



WHERE THE
WORLD CONNECTS

THE FUTURE OF AI IN THE BRAZILIAN JUDICIAL SYSTEM

AI Mapping, Integration, and Governance

PREPARED FOR

THE NATIONAL COUNCIL OF JUSTICE
INSTITUTE FOR TECHNOLOGY AND SOCIETY OF RIO DE JANEIRO

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Executive Summary

With a current backlog of 78 million lawsuits, the Brazilian judicial system operates with substantial challenges in case flow management and a lack of resources to meet this demand. Drastic solutions are needed to improve efficiency. In order to address these issues, the Brazilian National Council of Justice has enabled the 92 courts it administratively oversees to develop their own AI models, resulting in a seemingly uncoordinated algorithmic universe in the judicial system. In partnership with the Institute for Technology and Society (ITS) – a non-profit research institute based in Rio de Janeiro – the SIPA Capstone team will design a collaborative governance structure to strategically integrate all AI initiatives in the Brazilian judiciary. In order to do so, the proposed model has three objectives:

- 1) Create an open-ended framework to map and categorize the different AI tools already developed in the Brazilian Judiciary, including a comparative study and a model for integration and standardization.
- 2) Design an AI collaborative Governance structure that will allow the Courts to achieve greater collaboration and cooperation, and that works jointly with the Electronic Judicial Process (PJe) and its auxiliary tools.
- 3) Conduct an analysis of the principles, processes, incentives and internal regulations that govern the operation of the PJe Innovation Lab, including a proposal for perfecting and expanding the current management model according to international best practices.

In order to substantiate our objectives, we interviewed a sample of experts in the field, conducted a literature overview of AI and electronic processing systems in the Brazilian Judiciary, and developed a comparative analysis on both national and international case studies. After careful consideration, we have compiled a list of strategies and recommendations for the CNJ, which should be implemented according to its capacity. A summary of those recommendations are as follows:

1

Agenda Setting

- The CNJ should adopt and ratify an agenda regarding the use of AI tools within the Brazilian Judiciary Branch to be implemented in collaboration with courts interested in using AI tools.
- This agenda should lay out principles for the use of AI, our recommendations include the Role of Human Oversight, Data Governance, Transparency and Accountability, Human Rights and Safety.

Executive Summary

2

AI Mapping and Assessment Tools

- Creation of an AI Mapping and Assessment Tools (See Table 3 and 4) to identify and better understand the tools that are currently in development or deployment in the Brazilian Judicial Branch.

3

Integrating the Current Court System

- The CNJ should support the Open Source Software into the current Brazilian judicial system to increase the judicial system's transparency and collaboration among the public sector and the civil society.
- The CNJ should enhance AI interoperability among courts' systems to make the SINAPSES be easily available for the courts, by improving the National Interoperability Model, harmonizing with the federal government's initiatives such as e-PING framework.

4

Increasing Collaboration between the courts

- The CNJ should use the aforementioned classifying tool to understand and connect with courts currently developing tools.
- The CNJ should create regular forums and other outlets where AI court experts can communicate freely with tools.
- The CNJ should also ensure that SINAPSES is readily available, that courts are aware of how it works and how they can both reutilize and add their own algorithms into the system.
- The CNJ should also build a comprehensive incentive system to encourage courts who have not adopted the PJe and are currently creating tools using other e-Justice systems, to adopt the communications strategies we recommend above.

5

Strengthening the INOVA PJe Framework

- The INOVA PJe laboratories should include a national level strategy that disseminates knowledge regarding CNJ's agenda, SINAPSES remote trainings, and forums on the use of AI tools in the Brazilian Judiciary.
- The INOVA-PJe should also work at a local level, by creating centers of excellence in partnership with Federal Universities to use academic expertise for the creation of AI tools.

6

Facilitating Safe Participation by the Private Sector

- The CNJ should build and disseminate a framework for the provision or procurement of AI tools from the private sector by courts, in a way that respects the LGPD and other relevant laws.

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7

Monitoring and Evaluation of Tools and Policies

- The CNJ should create a monitoring and evaluation protocol for SINAPSES with indicators defined in the User Assessment Tool we designed and propose in this report.
- The CNJ should require courts to monitor their AI tools and test for accuracy, reliability, security, robustness, and outcome fairness.
- The CNJ should look at a set of indicators to ensure that courts are using resources such as the INOVA PJe system, adoption of AI tools within the courts, and the impact AI tools are having on case overload.

Glossary

CIFAR	Canadian Institute for Advanced Research
CNJ	National Council of Justice
INOVA PJe	Innovation Lab of the Electronic Judicial Process
LGPD	General Law for Data Protection
MNI	National Model of Interoperability
PJe	Electronic Judicial Process
SINAPSES	PJe's platform through which AI tools can be developed
STF	Supreme Federal Tribunal
TJAC	Tribunal of Justice of the Brazilian State of Acre
TJAL	Tribunal of Justice of the Brazilian State of Alagoas
TJMG	Tribunal of Justice of the Brazilian State of Minas Gerais
TJPE	Tribunal of Justice of the Brazilian State of Pernambuco



Part I. Background

1. Introduction

One of the primary tasks presented to the SIPA Capstone Team, a group of six Columbia University masters students, was to come up with a set of recommendations to enact a collaborative governance model within the Brazilian judiciary. Brazil has the largest judiciary system in the world with 92 courts; each court within the system receives a large volume of lawsuits every day.¹ For example, it would take 22,000 man hours to process the 42,000 lawsuits received by the Supreme Federal Tribunal every semester.²

The SIPA team was tasked with improving the current model by using a thorough review of case studies from both national and international sources and was tasked by the CNJ to draft the following:

- 1) Create an open-ended framework to map and categorize the different AI tools already developed in the Brazilian Judiciary, including a comparative study and a model for integration and standardization.
- 2) Design an AI collaborative Governance structure that will allow the Courts to achieve greater collaboration and cooperation, and that works jointly with the Electronic Judicial Process (PJe) and its auxiliary tools.
- 3) Conduct an analysis of the principles, processes, incentives and internal regulations that govern the operation of the PJe Innovation Lab, including a proposal for perfecting and expanding the current management model according to international best practices.

2. Scope and Goals

Throughout our research process which included consultations with the CNJ team, the ITS-Rio Team, judges from a variety of different tribunals, and other AI experts, we have identified the following priorities for the CNJ:

1. There is not a clear policy direction for the use of AI in the judicial branch and clear mandated policy principles to ensure that AI is used ethically and safely
2. Courts are not communicating with the CNJ or other courts regarding the development of their own tools. There is evidence of cross-collaboration between some courts, but that process is not widespread.
3. Many courts have not yet adopted the PJe electronic processing system, and therefore are in danger of being left out of the conversation regarding AI tools
4. Some courts may turn to other stakeholders, such as academia or the private sector, to help develop tools. Therefore, it is imperative that the CNJ comes up with a framework for such collaboration.
5. There is yet to be implemented a monitoring and evaluation mechanism to ensure that AI is used ethically within the Judicial Branch.

¹ Silva, N. C., Braz, F., Campos, T. E. de, Guedes, A. B. S., Mendes, D. B., Bezerra, D. A., Gusmao, D. B., Chaves, F. B. S., Ziegler, G. G., Horinouchi, L. H., Ferreira, M. U., Inazawa, P. H., Coelho, V. H. D., Fernandes, R. V. C., Peixoto, F. H., Filho, M. S. M., Sukiennik, B. P., Rosa, L., Silva, R., ... Carvalho, G. (2018). Document type classification for Brazil's supreme court using a Convolutional Neural Network. *ICoFCS-2018*. <https://doi.org/10.5769/c2018001>

² Ibid.

In order to address these issues, we will first look at the relevant stakeholders within this policy sphere before moving on to the following recommendations:

- Setting an Agenda for AI in the Judicial Sphere
- Creating an AI Assessment Tool
- Integrating the current court system
- Increasing Collaboration Between the Courts
- Strengthening the INOVA-PJe Framework
- Facilitating Safe Participation from the Private Sector
- Monitoring and Evaluating the Progress of AI in the Judicial Sphere

In order to base these recommendations, we looked at case studies regarding the use of AI within Brazil and in a global context including examples from Canada, Estonia, the United States and the United Kingdom, among others.

Part II. Methodology and Findings

1. Methodology

Pillars of Research

In order to organize our work, we identified three pillars of research, AI Mapping, Integration and Comparative Studies, and Collaborative Governance. The final findings of these pillars were consolidated and compiled into the recommendation section of this report.

Pillar 1: AI Mapping- This pillar strives to map the current tools in the Brazilian judiciary, and develop a mapping tool (questionnaire answered by the users and developers of the AI tool) to map/identify and categorize algorithmic tools already used/developed/procured by the diverse courts within the Brazilian Justice System. A prototype of this tool has been developed and will be discussed in further detail in Part II.

Pillar 2: Integration and Comparative Studies- This pillar looks to find best practices for integration for the AI tools in question, specifically on data and electronic processing integration models and analysis on stakeholders involved in court system integration.

Pillar 3: Collaborative Governance- This pillar consists of the institutional mapping of the principles, processes, incentives and internal regulations of the CNJ currently in place and how they can be leveraged to create a streamlined governance model. It includes a comparative analysis of governance strategies of other countries who are using AI in the public sector to help guide our recommendations.

Expert Testimonials

To better understand the context of the use of AI in the Brazilian Judicial System, we were able to conduct interviews with various experts involved with the process of AI use within courts.³ We relied on information provided to us by our Partner, ITS Rio, and our client, the CNJ. We were able to discuss the particularities of the AI system with the CNJ technical experts that are involved with the nationalization of the SINAPSES system.

To gather different perspectives on this issue, we also interviewed a select sample of judges from both state court systems and federal court systems. These interviews allowed us to understand the challenges faced by courts when implementing AI tools. We were able to converse with two courts that were building AI on separate judicial electronic systems, and one court that had built its tools on the PJe. We were also able to garner some insight regarding the lack of collaboration between court systems on AI tools, and ways in which to remedy that.

