



# GOVERNMENT PROCESS MINING IN THE BRAZILIAN EXECUTIVE BRANCH

## Summary

The Federative Republic of Brazil is the fifth largest country in the world in land area [1], sixth in population, with more than 200 million inhabitants [2], and one of the ten major world economies [3]. Due to its legal nature, Brazil has several formal processes for the preparation of standards, away from the idea of the common law. Since the date of the promulgation of the Brazilian current Constitution, in 1988, until september 2016, have been edited more than 163.000 federal rules [4], including 99 constitutional amendments [5]. This number becomes very significant when compared to other countries. The American Constitution, for example, has only 27 amendments [6] in over 230 years of existence. All this legal framework governs the lives of millions of citizens, which makes relevant the task of diagnosing imperfections in the federal regulatory process, since small improvements can generate profound positive impact in the lives of the Brazilian people. According to Davi Lago [7], “the degree of delay in

- Process mining case study in Government
- Revealed bottlenecks led to redesign of internal administrative routines
- Key success factor was the use of the animation to illustrate the dynamic flow



Brazilian public bureaucracy is simply absurd. In spite of its economic wealth, Brazil has pitiful administrative efficiency indices that deviate from the advanced nations". The purpose of the study, object of this article, was to identify gaps in regulatory processes proposed by the Federal Executive Branch, such as overlapping regulations in several layers, bottlenecks and rework. This challenge provided a unique opportunity for application of process mining, a methodology never used in the diagnosis of imperfections in the course of one of the main activities of the Federal Government: to legislate.

## Organization

The Brazilian State is structured in three Branches with distinct and complementary attributions. The Legislative Branch has the competence to propose and produce laws. The Judiciary has the task of solving doubts in possible divergences. The Executive Branch has the function of administering the State, applying what the normative apparatus orders (see Figure 1).

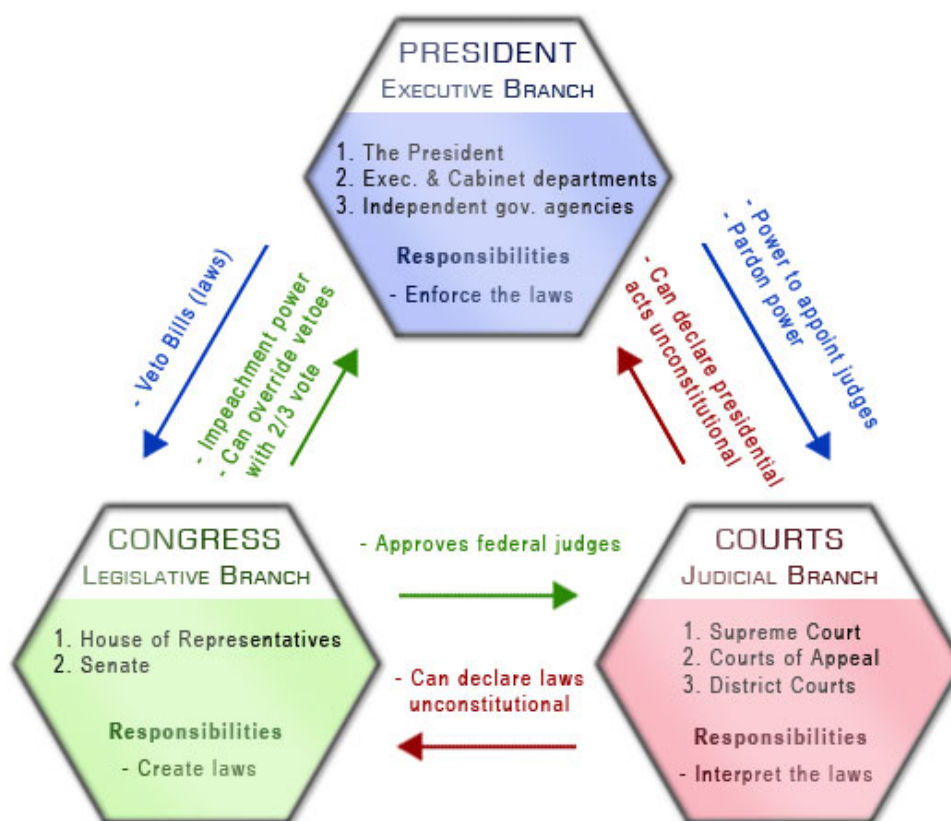


Figure 1: Separation of powers<sup>1</sup>

However, a Branch often practises in secondary ways the essential attributions of the rest. The Federal Constitution mentions the laws that must start by initiative of the President of the Republic, as well as on their competence to issue decrees and provisional measures, giving relevance to the legislative process in the Federal Executive Branch. It is in this context that the modernization team of the Civil House of the Presidency of the Republic has worked to improve the Government performance in the normative process.

