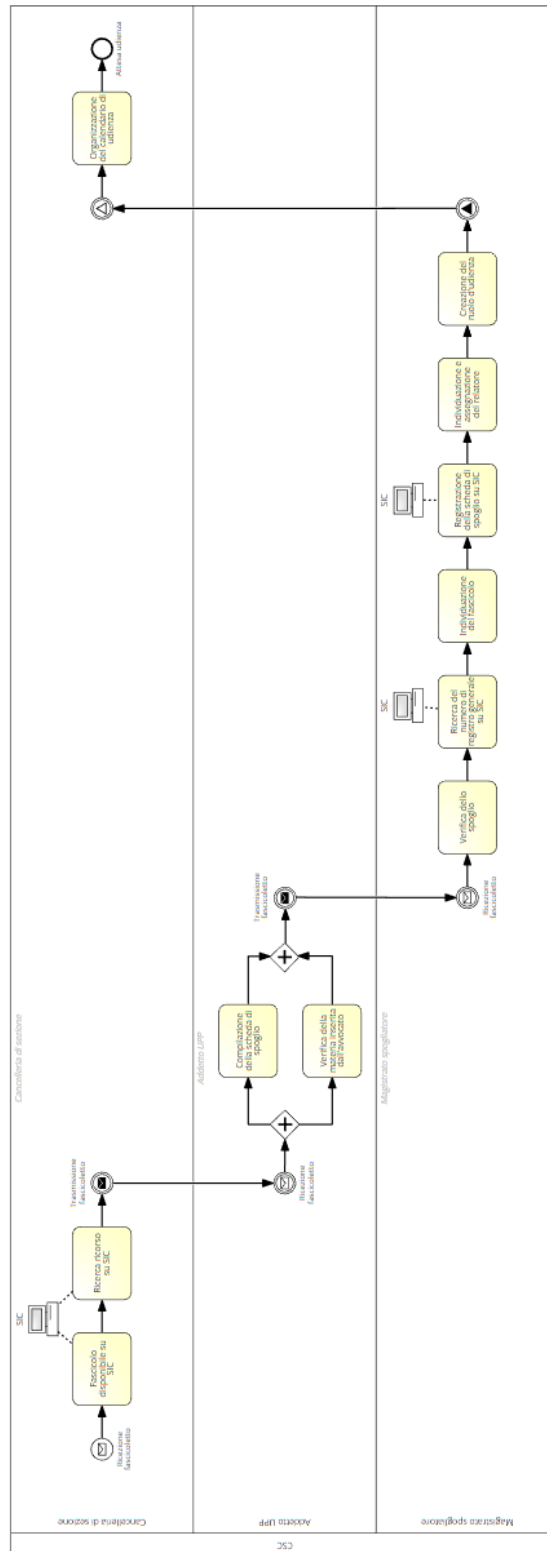
Figure 53 - to-be Examination

A.3.3. Hearing and post-Hearing
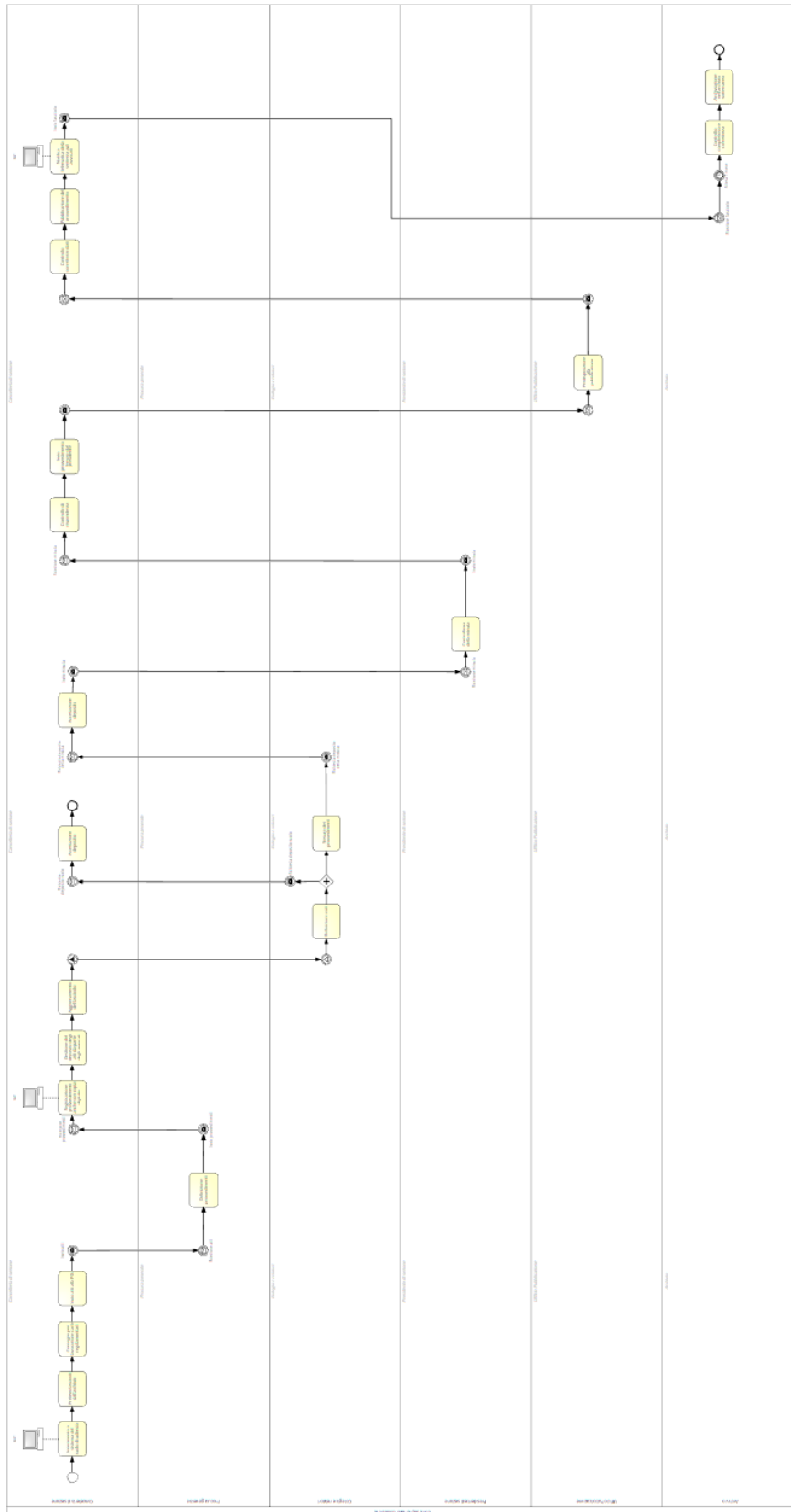
Figure 54 - to-be Hearing

B Appendix B

B.1. Questionnaire

The following questionnaire has been submitted to the SCC in order to gather information regarding the timings for the Excel file. It has been organised as to be specific for each phase of the process,

B.1.1 Premesse generali

Il seguente questionario ha lo scopo di raccogliere dati per la costruzione e successiva raffinazione del modello di simulazione per il settore civile della CSC. Per facilitare la compilazione, le domande sono state raccolte in base alla fase del processo a cui si riferiscono.

Tutte le domande del suddetto questionario hanno lo scopo di raccogliere i dati dell'anno solare 2022, in modo da poter confrontare il vecchio funzionamento della Corte con i fascicoli cartacei, con il nuovo modello unicamente telematico.

B.1.2 Ricezione

1) Nel 2022, qual è stata la percentuale di **fascicoli telematici** e **fascicoli cartacei** (i.e. 60% telematici, 40% cartacei)?

2) Nel 2022, qual è stata la percentuale di fascicoli cartacei **portati a mano** in corte e fascicoli cartacei di tipo **postale**?

3) Con che probabilità viene depositato un controricorso/ricorso incidentale (sono istanze successive al primo deposito di un ricorso in cassazione, non mutualmente esclusive)?