Lastly, we did speak to legal experts within the field of data protection to better understand data protection issues and adherence to the LGPD within this context.

³ Two judges from the TJAC, two federal first instance judges.

Literature and Case Study Consideration

In order to supplement our conversations with our sample of experts, we engaged in an extensive literature review to support our claims, understand best practices, and compile case studies for reference. Our literature review allowed us to understand the current practices of the Brazilian judiciary in regards to AI, innovation, and the use of electronic processing systems, as well as create a baseline for understanding AI governance strategies and ethics necessary to create a holistic plan for the CNJ.

We carefully selected our case studies to support our recommendations and provide insights on how similar projects have been implemented both within Brazil and abroad. We are aware that the Brazilian Judicial system is a unique model, and that no example would provide a catch-all solution. However, we hope that our recommendations, which are backed by detailed examples in other arenas, will provide insight and guidance.

Limitations of the Methodology

Originally, our sample of experts was meant to be much larger as we were supposed to be in Brasilia and Rio de Janeiro to conduct the bulk of our field research. Unfortunately, due to the occurrence of the COVID-19 pandemic and related issues, we were only able to conduct interviews on a relatively smaller sample of experts and rely on desk research for contextualizing our recommendations.

2. Key AI Actors and Systems

In this section, we will discuss some of the stakeholders and entities involved in the use of AI within the Judicial Branch, addressing their roles and some of the disconnects regarding current policy associated with each element.

The Electronic Judicial Process (PJe)

The Electronic Judicial Process or PJe is a system that converts digitalizes and authenticates documents. This system was developed by the CNJ in partnerships with various courts, and was sanctioned as the Judicial Branch's official electronic system. Currently, there is a push that all courts adopt the PJe- according to the Court of Union Accounts (TCU), the failure to enact a singular system has cost the CNJ R\$ 374 million from 2013 to 2017. ⁴

Other e-Justice Platforms

Outside of the PJe, there are several different systems that are currently being deployed within the Brazilian court system such as e-SAJ, e-Proc, Projudi, e-STF, and e-STJ among others. One of the more popular systems, e-SAJ or the System of Judicial Automation, is currently being used by the state courts of Acre, Mato Grosso do Sul, São Paulo, and Santa Catarina. Many of these systems complete the same tasks as the

⁴ União, Tribunal de Contas da. "TCU aponta atrasos na implementação do Processo Judicial Eletrônico | Portal TCU." Accessed April 13, 2020. <https://portal.tcu.gov.br/imprensa/noticias/tcu-aponta-atrasos-na-implementacao-do-processo-judicial-eletronico.htm>.

PJe, however some courts find the interfaces easier to use than the PJe.⁵ Other courts understand the reasoning behind a unified system such as the PJe, but want to switch over slowly and incrementally so as to not disrupt any productivity.

National Interoperability Model (MNI)

The MNI's purpose is to ease the exchange of information between the various information systems currently in use in the Brazilian Judiciary Branch. The entity looks at elements of information sharing between electronic processes and the elements used by its web service. Silveira et al (2015) using a framework modelled after the EU Interoperability Framework, categorized the MNI's actions into three parts: technical interoperability, syntax (formatting and processing data), and semantics (network architecture). Of the three areas, Silveira et al found that the MNI lacked strong standards in semantics.⁶

SINAPSES

SINAPSES, the “factory for AI models” has been identified by the CNJ as a possible component of an AI governance strategy. SINAPSES will allow both courts that use the PJe and courts that do not have in-house technology teams to scale algorithms for their operations. The tool is currently only built upon the Electronic Judicial Process (PJe) and available for other courts to reuse, adapt, and even add their own algorithms into the system. Courts that have their own AI tools built through the PJe will also be able to incorporate their homegrown algorithms back into the system. In this way, SINAPSES becomes an open platform for AI development, where courts are able to use different systems and expand upon others.⁷

However, we are not aware of SINAPSES can be replicated on the SAJ system, or if there is any mechanism of interoperability. Because of this, it is of utmost importance that the CNJ facilitate communication between courts who are using the PJe and SINAPSES as well as those who are using other systems, even if the end goal is that every court uses the PJe platform.

Innovation Labs- INOVA-PJe

As previously mentioned, the CNJ is planning to roll out a Laboratory for Innovation in the Electronic Judicial Process, also known as INOVA PJe. This lab is envisioned to be an accelerator for AI in the PJe. According to the CNJ, the laboratory will do the following:

- National Judicial Datasets to train tools
- The Center for Artificial Intelligence- technical and intellectual expertise on AI, guidance on which tools to develop. Center will also host forums, conventions, workshops, and seminars.
- Community for information sharing
- Share AI Models and algorithms
- Provide Subsidies

⁵ Migalhas. “PJe ou e-Proc? Tribunais contestam resolução do CNJ sobre suspensão imediata de e-Proc,” October 31, 2019. <https://www.migalhas.com.br/quentes/314284/pje-ou-e-proc-tribunais-contestam-resolucao-do-cnj-sobre-suspensao-imediata-de-e-proc>.

⁶ Silveira, Lucas, Raul Sidnei Wazlawick, and Aires Jose Rover. “Assessing the Brazilian E-Justice Interoperability Model.” *IEEE Latin America Transactions* 13, no. 5 (May 2015): 1504–10. <https://doi.org/10.1109/TLA.2015.7112008>.

⁷ Information gathered from discussion with Client

⁸ SINAPSES - Documentação Em Desenvolvimento.” Accessed February 10, 2020. <http://docs.pje.jus.br/manuais/manual-sinapses/sinapses-manual.html>

It also strives to create a community between the technology experts in each court where they may share ideas and algorithms.⁹ However, to our knowledge, the INOVA PJe lab has yet to be enacted. In addition to the INOVA PJe Lab, our client has informed us that each state court would also have its own incubator to accelerate the creation of homegrown algorithms. In order to best use the idea of INOVA PJe, we believe that this system should work on two levels, a national laboratory that provides high level expertise, and a series of smaller local laboratories that consist of partnerships with academia.

Existing Tools within the Judiciary System

In order to combat the sheer volume of lawsuits, many courts have turned to technology, particularly AI to increase productivity. These AI tools are used for various different tasks, from classifying lawsuits, to preventing servers from completing repetitive tasks, to even providing recommendations for a court ruling. As of April 2020, we are aware of the following AI Tools being used in different courts of the Brazilian Judiciary.

Table 1: List of existing tools in the Brazilian Judiciary

Entity	Tool	Task
Higher Courts		
Supreme Federal Tribunal (STF)	Victor ¹⁰	Aims to simplify pattern recognition within legal texts (usually within a PDF document) used for the Supreme Federal Tribunal (STF). This tool was created in partnership with a team from the University of Brasilia (UnB).
Supreme Tribunal of Justice (STJ)	Socrates ¹¹	Produce an automated examination of each appeal sent to the STJ and its previous judgement, recommend legislative resources and legal precedents, and a recommendation for action (the final decision will always be made by a STJ Minister).
State Courts		
Tribunal of Justice of Acre (TJAC)	LEIA	Tool, vinculated with SAJ and not the PJe that reads PDFs and attempts to connect each lawsuit with precedents in the higher courts. Other courts that use SAJ such as TJ-SC and TJ-SP are also creating similar models.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Migalhas. "Projeto-piloto do Sócrates, programa de inteligência artificial do STJ, é esperado para agosto," April 6, 2019. <https://www.migalhas.com.br/quentes/299820/projeto-piloto-do-socrates-programa-de-inteligencia-artificial-do-stj-e-esperado-para-agosto>.

Tribunal of Justice of Alagoas (TJAL)	Hércules ¹²	This tool is used to prevent a server from performing repetitive tasks, such as classifying whether a document is a request to block goods, quote a stakeholder, or suspend the process. This tool was created in a partnership with a team from the Federal University of Alagoas.
Tribunal of Justice of Minas Gerais (TJMG)	Radar ¹³	Identifies and separates legal resources that deal with the same issues or have precedents either in the Supreme Justice Tribunal or the Resolution Incident of Repetitive Demands (IRDR).
Tribunal of Justice of Pernambuco (TJPE)	Elis ¹⁴	Tool confers and presents documents, data, and dates from lawsuits to judges who are on the case.
Tribunal of Justice of Rio Grande do Norte (TJRN)	Poti, Clara, and Jerimum ¹⁵	Poti performs account blocking and unlocking and issues certificates related to Bacenjud, a system that connects the TJRN to the Central Bank and other financial entities. Clara is still in testing, but will read documents and recommend tasks that will be approved by a server, and Jerimum, which is also in testing, will categorize and label processes
Tribunal of Justice of Rondonia (TJRO)	SINAPSES ¹⁶	Was first used as a tool capable of optimizing the performance of repetitive tasks and ensuring greater legal security. Now it is being transformed into a framework where different courts can collaborate on algorithms.

The above may not be a complete list of AI tools currently being deployed within the Brazilian Judiciary. One of the most interesting aspects of the use of AI within the Brazilian court system is that such tools are organically created by tech savvy courts based on their needs. However, in terms of governance and scaling AI tools to different courts, this presents a challenge.

¹² “Your Fastest Process: Robots Already Take over Bureaucracies of the Country’s Justice – 03/03/2020 | Time24 News.” Accessed March 29, 2020. <https://www.time24.news/u/2020/03/your-fastest-process-robots-already-take-over-bureaucracies-of-the-countrys-justice-03-03-2020.html>

¹³ Radar é Destaque Na Imprensa Nacional.” Accessed March 29, 2020. <https://www.tjmg.jus.br/portal-tjmg/noticias/radar-e-destaque-na-imprensa-nacional.htm>

¹⁴ “Justiça de Pernambuco Usa Inteligência Artificial Para Acelerar Processos | Pernambuco | G1.” Accessed March 29, 2020. <https://g1.globo.com/pe/pernambuco/noticia/2019/05/04/justica-de-pernambuco-usa-inteligencia-artificial-para-acelerar-processos.ghtml>

¹⁵ Your Fastest Process: Robots Already Take over Bureaucracies of the Country’s Justice – 03/03/2020 | Time24 News.” Accessed March 29, 2020. (n.d.).