<sup>1</sup> Source: Viva La France! Support Our Revolution! (2013) [8]

## Process

The normative process in the Executive Branch comprises the activities associated with the production of administrative acts (proposals for constitutional amendments, laws, provisional measures, decrees, among others) from its initial conception until submission to the Legislative Branch, represented by the National Congress, or until its publication.

The present study focuses on the set of activities made by the different public organizations, the interaction between the Ministries and their relationship with the Presidency. The end of the acts in the Executive Branch is given in two ways: decrees and provisional measures must be published, and proposals for constitutional amendments and bills must be sent to the National Congress, whose procedural process was not the subject of this analysis (Figure 2).



Figure 2: The normative process

**Conception of the act:** The proposal of normative acts is the responsibility of the Ministers of State, according to their respective areas of competence. As a rule, these acts are designed by the technical areas, which make a diagnosis, evaluate alternatives, costs and possible practical results for society. The project to modernize the normative process in the Executive Branch involves improvements in the intra- ministerial process, but the process mining software Disco was used with a focus on the relationship between the Ministries, in their relationship with the Presidency of the Republic and in the internal process in the Presidency.

**Discussion with stakeholders:** Citizens, companies, parliamentarians, foreigners and other government agencies are examples of the various stakeholders in the standards produced by the Federal Government. Process mining is part of a robust modernization project, which aims, among other actions, to allow the proposer to identify which Ministries are competent to deal with a particular standard, and implement text mining technologies to identify similar regulatory initiatives in other government agencies, avoiding bypass and minimizing rework.

**Consolidation of the act:** Through interviews with actors from various Ministries, it was possible to verify that, once at this stage, there is already a consensus regarding the content of the proposal. The consolidation of the act can be divided between the stage prior to its arrival in the Civil House of the Presidency of the Republic, when the matter is inserted in the System of

Generation and Processing of Official Documents ('Sidof'), and the later stage, already in Civil House, when it starts to process through the Electronic Information System ('Sei!') until its finalization and preparation for the presidential signature.

**Signature of the act:** After the technical and legal analysis (internal procedure in the Civil House) the act is finally ready for presidential signature and referendum by the Ministers of State, in their respective areas of competence. Having diagnosed all this procedural context, it was possible to identify multiple opportunities for improvement to bring greater productivity, safety, control and reliability to the relevant activities performed.

## Data

The complexity of the process, due to the heterogeneous databases and the trade-off between formal and informal flows, forced the use of creative ways to systematize ideas and define the scope of mining. The first step was to disregard the so-called informal flow, which was the internal process represented by the exchange of e-mails in the conception of the act and in the discussion with stakeholders (Figure 3).

The solution to simplify the extensive general flow of the normative process was to make cuts that allowed two different analyses:

- the information exchange between Ministries and the standards sending to the Presidency of the Republic ('Sidof'); and
- the internal process in the Presidency in another system ('Sei!').

These systems are administered by different areas, having different characteristics. Despite the lack of uniformity, both systems gather the essential logs to operate DISCO tool. The processes ID, timestamps, activities, areas and other attributes were extracted and imported into DISCO to arrive at the below results.



Figure 3: Information systems involved in the process



## Results

The first results provided by our process mining analysis were quantitative, but no less relevant, allowing a *sui generis* study of the efficiency of the normative process in the Federal Executive Branch. This initial analysis also enabled the diagnosis of the most influential Ministries in this process: Foreign Relations (MP); Planning, Development and Management (MRE); and Finance (MF) are examples of Ministries that proposes most of the standards that the Executive Branch publishes or sends to the National Congress (Figure 4).

This is explained by the technical nature of the Ministry or even by its competence to initiate specific rules, such as International Agreements for example. The different Ministries' relevance levels in the process, exposed by the mining, defined Civil House's priority for the project expansion to the Ministries.