4) Nel caso di un fascicolo consegnato a mano, quale ufficio completa il ricorso su SIC (i.e. 40% delle volte l'ufficio caricamenti, 60% delle volte l'unità deposito a mano)?

5) Abbiamo considerato come **tempo medio** di attraversamento di un fascicolo all'interno dell'**Ufficio Depositi- Unità deposito a mano** (attività considerate: dalla ricezione del fascicolo dall'avvocato alla trasmissione all'unità caricamenti) pari a **35 minuti.** È verosimile?

6) Il tempo medio per l'**Ufficio Depositi- Unità deposito Postale** (attività considerate: dalla ricezione del fascicolo dall'avvocato alla trasmissione all'unità caricamenti) è stato considerato pari a **40 minuti.** È verosimile?

7) Il tempo medio dell'**Ufficio Depositi- Unità di Caricamento** (attività considerate: dalla ricezione del fascicolo dall'avvocato alla creazione della cartellina vuota e stampa dell'etichetta) è pari a **35 minuti** nel caso di un fascicolo **PCT.** È verosimile?

8) Il tempo medio dell'**Ufficio Depositi- Unità di Caricamento** (attività considerate: dalla ricezione del fascicolo dal deposito a mano non salvato precedentemente su SIC alla stampa dell'etichetta) è pari a **circa 40 minuti** nel caso di un fascicolo **cartaceo.** È verosimile?

9) Abbiamo immaginato che **l'Unità di caricamento**, prima di consegnare i fascicoli lavorati **all'archivio Cancelleria Centrale Civile** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati

all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

10) L'attesa di 90 gg nell'archivio temporaneo Cancelleria Centrale Civile è un'attesa media, minima o massima?

11) Il tempo medio impiegato dal **Back Office** (attività considerate: dalla ricezione del fascicolo dall'archivio temporaneo Cancelleria Centrale Civile alla decisione di destinazione del fascicolo) è considerato pari a **1 ora e 35 minuti.** È verosimile?

12) Qual è la percentuale di fascicoli che è di competenza delle **sezioni unite** e quale invece è la percentuale di fascicoli che **veniva trasmessa in VI**?

B.1.3 Filtro

1) Il tempo medio per **l'Ufficio Spoglio** (attività considerate: dalla ricezione del fascicolo dal back-office alla trasmissione in Cancelleria della sezione ordinaria) è stato considerato di **1 ora e 10 minuti**. È verosimile?

2) Abbiamo immaginato che **l'Ufficio Spoglio**, prima di consegnare i fascicoli lavorati **all'archivio VI sezione** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

3) Abbiamo immaginato che **l'addetto UPP** (attività considerate: dalla ricezione del fascicolo dalla cancelleria VI sezione civile all'invio del fascicolo con segnalazione al presidente coordinatore della sottosezione in VI) abbia un tempo medio pari **a 1 ora e 30 minuti**. È verosimile?

4) Abbiamo immaginato che **il Magistrato spogliatore della sottosezione in VI** (attività considerate: da ricezione fascicolo con segnalazione alla decisione se il fascicolo sia definibile o meno in VI) abbia un tempo medio pari **a 1 ora**. È verosimile?

5) Nel 2022, che percentuale di fascicoli era definibile in VI?

B.1.4 Spoglio II Sezione

1) Nel 2022, che percentuale di fascicoli era cartacea?

2) Il tempo medio per **la Cancelleria di Sezione** è stato considerato di **2 ore e 10 minuti** nel caso di un fascicolo **cartaceo** (attività considerate: dal controllo di inclusione per il trasferimento dei fascicoli cartacei alla trasmissione del fascicolo all'addetto UPP). È verosimile?

3) Il tempo medio per **la Cancelleria di Sezione** è stato considerato di **40 minuti** nel caso di un fascicolo **PCT** (attività considerate: dalla ricerca ricorso su SIC alla trasmissione del fascicolo all'addetto UPP). È verosimile?