¹⁶ Ibid.

Collaboration with Universities

It has come to our attention that at least two AI tools, VICTOR (STF) and Hercules (TJAL) were created in partnership with the University of Brasilia (UnB) and the University of Alagoas respectively. In our conversations with the members of TJAC, they expressed the wish to work directly with universities and use the expertise of academics on the topic of AI. This kind of partnership has been replicated globally through programs such as Canada's CIFAR chairs program and the United Kingdom's Turing Center, both of which will be further explored in the recommendation section.

Private Sector Participation

Although many of the algorithms that will be integrated in the PJe by the SINAPSES system were created by in-house teams within tribunals, there is a possibility that other algorithms were created in collaboration with the private sector. Law Techs, or start-ups from the private sector that create technologies to improve the efficiency of the legal sector, have grown exponentially in the past few years and are set to become an important entity within the judicial sphere. Private sector tools such as Docket, an algorithm that finds and analyzes legal documents, and upLexis, a private sector firm, is attempting to apply the use of big data to the judicial sphere.¹⁷ In addition, there is already a private sector database of court decisions from virtually all the courts and provides standardized data. Jusbrasil is a private sector database that is free to use and is frequently used by both law firms and in some cases even the courts themselves.¹⁸ With the event of these innovations within the private sector, it would not be out of the ordinary for tribunals to look for expertise with this stakeholder. Therefore, it is important that the CNJ look for a contingency plan that creates an open and transparent procurement process and establishes clear boundaries regarding data and privacy protection.

3. AI Integration

To study a model for integration and standardization, we classified the AI integration into six categories: (a) Data integration, (b) IT system, (c) Centralized Organization, (d) Policy Integration, (e) Key principles, and (f) Decision-making process - and analyze current AI integration in the Brazilian judicial system because the AI integration includes multiple meanings. Based on these six categories and their checklists, we analyzed the current AI system situation and challenges in Brazilian Judiciary by literature studies and interviews with judges in state and federal courts and lawyers. As a result of the analysis, we found that the IT system is the biggest obstacle to integrating AI tools while there are several problems in data integration and key principles.

Meaning of AI Integration

(a) Data Integration

AI tools require massive amounts of errorless data to train their algorithms. The data integration is the concept that reconciles data from many data sources with different formats and semantics into meaningful

¹⁷Jusbrasil. "Startups criam soluções que aceleram o setor judiciário." Accessed April 11, 2020.

<https://priscilaztsantos.jusbrasil.com.br/noticias/798165474/startups-criam-solucoes-que-aceleram-o-setor-judiciario>

¹⁸ "Jurisprudência." Jusbrasil, n.d. <https://www.jusbrasil.com.br/jurisprudencia/?ref=navbar>.

records.¹⁹ Broadly, there are five categories of data integration.²⁰ Within those categories, data integration protocols consistently require standardization of data format and enhanced access to the data.²¹ AI tools which classify the data can facilitate the integration process. Hence, data integration is not always necessary for AI projects as these tools circumvent the need for a formal integration. However, the AI tools indirectly create demand for integration because enablers of the AI tools in an organization require the collection, cleansing, and unification of data, as well as enforcing decisions and exposing outside data, each of which leads to many integration use cases.

(b) IT System

AI tools are one type of software that works on the IT system. Therefore, an integrated IT system²² supports the AI tools ability to function. If the operating system, system software, and corresponding workflow that use the AI tools are coherent, some AI tools can work in different systems. According to McKinsey & Company, one of the cited barriers to AI adoption is lack of technological infrastructure to support AI.²³

(c) Centralized Organization

To integrate AI tools to multiple organizations, a centralized organization needs to guide and manage the integration. The guiding and management include creating a roadmap to integrate the AI tools, obtaining commitment from multiple organizations to integrate the AI tools, regular monitoring and evaluation of the integration, providing technical support for the integration, and frequent communication with the organizations. To guide and manage the integration of multiple organizations, the centralized organization needs sufficient staff, funding, and expertise in technology, data science, and law.²⁴

(d) Policy Integration

Immense coordination is required across multiple governmental agencies in order to clarify the roles, responsibilities, scope, and relationship of the policies. As in the case of the United States, such an overarching policy may describe data standardization, digitalization of government, and identify the AI tools deployed by specific groups of government agencies.²⁵ If there are multiple policies by multiple

¹⁹ Perera, Srinath. "Applying AI to Enterprise Integration: How Ready Are We?" Towards Data Science, Accessed March 20, 2020. <https://towardsdatascience.com/applying-ai-to-enterprise-integration-how-ready-are-we-912b2a954e60>.

²⁰ "5 Types of Data Integration You Need to Know" GlobalScape, Make Business Flow Brilliantly. December 6, 2017. <https://www.globalscape.com/blog/5-types-data-integration>. The five categories of data integration include data consolidation (create a version of the consolidated data in one data store), data propagation (use applications to copy data from one location to another), data virtualization (provide a unified view of data from disparate sources with different data models), data federation (use a virtual database to create a common data model for heterogeneous data from different systems), and data warehouses (storage repositories for data).

²¹ Book, Adrien. "Want to get your A.I Project off the ground ? Ask yourself these 10 questions" August 27, 2019. <https://towardsdatascience.com/want-to-get-you-a-i-project-off-the-ground-ask-yourself-these-10-questions-9a8704de50c0>.

²² "Definition of IT Systems", Law Insider. Accessed on February 10, 2020. <https://www.lawinsider.com/dictionary/it-systems>

²³Chui, Michael, and Sankalp Malhotra. "AI adoption advances, but foundational barriers remain." McKinsey & Company, November 2018, <https://www.mckinsey.com/featured-insights/artificial-intelligence/ai-adoption-advances-but-foundational-barriers-remain>.

²⁴New York City Automate Decision Systems Task Force, "Automated Decision Systems Task Force Report" (November 2019), Available at <https://www1.nyc.gov/assets/adstaskforce/downloads/pdf/ADS-Report-11192019.pdf>.

²⁵"Artificial Intelligence for the American People." The White House. The United States Government. Accessed on February 10, 2020. <https://www.whitehouse.gov/ai/executive-order-ai/>

agencies without coordination, they blur the institutional governance and limit the efficient allocation of resources to support efficient policy implementation.²⁶

(e) Key Principals

As a non-member country, Brazil adhered the OECD Principles on AI in 2019.²⁷ The key principles for responsible stewardship of trustworthy AI are: inclusive growth, sustainable development and well-being, human-centric values and fairness, transparency and explainability, robustness, security and safety, and accountability.²⁸ In order to align the AI tools and organizations to this standard, they must incorporate the key principles into each and every of the AI tools and organization within the network.

(f) Decision-making Process

AI tools offer varying degrees of automated decision-making ability. AI tools can be a partial solution to automate some processes such as classifying documents which do not directly affect decision-making. The full AI integration is automatic decision-making by the AI tools, but this is not always ideal because the automation and human oversight and transparency need to be balanced. Therefore, it is important to recognize what process is automated, how the automation affects decision-making, how human-oversight is working, and how the decision-making supported by the AI tools is explainable.

Current AI System Situation and Challenges in Brazilian Judiciary

From the results of literature studies and interviews with judges in state and federal courts and lawyers, we found that the IT system is the potential biggest obstacle to integrating the AI tools in Brazilian judiciary, while each of the courts has common needs to automate the judicial process. We also found that there are multiple obstacles to AI integration such as lack of transparency of the courts, lack of communication among courts and the CNJ, limitation of IT technologists, and intellectual property rights issues.

Table 2: Current situation of Brazilian Judiciary based on 6 AI integration categories

Categories	Current Situation
(a) Data Integration	Each of the courts recognizes the importance of automation due to the huge amount of backlog. As of 2019, there are 80 million lawsuits in the Brazilian Judiciary while there are only 18,000 judges. In simple calculation, each judge needs to process 4,400 lawsuits in a year. There is no centralized database which is publicly available. ²⁹ This limits the amount of training data for AI tools' algorithms. Regarding the STF, it receives processes from all the Brazilian courts of second instance and there is no pattern in the way they are written. A significant part of the documents available in the court are in the form of images obtained by scanning printed documents, which often contain handwritten annotations, stamps, stains, etc. Many of the processes are stored in the form of a series of PDF volumes, rather than a single PDF file that contains all its

²⁶Digital Government Review of Brazil Towards the Digital Transformation of the Public Sector.” OECD, November 28, 2018. <http://www.oecd.org/governance/digital-government-review-of-brazil-9789264307636-en.htm>.