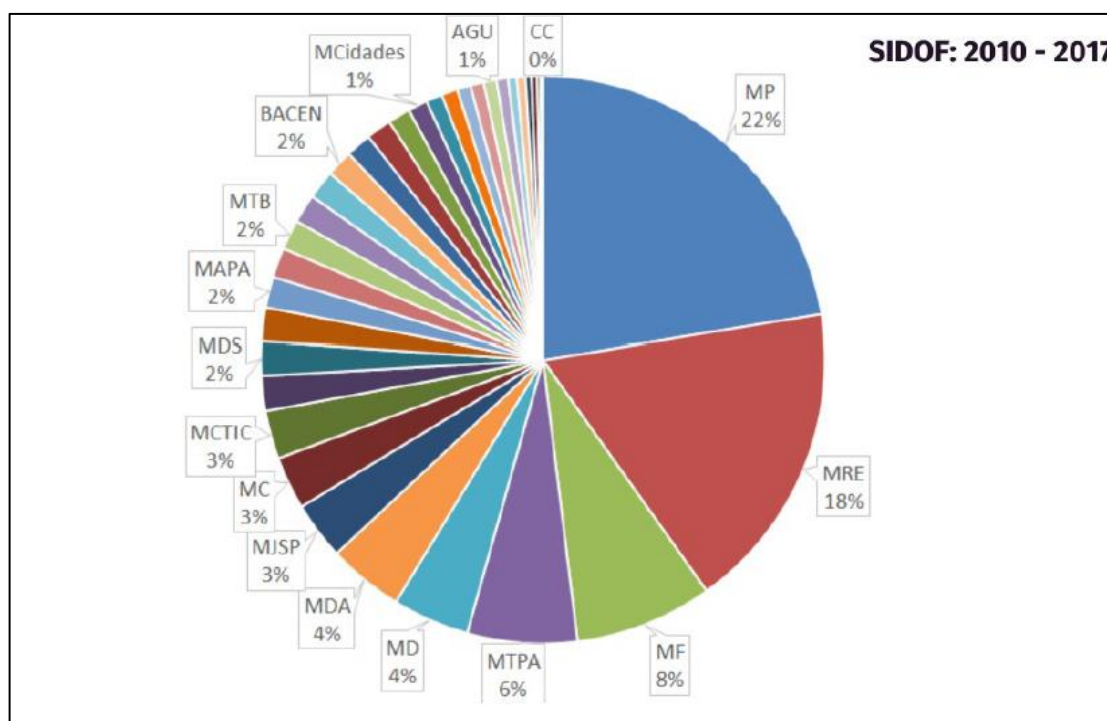


Figure 4: Main Proposing Ministries

The 'Sidof' database had 9,906 normative projects between October 1, 2010 and March 12, 2018. After applying some attribute and endpoint filters to remove the non-normative decrees (28%) and the incomplete cases it was possible to reach the following conclusions: Only 2,964 decrees and provisional measures were published. It was not possible to distinguish the amount sent to the National Congress (bills and amendments) from those filed in the rest of the cases.

The mean duration of these processes was 30 weeks (Figure 5), following 2,739 different paths. The most common path (variant no. 1) contains only 21 cases, which is not understandable, since several projects have the same nature, traveling the same course at least in theory. It was found that 2,637 decrees and provisional measures followed exclusive paths until their arrival in the Presidency. Almost a different trajectory for each published standard.



Events	361,635
Cases	2,964
Activities	26
Median case duration	86.8 d
Mean case duration	30 wks
Start	04.10.2010 11:16:00
End	12.03.2018 14:23:00

Figure 5: 'Sidof' Statistics in Disco

The findings from the 'Sidof' process mining analysis were already very helpful for the modernization team, but especially the analysis of the 'Sei!' database is the one that has generated immediate impacts in the normative process.

Because it is a more modern and recent implementation system, the 'Sei!' study involved a database of 2,470 normative projects evaluated by the Presidency between November 23, 2016 and November 28, 2017, including the non-normative acts, which this time were not segregated because they could not be distinguished in the system.

The study of variants (reflecting the different paths that the normative projects run in 'Sei!') enabled the following discovery: The variety of procedural alternatives found "from the door out" of the Civil House also occurs internally. This means that, in theory, the process flow of a norm preparation is known by all stakeholders, but practice shows that there is no standard. There is a great deficit of information, since the Ministries don't have access to the Presidency's electronic system (they process the normative projects through another system) and cannot clearly identify which path their processes go through until presidential signature (evidenced by the study of variants in Disco). The result is that the process is seen as a black box by the proponent, one of the most relevant actors in this process and the one who truly knows the impact that the norm will have on society.

In the case of the 'Sei!' process mining analysis, especially the animation made the relevance of certain areas and the existence of possible bottlenecks visible. Generating the dynamic replay of the process data has helped to discover and illustrate the importance of two major players in the internal process of the Presidency. They are the legal unit (called SAJ) and the government policies unit (called SAG), which carry out, respectively, the legal and merit analysis of the normative projects, upon their arrival in the Presidency.

The image in Figure 6 is a clipping of the dynamic process map (animation). All the indicated sectors are areas of the SAJ. The activities indicated by arrows are the technical areas and the one indicated by a circle is the area of the administrative protocol.



Figure 7: Processes in SAG

Initially, the proposal was made to eliminate this activity. However, the decision was made to maintain the activity as a means of control for the area through its central position. Nevertheless, our team found a possibility to improve the process for some cases, which do not need to pass

through this activity anymore, because there is no reason for standards to be queued up in an administrative unit when there is no technical analysis involved (which takes more time than others).