4) Abbiamo immaginato che **la Cancelleria di Sezione**, prima di consegnare i fascicoli lavorati **all'archivio di sezione** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

5) Che percentuale di fascicoli ha la corsia preferenziale?

6) Che percentuale di fascicoli ha la materia indicata dall'avvocato corretta?

7) Il tempo medio per **l'Addetto UPP** (attività considerate: dalla ricezione del fascicolo dalla cancelleria di sezione alla trasmissione del fascicolo al magistrato spogliatore) è stato considerato di **1 ora e 40 minuti**. È verosimile?

8) Abbiamo immaginato che **l'Addetto UPP**, prima di consegnare i fascicoli lavorati **al Magistrato Spogliatore** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

9) Il tempo medio per **il Magistrato Spogliatore** (attività considerate: dalla ricezione del fascicolo di ufficio dall'addetto UPP all'archiviazione del fascicolo in attesa dell'udienza) è stato considerato di **1 ora e 40 minuti.** È verosimile?

B.1.5 Spoglio IV Sezione

1) Nel 2022, che percentuale di fascicoli era cartacea?

2) Il tempo medio per **la Cancelleria di Sezione** è stato considerato di **1 ore e 35 minuti** nel caso di fascicolo **cartaceo** (attività considerate: dal controllo di inclusione per il trasferimento di fascicoli cartacei alla scrematura iniziale per sotto-materia). È verosimile?

3) Il tempo medio per **la Cancelleria di Sezione** è stato considerato di **35 minuti** nel caso di fascicolo **PCT** (attività considerate: dalla ricerca ricorso su SIC alla scrematura iniziale per sotto-materia). È verosimile?

4) Abbiamo immaginato che **la Cancelleria di Sezione**, prima di consegnare i fascicoli lavorati **all'archivio di sezione** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

5) Abbiamo immaginato che **la Cancelleria di Sezione**, prima di consegnare i fascicoli lavorati **all'Ufficio Pubblico, Privato o Previdenza,** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

6) Che percentuale di fascicoli ha come sotto-area il Pubblico? E Privato?

7) Il tempo medio per **il Magistrato Spogliatore Pubblico** (attività considerate: dalla ricezione fascicolo dalla cancelleria di sezione all'attesa udienza) è stato considerato di **1 ora e 35 minuti.** È verosimile?

8) Il tempo medio per **l'Addetto UPP Privato** (attività considerate: dalla ricezione del fascicolo di ufficio dall'archivio sottosezione privato all'attesa udienza) è stato considerato di **1 ora e 20 minuti.** È verosimile?

9) Qual è il tempo medio di attesa dell'Addetto UPP Privato una volta che ha ricevuto il fascicolo dall'archivio sottosezione privato?

10) Il tempo medio per **il Presidente sottosezione Previdenza** (attività considerate: dalla ricezione fascicolo di ufficio dalla cancelleria alla trasmissione del fascicolo all'addetto UPP-previdenza) è stato considerato di **40 minuti.** È verosimile?

11) Abbiamo immaginato che **il Presidente sottosezione Previdenza**, prima di consegnare i fascicoli lavorati **all'Addetto UPP Previdenza,** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

12) Il tempo medio per **il Magistrato Spogliatore Pubblico** (attività considerate: dalla ricezione fascicolo dal presidente sottosezione previdenza all'attesa udienza) è stato considerato di **1 ora e 50 minuti.** È verosimile?

B.1.6 Spoglio V Sezione

1) Nel 2022, che percentuale di fascicoli era cartacea?

2) Il tempo medio per **la Cancelleria di Sezione** è stato considerato di **1 ora e 15 minuti** nel caso di fascicolo **cartaceo** (attività considerate: dal controllo di inclusione per il trasferimento di fascicoli cartacei alla trasmissione del fascicolo all'addetto UPP). È verosimile?

3) Il tempo medio per **la Cancelleria di Sezione** è stato considerato di **15 minuti** nel caso di fascicolo **PCT** (attività considerate: dalla ricerca ricorso su SIC alla trasmissione del fascicolo all'addetto UPP). È verosimile?