²⁷ <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>

²⁸ “Recommendation of the Council on Artificial Intelligence” OECD, May 22, 2019. <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>

²⁹ From the interview with the partner.

	documents. This was done to avoid file handling problems in legacy systems. Each PDF volume often finishes in the middle of a document and the next PDF volume starts with the next page of that document. There are issues with data standardization- the lawyers write the name of the same plaintiff several different ways thus impeding data collection (i.e. Banco do Brasil, Banco Brasil, Agencia BB, etc)
(b) IT system	Many courts create and use different systems, even within a state court system. For example, the court of the first instances might use one, and then the second instance will use another. That means that the lawyer has to re-upload all the data from one system to another. According to the Federal Court of Justice, federal courts use at least eight types of electronic judicial process management system though the objectives of the systems are similar. ³⁰ Therefore, AI tools which are compatible with a particular system need to be adjusted to another system. This shows the lack of interoperability among courts' systems. The CNJ established the National Judicial Interoperability Model (MNI), but it is said the intermediate level of interoperability, having no initiatives and mechanisms to reach higher levels (semantic, organizational, and legal). ³¹ According to a federal judge, one of the reasons why each of the courts does not share their AI tools to another court is the challenge of intellectual property rights. Providing AI tools developed within the court by using its budget to another court is also bureaucratically difficult. One-fifth of AI solutions face intellectual property rights problems.
(c) Centralized organization	An ideal scenario for the INOVA PJe for the CNJ is making it the single laboratory for AI research in Brazilian justice, as currently, each of the courts utilizes its own laboratory. Due to the autonomy and lack of transparency of the courts, the CNJ does not know the AI tool usage, IT system management, and opinion regarding the PJe of the courts very well. Therefore, it is not easy for the CNJ to overstep, monitor, and evaluate the IT management of the courts. Though the CNJ made it a mandate to adopt PJe in 2013, and the Minister sent letters to a president of multiple courts to it in 2019, they opposed implementing the PJe. ³² Among the federal courts, the satisfaction of the PJe is lower than other Electronic Judicial Process Management Systems due to occurrences of unavailability and low speed. ³³ On the one hand, we could listen to the expectation toward the SINAPSES. It is an open source community that can address the intellectual property rights problem. On the other hand, the SINAPSES only works for the courts which use the PJe despite the expectation for integration.
(d) Policy Integration	While there is a concern that the multiple strategies had made the Brazilian electronic government policies blur, ³⁴ we did not hear about the issues

³⁰ “Pesquisa sistemas judiciais eletrônicos da justiça federal.” Corregedoria-Geral Da Justiça Federal, August 2018. <https://migalhas.com.br/arquivos/2019/10/art20191031-14.pdf>

³¹ Silveira, Lucas, Raul Sidnei Wazlawick, and Aires Jose Rover. “Assessing the Brazilian E-Justice Interoperability Model.” *IEEE Latin America Transactions* 13, no. 5 (May 2015): 1504–10. <https://doi.org/10.1109/TLA.2015.7112008>.

³² Migalhas. “PJe ou e-Proc? Tribunais contestam resolução do CNJ sobre suspensão imediata de e-Proc,” October 31, 2019. <https://www.migalhas.com.br/quentes/314284/pje-ou-e-proc-tribunais-contestam-resolucao-do-cnj-sobre-suspensao-imediata-de-e-proc>.

³³ “Pesquisa Sistemas Judiciais Eletrônicos Da Justiça Federal (Research Electronic Judicial System of Federal Justice).” Corregedoria-Geral da Justiça Federal, n.d., October 19, 2019. <https://migalhas.com.br/arquivos/2019/10/art20191031-14.pdf>.

³⁴ OECD, Op. Cit.

	regarding the policy integration through interviews. Existing major policies clearly define their scope, responsible organizations, and role of the CNJ. ³⁵
(e) Key Principles	<p>A comprehensive national AI strategy was under the public consultation process by March 2, 2020.³⁶ Though it has not been completed, the initial consultation instruction recognizes and is likely to incorporate the OECD principles. However, through the interview process, we identified the lack of transparency among the courts. For instance, regarding the development of the AI tool called VICTOR of the STF, there was no consultation process with federal and state courts while their data may be used. No one can know who actually develops the tool and how it is used. There is a cultural reason behind this - Brazilians don't want to talk about their innovations because they are afraid of making a mistake and having it be made public.</p> <p>In addition to the National AI Strategy, substantial parts of General Law for Data Protection (LGPD) will be effective May 2021, including the establishment of the National Authority. The LGPD is the opportunity to enhance transparency of personal data processes generally.</p>
(f) Decision-making process	The courts share common problems, including huge amounts of backlog. Automation of classification is a major objective of the AI tools. Of the stakeholders that we interviewed, there was no complete automatic decision-making by the AI tools, but the AI tools partially automate the process and judges make a decision. Therefore, there's no problem regarding human oversight and trust against AI tools' output.

³⁵ As major digital government policies, there are Resolution 211 of 12/15/2015 (Establishes the National Strategy for Information and Communication Technology of the Judiciary (ENTIC-JUD)), Code of Civil Procedure 2015, Electronic Practice of Procedural Acts, and Resolution No. 185 of 12/18/201 (Institutes the Electronic Judicial Process System - PJe as an information processing system and the practice of procedural acts and establishes the parameters for its implementation and operation.)

³⁶ Pedro Gontijo Menezes, "Estrategia Brasileira de Inteligencia Artificial", Secretary of Telecommunications, Ministry of Science, Technology, Innovations and Communications, January 2020. <http://www.participa.br/estrategia-brasileira-de-inteligencia-artificial/blog/apresentacao-e-instrucoes>

Part III: Recommendations for AI Governance in the Brazilian Judiciary

1. Agenda Setting for Artificial Intelligence in the Judicial Sphere

In order to create a comprehensive AI governance model, it is imperative to set an agenda that defines the principles and objectives that will be implemented, from the creation of the tool, to its testing phases, to its use in one court or the process of scaling it to the national level. The CNJ should adopt a clear agenda which can be implemented and pushed forward through allotment of its resources, the PJe, the INOVA PJe Labs, and any other forums or entities dealing with AI in the Judicial Space. It's also important that these principles are consistently adopted by all courts, not only those who have adopted the PJe.

Many countries around the world are currently drafting or implementing their AI strategies, which discuss how both the private and public sector should explore this technology. In addition, many private sector and civil society organizations are also providing recommendations to governments on how to enact AI tools among various public sector operations. Through our research, we have determined that the Role of Human Oversight, Data Governance, Transparency, Human Rights, and Safety and Accountability are relevant AI principles based on the context of the Brazilian judicial system and various case studies around the globe.

Role of Human Oversight

As AI and Machine Learning algorithms become more complex, they can often make decisions that can affect the lives of humans. One of the forefront principles defined by the OECD, is that every AI system should have appropriate safeguards for enabling human intervention, adding that such an action is important for protecting the rule of law, human rights, democratic values, and diversity. In its appraisal of the United States National AI Strategy, Amnesty International gave the recommendation that the United States should ensure that its “AI systems are regularly and effectively audited and system developers and users are held accountable for any adverse impacts on human rights, with clear processes of responsibility outlined prior to development and deployment.”³⁷ This is especially relevant in the United States, where unsupervised AI systems have enforced biases that have negatively impacted Americans.³⁸

A 2020 Report submitted to the National Administrative Council by researchers at Stanford University and New York University discusses specifically how unsupervised algorithms can impact the American judicial system and how administrative law can deal with claims of disparate impact. For example, the Report states that “Litigants may claim that the adoption of an algorithmic decision tool causes disparate impact across demographic groups and that the failure to address and explain such consequences is arbitrary and capricious. Yet whether courts will entertain such claims and how courts weigh the fairness-accuracy trade-off, remains an open question.”³⁹ Currently, in the Brazilian Court system, we are unaware of any tools that make decisions on behalf of the judge, magistrate or minister in a court. We know that some tools, such

³⁷ “Comment on Proposed Artificial Intelligence Regulations (3-13-2020)”, March 13, 2020. Amnesty International USA, <https://www.amnestyusa.org/our-work/government-relations/advocacy/comment-on-proposed-artificial-intelligence-regulations-3-13-2020/>

³⁸ David Freeman Engstrom, Daniel E. Ho, Catherine M. Sharkey, & Mariano-Florentino Cuéllar, “Government by Algorithm: Artificial Intelligence in Federal Administrative Agencies”, Stanford University, New York University.

³⁹ Silva et al.

as Victor, recommend decisions, but final word is given by the Minister. We believe that this practice should continue.

CASE 1 USA and Biases in AI Law Enforcement Tools

In a report submitted to the Administrative Conference of the United States, researchers from Stanford and New York University identified recommendations for fighting biases in law enforcement operations. In this case, agency use of facial recognition software or risk prediction tools can entrench bias into agency decision making processes. This is especially relevant when training data may show disproportionate data for minorities and other vulnerable populations, that may result in disparate impacts and treatment. According to the report, there are three major concerns regarding bias for AI tools in the U.S. government’s administrative operations:

1. There is significant potential for machine learning to encode bias.
2. There are divergent definitions of “fair machine learning”.
3. There are questions regarding how AI decisions compare to human based decisions, even as human decisions are also plagued with biases.

In order to combat said biases, the report recommends the following:

- Benchmarking processes that could create random hold-out sets” to compare AI-assisted outcomes and human (status quo) decision-making.” This would see if tools were performing under bias or arbitrariness.
- Ensure “accountability by design” by bringing in internal agency supervision and embedding expertise into the team.
- The use of systematic protocols on how to act if an algorithm demonstrates biases.

Data Governance

One of the primary issues within the Brazilian Judicial system is the way that data is handled. According to Silva et al., data comes to the STF through courts of second instances through not defined standard or pattern. In most cases, that data comes through scanned PDFs, especially through raster images that are obtained through scanning documents. Many of the AI tools described above have been created with the specific task of collecting data on these documents. The main issue is if the data stored in the PJe by these tools are being collected in similar formats. This will facilitate the data usage across various different tools and enable exchanges throughout all three instances of the Brazilian court system. There are a few tasks that the CNJ can carry out in order to ensure data interoperability.

One of the most common ways that data can be stored in an appropriate way is to have a defined Application Programming Interface (APIs). APIs define the kind of formatting and data collection methodology that should be used. In fact, it appears as though SINAPSES is already using APIs to facilitate the use of the algorithms already within its framework. However, there should also be APIs to facilitate the integration of homegrown algorithms within the SINAPSES system.

Another valuable component of data governance is data decentralization. We are aware that the CNJ takes this component very seriously and has implemented it into the PJe framework. We are also aware that SINAPSES will be held on an Amazon Web Services server, which is a centralized cloud server, and hope that the utmost precaution will be used to protect data that might come from using this service.

Transparency and Accountability

When discussing the use of AI in any public sector it is of utmost importance to ensure transparency and accountability. One of the principles of Canada’s National AI Strategy is that AI should only be used when there is a clear user need for the tasks which the tool executes.