The second qualitative result made possible by our process mining analysis was the discovery of the relevance of SAJ and SAG during the normative process. The legal and the merit analyses are the basis of the presidential signature and are the main activities performed by the Civil House in this process.

As a result of the analyses of the modernization team, it was agreed to focus on automation and on reducing information deficits, specifically in the activities carried out by the SAG and SAJ areas. In the Research and Development department, a project named "LeXXIs" was started about modeling the "normative process in the 21st century".

## Impact

Several actions that were derived from the visualizations of the normative process map in the process mining software Disco are already being adopted. Once the most critical areas and points were identified, the improvement initiatives were divided into three major strategies (see also Figure 8).

### 1. Project expansion to the Ministries (through the prototyping of a new system)

The first action was the prototyping of a new system called 'Seidof', which combines the qualities of both the 'Seil' and the 'Sidof' systems and minimizes their defects. In this new environment, the modernization team specified types of processes by theme of the standard and defined patterns. Real normative processes from the Ministry of Planning, Development and Management (one of the main proponents as shown in Figure 4) were included in the prototype to test the process flow between author, coauthors and the Presidency.

In this way, our team has delivered the new system 'Seidof' ready to begin the replacement of the old system by the end of 2018. The main goal is to make the process more transparent for the Ministries (one single system) and to establish more streamlined process patterns, thereby reducing the huge number of paths diagnosed by Disco.

### 2. Improvement of working conditions (workers from SAJ and SAG)

The second action was a proof of concept (PoC) in partnership with Microsoft's business area to use Office365 to test collaborative editing tools, such as SharePoint and Teams, in the preparation phase of standards. The goal is to provide collaborative editing (in real time) to the merit and legal analyses, facilitating the interaction between the two largest actors of the normative process in the Civil House.

Furthermore, we started to create a means for the automated cleaning and formatting of normative texts. This activity requires valuable time from several technicians in the process. The greatest difficulty of the tool will be to ensure that rules for drafting, articulating and changing



SYSTEM	PROCESS MINING RESULTS	PROBLEMS	INSIGHTS	PROPOSED SOLUTIONS
Sidof	Only three ministries are responsible for 50% of the proposals.	There is no balance between the Ministries.	Performance outside Presidency must begin with the main proponent Ministry.	Prototyping a new system, called internally "Seidof".
Sidof	2,739 variants (sample of 2,964 processes).	Almost a different trajectory for each published standard.	Information deficit and lack of patterns.	
Sei!	2,412 variants (sample of 2,470 processes).			
Sei!	Animation shows that standards remain most of the time in SAG and SAJ.	Loops, rework, manual activities and lack of communication between SAG and SAJ's workers.	Automation deficit: need to improve working conditions from SAG and SAJ's advisors.	Collaborative editing tools and artificial intelligence.
Sei!	Animation shows a bottleneck in SAG's document dispatch area.	Area identified as a bottleneck doesn't perform technical activity (legal or merit).	Redesign of internal administrative routines.	Adapting the schedules of the administrative areas to the schedules of the technical areas.

Figure 8: Link between proposed solutions and process mining results

normative acts were fulfilled. This solution represents the editing function of the virtual assistant created, named Doctor Norma.

Doctor Norma's artificial intelligence was developed using tools and techniques of data science and textual mining<sup>2</sup>. Some of the SAJ technicians who experimented and visualized the prototype identified a great potential for this solution. For them, it allows to check the latest recommendations of the public compliance organizations on a normative subject, and to find the related law projects in process in the Legislative Branch.

<sup>2</sup> The prototype was developed by a post-doctor in computer science, specialist in text mining, using knowledge in textual similarity. The PoC (using training data from the 30-year period: 1988 to 2018) was made available for viewing at [romualdoalves.com/decretos-2015-a-2018-poc-text-mining](http://romualdoalves.com/decretos-2015-a-2018-poc-text-mining).



### 3. Redesign of internal administrative routines

The third action was a redesign of internal administrative routines. The initial idea was to adapt schedules and timetables of the SAG document dispatch areas to the schedules of the technical areas, so that the process could flow more naturally.

The relevance of the protocol and expedition area as a separate entity to increase administrative control is understood, but it makes no sense that this administrative step is the bottleneck for such a relevant process. The internal division of procedures may seem efficient, but it has been disrupting the process flow as shown in the animation in Figure 7.

The modernization team suggested a modification of the work hours of the “bottleneck area” with the intention to adapt the area to the rest of the process, unlike what happens today. In addition, we recommended that the activity of dispatching the normative projects occurs daily rather than on a certain day of the week, in order to give fluidity to the process. This redesign of administrative routines faced great resistance and was interrupted, forcing the modernization team to focus its work on the automation of the process at first.

The implementation of all these improvements, the expansion of the project and the follow-up of the gains obtained with process mining are the focus of the modernization team of the Civil House from now on.

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