4) Abbiamo immaginato che **la Cancelleria di Sezione**, prima di consegnare i fascicoli lavorati **all'archivio di sezione** attenda la lavorazione di un lotto di **4 fascicoli** che verranno poi contestualmente inviati all'archivio (questo per ridurre i tempi di viaggio da un ufficio all'altro). È verosimile?

5) Il tempo medio per **l'Addetto UPP** (attività considerate: dalla ricezione del fascicolo dalla cancelleria di sezione alla trasmissione del fascicolo alla guardia di finanza) è stato considerato di **1 ore e 10 minuti.** È verosimile?

6) Che percentuale di fascicoli è della sottosezione "Imposte dirette", e che percentuale invece "tribuni armonizzati"?

7) Il tempo medio per **la Guardia di Finanza** (attività considerate: dalla ricezione del fascicolo dall'addetto UPP alla trasmissione al magistrato spogliatore) è stato considerato di 40 **minuti.** È verosimile?

8) Qual è il tempo medio di attesa della Guardia di Finanza, una volta archiviato il fascicolo?

9) Il tempo medio per **lo Spogliatore e l'UPP** (attività considerate: dalla ricezione del fascicolo dalla guardia di finanza all'attesa udienza o adunanza) è stato considerato di **1 ora e 30 minuti.** È verosimile?

B.1.7 Udienza e post-Udienza

1) La calendarizzazione dell'udienza la dispone la cancelleria di sezione o il presidente di sezione?

2) Il tempo medio per **la cancelleria di sezione** è stato considerato pari a **1 ora e 40 minuti** (attività considerate: da inserimento a sistema del ruolo d'udienza a gestione del deposito degli atti da parte degli avvocati e aggiornamento del fascicolo). È verosimile?

3) Il tempo medio per **il collegio e relatori** è stato considerato pari a **40 minuti** (attività considerate: da deposito in cancelleria del ruolo di udienza con annotazione degli esiti a controfirma della minuta da parte del Presidente per il perfezionamento dell'atto). È verosimile?

4) Il tempo medio per **la cancelleria di sezione** è stato considerato pari a **1 ora e 10 minuti** (attività considerate: da controlli di rispondenza della minuta rispetto alle note registrate sul ruolo in merito all'esito udienza a notifica telematica della sentenza agli avvocati e alle autorità di merito). È verosimile?

5) L'attesa di 1 mese in archivio è un tempo medio, massimo o minimo?

B.2.   Interview form

The following form has been used to gather information regarding the pending files, organization of the relevant section, ITS used in the section, relevant KPIs to consider, criticalities emerged in the interview, and suggestions made by the interviewed.

B.2.1 Interview example

SCHEDA RIASSUNTIVA INTERVISTA – WP1

Data: xx/xx/xxxx
Sezione/Ufficio intervistato: xxxxxxxx

SITUAZIONE RICORSI

II Sezione	Sezione Ordinaria	Sottosezione in VI	Totale
Pendenze Iniziali			
Definiti (*Capacità produttiva*)			
Pendenze Finali (*Stock*)			
Flusso in Ingresso	-	-	-
Ritardo accumulato	-	-	-

ORGANICO DELLA SEZIONE

II Sezione	Sezione Ordinaria	Sottosezione in VI	Totale
Presidenti			
Magistrati			
Cancelleria			
UPP			

MAPPATURA PROCESSO
MACRO PROCESSO 1
MACRO PROCESSO 2

SISTEMI INFORMATIVI ADOTTATI

Sistema Informativo	Attività	Criticità

KPI DA CONSIDERARE

KPI	Metrica	Descrizione

CRITICITÀ EMERSE

Macroarea	Criticità
Es. PROCESSO	Non viene tenuta traccia dello spoglio effettuato in VI
Es. STRUMENTI	MAGISWEB non è integrato con SIC, né con nessun sistema informativo

RICHIESTE – SUGGERIMENTI – ASPETTI DA APPROFONDIRE…

Richieste	Suggerimenti	Aspetti da approfondire

List of Figures

List of Tables

List of Graphs