In addition, the European Commission’s recent white paper on AI technologies discusses the issue of “AI opaqueness” and how that may make it more difficult for administrators to identify possible violations and breaches of laws and fundamental rights.⁴⁰ In the private sector, Google has established a framework for what it considers to be explainability standards which discuss how to keep AI tools transparent even as their complexity increases. These recommendations include how to “calibrate how to balance the benefits of using complex AI systems against the practical constraints that different standards of explainability impose.”⁴¹

In civil society, Access Now has discussed how AI “should be governed by a high standard, including open procurement standards, human rights impact assessments, full transparency, and explainability and accountability processes.”⁴²

With regards to the Brazilian Judicial system, both the INOVA PJe and the SINAPSES system can provide actions to ensure transparency. For the innovation labs, they can ensure that new AI tools are as transparent as possible with balance to their complexity. SINAPSES, with its system of translatable AI, has to ensure transparency by definition in order for tools to be integrated into courts.

⁴⁰ “White Paper on Artificial Intelligence: A European approach to excellence and trust”, European Commission, February 19, 2020. https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en.

⁴¹ “Perspectives on Issues in AI Governance”, Google, Accessed on March 29, 2020. <https://ai.google/static/documents/perspectives-on-issues-in-ai-governance.pdf>.

⁴² “AI-and-Human-Rights”, Access Now, Accessed on March 29, 2020. <https://www.accessnow.org/cms/assets/uploads/2018/11/AI-and-Human-Rights.pdf>.

CASE 2 Transparency and Trust in the European Commission's AI Framework

In the European Commission's 2020 White Paper on AI: A European Approach to Excellence and Trust, the Commission reiterated that while technological advancement is integral to improving the lives of Europeans, there are concerns that "Artificial Intelligence (AI) entails a number of potential risks, such as opaque decision-making, gender-based or other kinds of discrimination, intrusion in our private lives or being used for criminal purposes."

Therefore, the Commission has identified that the concept of trustworthiness is integral to the adoption of AI systems. They define an "ecosystem of trust" as a main prerequisite for AI adoption, meaning that AI tools are compliant with EU rules and are human centric. In order to fulfill those guidelines, the Commission has set forth the following recommendations to ensure that regulations foster an ecosystem of trust:

Training Data

- Requirements for safety assurance such as requirements for training AI systems on "data sets that are sufficiently broad and cover all relevant scenarios needed to avoid dangerous situations."
- Measures aimed at ensuring that AI systems are not leading to outcomes based on discrimination
- Requirements to protect personal data and address other privacy related concerns.

Data and Record-keeping

- Records addressing the use of datasets that are used to train and test the applications.
- In certain cases, the datasets themselves.
- Documentation on programming training methodologies, processes, and techniques used to build the tool.

Information to be provided

- Ensure the provision of clear information regarding the Tool's capacity and limitations.
- Inform users when they are using an AI system.

Robustness and Accuracy

- Reflect accuracy of AI tools throughout their lifecycles.
- Ensure outcomes are reproducible.
- Ensure systems can adequately address errors and inconsistencies throughout lifecycle.
- Require systems to be resilient under attacks or attempts to manipulate data.

Human Oversight

- Output of AI systems can only be effective if human overseers validate it.
- Outputs of AI systems can become immediately effective if human intervention can correct the outcome if needed.
- Real Time monitoring of AI system and ability to intervene with or deactivate the tool if necessary.
- Operational constraints in the design phase.

Human Rights and Safety

Unfortunately, one of the main issues associated with AI in the judiciary is the insertion of bias into decisions and actions executed by AI tools. In the United States, the use of AI to determine bail bond rates and other decisions have been biased and discriminatory against certain groups of the population. The Stanford and NYU white paper has looked extensively into this topic, and has determined that it is necessary for human interference and benchmarking to ensure that an algorithm is not straying and is continuing to be unbiased.⁴³

⁴³ David Freeman Engstrom, et al, op. cit.

Another major issue is the idea of personal data and privacy protection. Google's white paper on AI has discussed the importance of comprehensive data protection legislation to mitigate the human rights risks posed by AI, however, they also warn that additional measures are necessary to protect data.⁴⁴ Brazil has a General Law for the Protection of Data (LGPD) which deals with the use of personal data within both the public and private sectors and stipulates under which circumstances (such as consent) an entity is allowed to use them. The CNJ should also take stock of the kinds of personal data that is being used by AI tools and take additional steps to ensure that data's protection.

2. AI Tool Identification

Purpose and background

The local autonomy vested in the State Courts gives them the attributions to develop, procure and implement artificial intelligence tools without a centralized directive or specific technological governance guidelines. In order to develop a coherent and robust governance model, we developed a mapping tool that could provide CNJ with enough information to identify the existing artificial intelligence systems.

The survey is designed to gather information about the different algorithmic tools used in the Brazilian Judicial System to help maintain an homogenized, comparable and interoperable Artificial Intelligence ecosystem. The tool can also inform and help identify any potential social impact the system may be having. The questions are focused on three aspects of each system: the tool's development processes, its data processing, and the design decisions that support it.

Development methodology

The questionnaire is designed to be answered by any member of the technical staff in the Courts or entities that utilize or developed the AI tool. The answers provided can be sorted into three main categories:

- 1) Development and training processes of the AI tool; i.e. what data was used to train the model, what data was used to test the model, and whether the data contains sensitive or personal information.
- 2) Ownership and management. This information provides insights on who built the model, whether it was a government developed tool, or procured through a third party or research center. Also, what kind of permissions these entities and the public have to access the source code and the data itself.
- 3) Descriptive and methodological information. This information is about what is motivating the development of the tool and describing the actual work that the tool gets done. What are the outcomes or outputs that the tool has, what statistical and technological methods it uses to reach those outcomes.

This tool is not meant to categorize or assess any impact that it may have on a wider social context, but rather to throw light on an uncharted algorithmic ecosystem and homogenize. It was designed to gather descriptive information and metadata regarding the functionality of the AI system.

⁴⁴ Google, op. cit.

The questions in the survey were inspired by the Algorithmic Impact Assessment tool,⁴⁵ an open source resource developed by the Government of Canada, which obeys the directives set forward by the Canadian Directive on Automated Decision Making.⁴⁶ The scope of our tool was narrower, as we focused on trying to gather metadata around the tools that are being used, and not provide any impact assessment or impact mitigation strategies. Instead, as it has been developed previously, we developed a coordination governance model to be able to provide a useful given the judicial system’s unique nature.

Table 3: AI mapping tool

#	Question	Type of answers	Answers
1	What is the name of the Artificial Intelligence tool being assessed with this questionnaire?	Open-ended	
2	Briefly describe the tool's main functionality.	Open-ended	
3	What is motivating the use of AI tools in this case? (Check all that apply)	Select All	<ol style="list-style-type: none"> 1) Existing backlog of work or cases 2) Improve overall quality of decisions 3) Lower transaction costs of an existing program 4) The tool is performing tasks that humans could not accomplish in a reasonable period of time 5) Use innovative approaches 6) Other
4	How was this tool developed?	Select All	<ol style="list-style-type: none"> 1) Completely developed by your institution's technical staff. 2) Developed in collaboration with an external entity. 3) Procured, developed entirely by an external party 4) I don't know 5) Other:
5	Which e-Justice platform is this tool developed for/with?	Select	<ol style="list-style-type: none"> 1) PJe 2) e-SAJ 3) e-Proc 4) Apolo 5) Other
6	What stage of development is the tool currently in?	Select All	<ol style="list-style-type: none"> 1) In development / ongoing procurement process 2) Prototype / Testing 3) Ready for deployment, not currently operating 4) Fully deployed

⁴⁵ “Algorithmic Impact Assessment”, Government of Canada, Accessed on March 29, 2020. <https://open.canada.ca/aia-eia-js/?lang=en>.

⁴⁶ “Directive on Automated Decision-Making”, Government of Canada, Accessed on March 29, 2020. <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592>.

			5) Other
7	Which methods is the tool based on?	Select All	1) Logistic regression 2) Support Vector Machines 3) Decision Trees / Random Forest 4) Neural Networks / CNN 5) Oversampling / Resampling methods 6) Dimensionality reduction methods (PCA, Clustering, Manifold Learning) 1) Other:
8	Please check which, if any, of the following capabilities apply to the tool. (Check all that apply)	Select All	2) Modeling & risk assessment: Analyzing data sets to identify patterns and recommend courses of action and in some cases trigger specific actions. 3) Data organization: Analyzing data to categorize, process, triage, personalize, and serve specific content for specific contexts. 4) Image and object recognition: Analyzing data to automate the recognition, classification, and context associated with an image or object. 5) Text and speech analysis: Analyzing data to recognize, process, and tag text, speech, voice, and make recommendations, classifications or other kind of outputs based on the tagging. 6) Process optimization & workflow automation: Analyzing data to identify anomalies, cluster patterns, predict outcomes or ways to optimize; and automate specific workflows. 7) None / Non applicable 8) Other
9	Does the tool perform any kind of analysis of unstructured data?	Select	1) Yes 2) No 3) I don't know.
10	Is the data that was used to train the tool known by the team using it?	Select	1) Yes 2) No 3) I don't know. 4) Not applicable.
11	Is the tool's code publicly available and reviewable?	Select	1) Yes 2) No 3) I don't know. 4) Not applicable.
12	Is the tool's algorithm and its code?	Select	1) Open source 2) CNJ / State Court Owned

			3) Owned by a third party
13	Is the tool collecting and/or analyzing personal data (as defined by the General Data Protection Law)?	Select All	1) Collecting 2) Analyzing 3) Neither
14	Is the tool collecting and/or analyzing personally identifiable information?	Select All	1) Collecting 2) Analyzing 3) Neither
15	The data used by the tool... (Check all that apply)	Select All	1) Was collected by CNJ, a State Court, or a government entity. 2) Is publicly available and reviewable. 3) Is shared with another CNJ-dependent entity. 4) Was collected by an external entity. 5) Is shared with an external entity.
16	Can the technical staff in your institution explain:	Select All	1) What the inputs of the tool are. 2) What the outputs of the tool are. 1) The process through which the inputs become outputs.
17	Can non-technical staff in your institution explain:	Select All	1) What the inputs of the tool are. 2) What the outputs of the tool are. 3) The process through which the inputs become outputs.
18	Has the tool gone through:	Select All	1) A technical monitoring and quality assurance processes 2) A review of its training data to detect biases 3) A legal and/or administrative review 7) Other:

Prototyping and Pre-Testing

Before circulating the tool with ITS Rio, the internal capstone team tested its functionality by evaluating the VICTOR tool. We did QA testing for the questionnaire functionality in order to ensure it would work in a broader application. This resulted in a few minor changes to the tool format and wording.

Next, we partnered with the ITS Rio team to compile a sample population to further test the tool. ITS Rio provided us a list of court CTOs that represented a broad random sampling of the Brazilian Judiciary System. We shared the tool with the CTOs in order to validate the questions for completeness, ease of use and holistic answers. After testing the tool with the CTO sample, we found that the tool was ready to be delivered to the client and implemented on a larger scale.

Implementation and Analysis

ITS Rio and the CNJ will incorporate the tool as a standardized requirement for anyone that aims to develop or use AI tools in the judiciary. The tool would be shared with the CTO of the court system to complete for

their court. This will allow ITS Rio and the CNJ to have a full repository of all of the tools utilized in the Brazilian Judicial System, along with the metadata surrounding the AI programs.

3. Integrating the Current Court System

Open Source Software

We recommend the utilization of open source software (OSS) to integrate geographically diverse and different levels of courts. The Brazilian government had multiple experiences in the past to adopt the OSS model. In 2003, the federal government created a Technical Committee on the Implementation of OSS⁴⁷, which is an online knowledge-sharing tool for the ICT professionals. Another example of an OSS model is the Brazilian Public Software Portal that was created in 2007. The portal contains variety of OSS and shared the development of source code to assist the public sector and different sectors OSS policy⁴⁸. These two are great examples of how the Brazilian government has been able to adopt the OSS model in the past. If the judicial system can successfully adopt OSS to their current system, OSS will be able to increase the judicial system's transparency and collaboration among the public sector and the civil society.

OSS is an essential component to develop a true digital government in Brazil. With collaboration with federal government agencies' initiatives, it is possible to strategically support OSS into the current Brazilian judicial system. The French central government, for example, established an interdepartmental Open Source Contribution Policy to promote the use of OSS in the public sector in 2016⁴⁹. The policy presented the rules and good practices for open source codes that enables the ministries to adopt the OSS.

Utilizing OSS can induce co-creation and collaboration, and ensure interoperability among courts' systems. However, the collaboration among the stakeholders must be prioritized to share the policy ownership and accountability to ensure OSS' positive impact for the end users and the public. The federal government must also increase awareness and understanding of OSS at federal, state and local level to emphasize the importance of OSS.

Enhance interoperability among courts' system

Under the circumstances that different courts use different electronic judicial management systems, AI tools developed on SINAPSES which are compatible with PJe should be compatible with other electronic judicial management systems to integrate them. Therefore, from the foreign model which achieves 4 layers of interoperability⁵⁰ - legal, organizational, semantic, and technical interoperability, we recommend CNJ collaboratively enhance interoperability among courts' systems.

⁴⁷ “Decreto de 29 de Outubro de 2003 - Institui Comitês Técnicos do Comitê Executivo do Governo Eletrônico e dá outras providências”, Casa Civil, Accessed on March 2020. http://www.planalto.gov.br/ccivil_03/DNN/2003/Dnn10007.htm

⁴⁸ “Software Público Brasileiro — Governo Digital”, Ministério do Planejamento, Accessed on March 2020. <https://www.governodigital.gov.br/transformacao/cidadania/software-publico>

⁴⁹ “Loi n° 2016-1321 du 7 octobre 2016 pour une République numérique, Legifrance”, Accessed on March 20, 2020. https://www.legifrance.gouv.fr/affichTexte.do;jsessionid=6E9C9BD1F4AAF6E6FD525E8FE902A615.tplgfr26s_2?cidTexte=JORFTEXT000033202746&categorieLien=id

⁵⁰ “New European Interoperability Framework, European Commission, Accessed on March 2020. https://ec.europa.eu/isa2/sites/isa/files/eif_brochure_final.pdf

EU Interoperability Framework (EIF)⁵¹

The European Interoperability Framework (EIF) gives specific guidance on how to set up interoperable digital public services among EU member countries. It offers public administrations 47 concrete recommendations on how to improve governance of their interoperability activities, establish cross-organizational relationships, streamline processes supporting end-to-end digital services, and ensure that both existing and new legislation do not compromise interoperability efforts. The EIF is a commonly agreed approach to the delivery of European public services in an interoperable manner. It defines basic interoperability guidelines in the form of common principles, models and recommendations.

More specifically, it delivers public services by the principles of digital-by-default (i.e. providing services and data preferably via digital channels), cross-border by-default (i.e. accessible for all citizens in the EU) and open-by-default (i.e. enabling reuse, participation/access and transparency); and it provides guidance to public administrations on the design and update of national interoperability frameworks (NIFs), or national policies, strategies and guidelines promoting interoperability. It covers the ranges of A2A (administration to administration), A2B (administration to business), and A2C (administration to citizen) among Member States.

The Action Plan of the EIF identifies the 5 focus areas, concrete actions, schedule, and responsibilities of the actions, European Commission, and member states⁵². The focus areas are Ensure governance, coordination and sharing of interoperability initiatives, Develop organizational interoperability solutions, Engage stakeholders and raise awareness on interoperability, Develop, maintain and promote key interoperability enablers, and Develop, maintain and promote supporting instruments for interoperability. The European Commission was supposed to evaluate the EIF by the end of 2019⁵³.

⁵¹ Ibid.

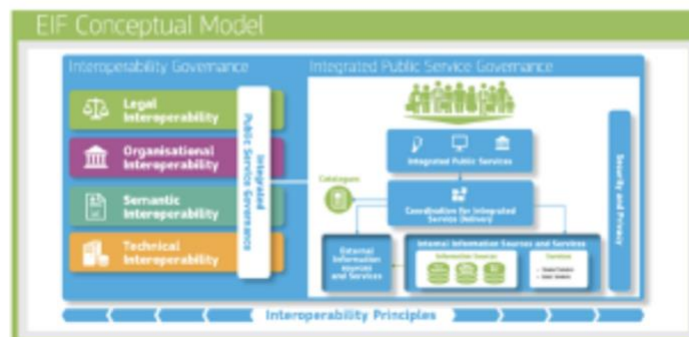
⁵² “European Interoperability Framework - Implementation Strategy Interoperability Action Plan” European Commission, March 23, 2017. https://eur-lex.europa.eu/resource.html?uri=cellar:2c2f2554-0faf-11e7-8a35-01aa75ed71a1.0017.02/DOC_2&format=PDF.

⁵³ “Interoperability solutions for public administrations, businesses and citizens”, The New European Interoperability Framework, European Commission, March 23, 2017. https://ec.europa.eu/isa2/eif_en.

CASE 3 EU interoperability framework (EIF)

The EIF includes four layers of interoperability: legal, organizational, semantic and technical; a cross-cutting component of the four layers, integrated public service governance; and a background layer, interoperability governance.

- Legal interoperability is about ensuring that organizations operating under different legal frameworks, policies and strategies are able to work together.
- Organizational interoperability is documenting and integrating or aligning business processes and relevant information exchanged.
- Semantic interoperability ensures that the precise format and meaning of exchanged data and information is preserved and understood throughout exchanges between parties.
 - The semantic aspect refers to the meaning of data elements and the relationship between them. It includes developing vocabularies and schemata to describe data exchanges, and ensures that data elements are understood in the same way by all communicating parties.
 - The syntactic aspect refers to describing the exact format of the information to be exchanged in terms of grammar and format.
- Technical interoperability covers the applications and infrastructures linking systems and services. Aspects of technical interoperability include interface specifications, interconnection services, data integration services, data presentation and exchange, and secure communication protocols. A major obstacle to interoperability arises from legacy systems. Historically, applications and information systems in public administrations were developed in a bottom-up fashion, trying to solve domain-specific and local problems. This resulted in fragmented ICT islands which are difficult to interoperate.
- Integrated public service governance is interconnection of public services among Member States, by common or compatible models, standards and agreements on common infrastructure.
- Interoperability governance is coordination, communication and monitoring to implement the NIF among Member States. National Interoperability Framework Observatory (NIFO) is the organization to play the role, supported by the European Commission. Its main objective is to provide information about NIFs and related interoperability and digital strategies/policies, to help public administrations share and reuse experiences and to support aligning with the EIF nationally.



European Commission, New European Interoperability Framework (2017)

e-CODEX⁵⁴

e-CODEX (e-Justice Communication via Online Data Exchange) provides easy access to cross-border justice for citizens, business and legal professionals all over Europe by offering a digital infrastructure for secure cross-border communication in the field of justice in Europe. This is the project directed by the Ministry of Justice of the State of North Rhine-Westphalia (Germany), and one of the interoperable public services within European countries. The project is carried out by 27 partners either being or representing their national ministries of justice of 24 European countries, plus the Council of Bars and Law Societies of

⁵⁴ e-CODEX, Making Justice Faster. Available at: <https://www.e-codex.eu/>

Europe (CCBE), the Conseil des Notariats de l'Union Européenne (CNUE) and the European Chamber of the Judicial Officers (CEHJ)⁵⁵.

An outstanding merit of e-CODEX is easy connection. Member States can use any hardware as long as it supports the language e-CODEX uses for communications, that is, the ebXML standards stack and ETSI REM standards. e-CODEX does not force one European system upon all participating Member States nor oblige Member States to reinvent their systems. By using open international standards, e-CODEX enables existing systems to securely communicate with each other, without being affected by technical issues or changes in other Member States.

CASE 4 e-CODEX

The e-CODEX technical infrastructure consists of the reusable modules Gateway and Connector. As e-CODEX is a decentralized system, every participant needs to install their own instance of the e-CODEX components nationally. Therefore, the operation of the running system has to be done by the e-CODEX participant himself. The Gateway which Member states have to set up ensures the connection and message exchange with the Gateway in another Member State. The Connector resides between the national backend Systems and the national Gateway. It is a web application that communicates with the Gateway, carries out the message routing to the backend systems and creates the secure ASiC-S containers for the messages. The recommended product of the Gateway “Domibus Gateway”, “Domibus Connector” and “e-CODEX Schemas” which are developed and maintained by the e-CODEX consortium and its technical document and development roadmap are all available on its website . Below is the technical infrastructure of the e-CODEX. Moreover, various projects are using e-CODEX for secure information exchange in civil and criminal law, or to enhance the access to legal information and means throughout Europe .

The diagram, titled "e-CODEX / Technical infrastructure", illustrates the communication flow between two Member States, A and B. On the left, Member State A contains three backend applications (represented by icons) connected to a local Gateway (G) and a Connector (C_A). On the right, Member State B contains three backend applications connected to a local Gateway (G) and a Connector (C_B). A "secured connection" is established between the Gateway of Member State A and the Gateway of Member State B, with bidirectional arrows indicating message exchange. A legend at the bottom identifies the icons: a circle with 'C' for Connector, a circle with 'G' for Gateway, and a circle with three application icons for Backend applications. Below the legend, it states "e-CODEX.Tech. Available at: <https://www.e-codex.eu/tech>".

Key takeaway from the EU model

1. The documentation of the EIF enables the European Commission to share the vision of the interoperability framework, including the benefits of interoperability and concrete recommended actions to follow the framework.

⁵⁵ Ibid.

2. The EIF provides a comprehensive interoperability framework across member states, with recommendations beyond the four layers of interoperability, including cross-cutting components and a background layer.
3. The EIF identifies the responsible, committed organizations that successfully communicate, monitor, and implement the framework.
4. The EIF action plan identified a clear lifecycle with concrete actions, proposed timing, and responsibilities that included the evaluation of the EIF itself.
5. e-CODEX maintains a decentralized member states' system decentralized, does not force to use a single system nor require reinvestment by using international standards.

Comparison to the National Interoperability Models⁵⁶

The National Interoperability Model (MNI) was established in 2009 by a small subset of judicial organizations to standardize the exchange of information on judicial and similar proceedings between the various organs of justice administration, in addition to serving as a basis for the implementation of the relevant functionalities within the scope of the procedural system. The charter of the National Interoperability Model v3.0 is to standardize shipping electronic processes between courts.⁵⁷

In contrast to the EIF, the MNI documentation is limited. Communication flow charts are available, but there is a lack of documentation surrounding its vision, benefit, target, definition, recommended actions, commitment, and governance model. Further, the type of interoperability by the MNI is limited to the syntax level. There is no publicly available roadmap or action plan to deploy the model. The MNI does not clarify which network protocols should be used for communication between computers, or provide a standardization in the model for this level of communication.⁵⁸ Second, the lack of relationship between the MNI and the Requirements Model for Computerized Systems for the Management of Processes and Documents of the Brazilian Judiciary (MoReq-Jus) fails to define the minimum requirements for the computerized systems of the judiciary. Lastly, the types of interaction with the courts, such as: Court to Court, Court to Company, Court to Citizen, are also not presented by the MNI.

Therefore, further improvement is required in the area of documentation, including action plans to deploy the standard, and an effective monitoring and evaluation protocol, and implementation guidelines. Furthermore, by collaborating with federal governments, targets of interoperability must be more comprehensive.

Enhance interoperability among different courts' systems by e-PING⁵⁹

Having a common architecture and standard is essential to proceed a smooth integration process. Brazil already has an interoperability framework that could be utilized. Since 2005, a decentralized electronic

⁵⁶ "National Interoperability Model", National Council of Justice, Accessed on March 2020. <https://www.cnj.jus.br/tecnologia-da-informacao-e-comunicacao/comite-nacional-de-gestao-de-tecnologia-da-informacao-e-comunicacao-do-poder-judiciario/modelo-nacional-de-interoperabilidade/>

⁵⁷ "National Interoperability Model: Files, Version 3.0.", National Council of Justice, Accessed on March 2020. <https://www.cnj.jus.br/arquivos-do-modelo-nacional-de-interoperabilidade/>

⁵⁸ Silveira, R. S., et al, op cit.

⁵⁹ "Digital Government Review of Brazil: Towards the Digital Transformation of the Public Sector, Chapter 4, Strengthening the foundations for integrated digital service delivery in Brazil", OECD iLibrary, OECD Digital Government Studies. November 28, 2018. <https://www.oecd-ilibrary.org/sites/9789264307636-7-en/index.html?itemId=/content/component/9789264307636-7-en>.

government interoperability standard called e-PING has been mandatory to adopt for all the entities of the executive branch of the federal government.⁶⁰ Currently, ePING is overseen by the Logistics and Information Technology Secretariat (SLTI) of the Ministry of Planning, Development, and Management. e-PING framework helps integrate process, applications, data, security, and information exchanges between federal Executive branch agencies and citizens, other levels and branches of the government.

If all the courts adopt the e-PING, it will be able to have the same standard across all the Brazilian public sectors that is needed to increase efficiency in their procedures.

Utilize Conecta.gov

Conecta.gov was launched in 2018 through Efficient Brazil, a programme of the National Debureaucratization Council, to improve interoperability in different levels of Brazilian government. It is simply a platform that consists of a variety of application programming interfaces (APIs) that can be used to integrate and exchange information in the public services. Public institutions are able to connect their own platform using APIs and exchange data in an efficient manner. The use of APIs to increase transparency and exchanging data is innovative, yet a simple solution that could transform the current judicial system.

4. Increasing Collaboration Between the Courts

Identify AI Tools currently in development and use

In consultation with both the client and a number of experts in the field, it is apparent that there is a lack of information regarding the use of AI tools in courts, and their status of use and development. One option, as previously defined in Pillar 1 is the use of the classifying questionnaire to understand the kinds of AI tools that are currently out there.

By strengthening the INOVA PJe, which will be discussed at length in the next section, the CNJ will also be able to understand the level of development each tool currently has, and connect them to other courts that may be able to help them.

In addition, the CNJ should also try to reach out to courts who are using a system other than the PJe to create their AI tools. Although it is understood that the CNJ has an agenda to universalize the PJe, it is important that these perspectives are included within any platform, forum or conversation regarding AI in the Judiciary.

Provide a Forum where Court experts can discuss their tools

The CNJ should also create more spaces, such as Forums, where the leadership and technical expertise of each court can meet and discuss the various different tools currently in use or in development. We are aware that such forums already exist, but it would be prudent to ensure that they occur on a regular basis and also include the perspectives of courts who have not adopted the PJe and therefore the SINAPSES system.

⁶⁰ Op. Cit. OECD Digital Government Studies.

These forums could also be an opportunity to discuss the principles and agenda of using AI in the Judicial Sphere and decide collaboratively on the norms and processes that should be in effect.

Ensure the availability of the SINAPSES system

The SINAPSES system seems like an effective platform for collaboration and dissemination of AI tools. However, it is not clear how many courts are aware of this resource. Therefore, once SINAPSES is ready for use, it is important that the CNJ enacts an aggressive advocacy campaign and continues its plan of providing remote capacity building to courts. In addition, it should review if said API's on the SINAPSES framework can be replicated by courts that are not currently using the PJe. SINAPSES is the perfect tool to not only increase inter-court collaboration, but also execute the co-development of AI tools.

5. Strengthening the INOVA-PJe Model

National INOVA PJe Framework

At a national level, it is important that there is an entity that provides high-level oversight and guidance in the creation of AI tools throughout the Brazilian Judiciary. This entity could enforce the principles and objectives outlined in the section above, while also providing guidance on data standardization, APIs, and workshops on algorithm building. As previously mentioned by the client, there will be remote training on how to use SINAPSES, which could be performed by the INOVA PJe lab on a national basis. Lastly, the INOVA PJe lab could provide a forum for national collaboration between the different courts.

In the European Commission's White Paper, they specifically discuss how a list of ethical guidelines—such as the principles outlined in section 1 can be transformed into an indicative “curriculum” for developers of AI that will be made available as a resource for training institutions. They also discuss that such training institutions should undertake efforts to increase the number of women and minorities trained and employed in this area.⁶¹

Although the name of the laboratory is INOVA PJe, it is imperative that courts who do not currently use the PJe are included within the activities of the laboratory. Many of these courts already have tools in place within their courts and could impart valuable lessons learned to other courts. This kind of cross electronic platform collaboration could also provide temporary ways of integration, even if the end result is a universal adoption of the PJe.

Local Level Laboratories

Some of the current tools in use in the Brazilian Judiciary were created in partnership with federal universities. The STF's Victor was created via a partnership with the University of Brasilia and the state court of Alagoas used expertise from the Federal University of Alagoas to create their Hercules system.⁶² This model is not unique to the Brazilian Justice system as similar partnerships exist within different

⁶¹“White Paper on Artificial Intelligence: A European approach to excellence and trust”, European Commission. Accessed on February 19, 2020. https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en

⁶² “Your fastest process: Robots already take over bureaucracies of the country's Justice”, Time 24 News. March 3, 2020. <https://www.time24.news/u/2020/03/your-fastest-process-robots-already-take-over-bureaucracies-of-the-countrys-justice-03-03-2020.html>

policy spheres in Brazil. IBM is currently partnering with the Foundation of Sao Paulo (FAPESP) and the University of Sao Paulo (USP) to create an incubator for AI start-ups that deal with various different issues in public policy such as agriculture, healthcare, and financial services.⁶³ Both Mexico and the United Kingdom also have a record of promoting public sector and academia partnerships through the UK's Turing Institute and the proposed Mexican National Center for AI Research.⁶⁴

However, in order to facilitate such a partnership, the CNJ should look at providing incentives for the participation of Universities. Canada's CIFAR Chairs program outlines a series of incentives to create a partnership between academia and the public sector including "recruiting top academic researchers and allowing them the freedom to carry out research, train students, and interact with industry. Supporting the recruitment and training of young researchers, including both graduate students and postdoctoral fellows. Including funding for graduate students who will work with the CCAI Chairs, as well as training for students at the three AI Institutes."⁶⁵

CASE 5 UK Alan Turing Institute

The Alan Turing Institute is the United Kingdom's National institute for data science and artificial intelligence. It was created by five founding universities- Cambridge, Edinburgh, Oxford, UCL and Warwick – and the UK Engineering and Physical Sciences Research Council in 2015. In 2018, eight more universities joined the institute-Leeds, Manchester, Newcastle, Queen Mary University of London, Birmingham, Exeter, Bristol, and Southampton. The idea is that the center is a "collaborative hub" which cooperates with the private sector, government, and civil society to advance research, train future leaders, and lead the public conversation on AI. Its primary funders are the UK Engineering and Physical Sciences Research Council and the UK Arts and Humanities Council.

This particular institution is interesting because it is run by the academic sector for the benefit of the public. It enters into strategic time based partnerships with entities from industry and government with specific projects in mind. It also provides funding for university researchers throughout the U.K.

6. Facilitating Safe Participation from the Private Sector

Eventually, there will be the possibility that courts turn to private sector entities for their expertise within the sector. If constitutional, the CNJ should set in place a transparent framework for that possibility that includes an open procurement process, communicates regulations and statutes, and a clear contract regarding services rendered.

One model that provides an interesting alternative is Estonia's Accelerate Estonia Platform, which seeks to involve start-ups to solve difficult issues within the public sector. In this case, the Government of Estonia provides seed capital, funding, and oversight.⁶⁶ Similar models have also been implemented in the United Kingdom where the Financial Conduct Authority has implemented Project Innovate. Although

⁶³ "University of São Paulo to host the new FAPESP-IBM joint center for Artificial Intelligence", AGÊNCIA FAPESP. October 23, 2019. <http://agencia.fapesp.br/university-of-sao-paulo-to-host-the-new-fapesp-ibm-joint-center-for-artificial-intelligence/31742/>

⁶⁴ "Mapping AI Governance", NESTA, Accessed on March 2020. <https://www.nesta.org.uk/data-visualisation-and-interactive/mapping-ai-governance/>

⁶⁵ "AI", CIFAR, Accessed on March 2020. <https://www.cifar.ca/ai>

⁶⁶ "Accelerate Estonia", Ministry of Economic Affairs of Estonia, Accessed on March 2020, available at: <https://accelerateestonia.ee/en/>

geared towards private sector fintech start-ups, this laboratory offers opportunities such as a Regulatory Sandbox, direct support for regulatory issues, and an advice unit. They also have an AI Public Private Forum where different entities can interact and share best practices.⁶⁷

The CNJ could begin a partnership with Jusbrasil, which already has a database with an impressive number of court cases from the majority of Brazil's courts. Jusbrasil could be a natural partner for the CNJ to help integrate systems and standardize data, especially since many courts, regardless of electronic processing systems, already use this resource.

CASE Accelerate Estonia (aE!)

6

The accelerateEstonia (aE!) program is run jointly by the Ministry of Economic Affairs and Communications, and Tehnopol Science Park to identify start-ups that can work on issues of public concern. The idea is that the government and the private sector can work together to design solutions and develop effective regulatory frameworks.

The current edition of the program has chosen 4 projects that will receive a € 10,000 start-up grant, necessary training and comprehensive mentoring support. These are the current projects:

PROJECT Green Tiger aka Environmental Impact Meters

“The project aims to give impetus to greener economic activities. The Green Tiger project creates a solution that collects environmental impact data and creates the prerequisite for dynamic taxation of goods and services according to their share of environmental factors in CO2. For the citizen, dynamic access to environmental information means a better choice when it comes to consuming environmentally friendly products and services, as the store can automatically track the environmental impact of one or another commodity.”

PROJECT Earth Mobility Project XT (Mobility as a Service)

“Today, the transport system is isolated, where different modes of public transport (tram, train, barge, etc.) do not exchange information and make it difficult for passengers to navigate between different modes of transport. Therefore, comprehensive travel planning and ticketing is also a complex process. The MaaS project team solves the problem by creating a platform for mediating traffic requests.”

PROJECT Local Offset

“Local Offset, in partnership with the state, creates a carbon offset certificate that describes the amount of carbon dioxide in the atmosphere through sustainable management of nature. This will enable companies to link their carbon footprint to local forests, wetlands, farmland and other natural resources – and to support the preservation of their species-rich ecosystems. Local Offset provides a transparent and scalable platform to offset carbon footprint, integrating nature conservation into today's workable economy.”

PROJECT Developing Estonia as an Information Warfare Center

“The information war is a threat to democracy, public order and economic stability. The spread of misinformation is paralyzing and affecting the daily lives of many people – for example, it is not uncommon to refer people to ransom or phishing bank account information when referring to intimate video publishing. The cost of fake news losses is estimated at about \$78 billion a year. This project establishes a software platform that analyzes, detects and visualizes the authenticity of digital images and videos.”

⁶⁷ “Fintech, regtech and innovative businesses”, FCA Innovation, Accessed on March 2020. <https://www.fca.org.uk/firms/innovation>

7. Monitoring and Evaluating the Progress of AI in the Judicial Sphere

It is imperative that there be monitoring and evaluation mechanisms put in place in order to ensure that the principles and objectives of the CNJ's governance model are being implemented. The following are a list of indicators that could be used in order to create a monitoring and evaluation framework.

Indicators of AI Use for a Specific Tool

The Alan Turing Institute (U.K.) recently published a report on “*Understanding artificial intelligence ethics and safety A guide for the responsible design and implementation of AI systems in the public sector.*” One major element of the report is that AI tools in the public sector should constantly be tested for their accuracy, reliability, security, robustness and outcome fairness.⁶⁸

In regards to algorithm accuracy, there are four specific measures that courts should assess to ensure that their tool is accurate.

Accuracy: How often the model is correct⁶⁹

$$\text{Accuracy} = \frac{\text{truepositives} + \text{truenegatives}}{\text{totalexamples}}$$

Precision: assesses how often the tool is correct when it predicts a positive outcome

$$\text{Precision} = \frac{\text{truepositives}}{\text{truepositives} + \text{falsepositives}}$$

Recall: Assesses the frequency of false negatives

$$\text{Recall} = \frac{\text{truepositives}}{\text{truepositives} + \text{falsenegatives}}$$

F1 score: Calculates how often the model is correct incorporating both the precision and recall score.

$$F1 = 2 \times \frac{\text{precision} \times \text{recall}}{\text{precision} + \text{recall}}$$

Many courts are probably already using these measures to test their AI tools. However, it is up to the CNJ to create guidelines for how often to test models and the score threshold that tools must surpass in order to be used within a court system.

In addition, it is important to assess the nature of data used by these systems. After all, an AI model could have a high accuracy score, but that does not matter if it is built upon inaccurate data. A list of indicators

⁶⁸ Leslie, David, “Understanding artificial intelligence ethics and safety: A guide for the responsible design and implementation of AI systems in the public sector” The Alan Turing Institute. June 11, 2019. <https://doi.org/10.5281/zenodo.3240529>

⁶⁹ “Evaluation Metrics for Machine Learning - Accuracy, Precision, Recall, and F1 Defined”, Pathmind, Accessed on March 20, 2020. <https://pathmind.com/wiki/accuracy-precision-recall-f1>

regarding the use of data, as defined by the U.K.’s Turing institute are as follows “a comprehensive record of data provenance, procurement, pre-processing, lineage, storage, and security as well as qualitative input from team members about determinations made with regard to data representativeness, data sufficiency, source integrity, data timeliness, data relevance, training/testing/validating splits, and unforeseen data issues encountered across the workflow.”⁷⁰

Indicators for evaluating the Governance System

In terms of evaluating the AI governance system, the indicators are quite straightforward. The CNJ should collect data regarding the number of courts developing or using AI Tools, participating in the INOVA PJe or in any relevant forums, and have completed the classifying questionnaire and the user assessment. They should look at the increases in adoption of new algorithms and algorithms in reuse by other courts. In addition, the CNJ should also evaluate how AI tools have impacted the casework overload of the Brazilian judicial system.

Determine the Incentives to Adopt the AI Tool

After several interviews from the judges, there was one clear theme that was consistent across all interviewees: the unawareness of the initiatives in Brazil. From small to large initiatives, there are several initiatives that have been done to decrease the overwhelming amount of labor. Yet, many courts have their own system because of the bureaucratic procedures, lack of financial resources, or lack of ability to solve the needs of all courts. Some judges had difficulties navigating through SINAPSES and ended up creating their own court system that fits their needs. Due to such issues, most of the initiatives have not been shared among the courts. We identified that each court has different needs and the importance of convenience for the judges so that one system can be widely adopted. Therefore, we designed a user assessment tool for the client to deploy when SINAPSES is post production and ready to be tested.

The objectives of the tool are below:

- 1) Determine the awareness of the AI tools of the courts
- 2) Determine the obstacles to use the AI tools developed at the SINAPSES
- 3) Determine the incentives to adopt the AI tools

Table 4: AI user assessment tool

#	Categories	Questions	Type of answers	Answers
1	e-Justice system	Which Electronic Judicial Process Management Systems is your court using?	Select	1) SAJ 2) PJe 3) eProc 4) Creta 5) Apolo 6) JEF Virtual 7) PJD 8) Juris 9) E-jur 10) Other
2	AI tool usage	Is your court using any Artificial Intelligence (AI) tools?	Select	1) Yes 2) No

⁷⁰ Ibid.

3	Non-AI tool users	(If answer to Q2 is No) Is your court considering using AI tools?	Select	1) Yes 2) No
4	AI tool users	(If answer to Q3 is Yes) What are the court's priorities for the use of AI tools? What is the intended impact?	Select All	1) Existing backlog of work or cases 2) Improve overall quality of decisions 3) Lower transaction costs of an existing program 4) The tool is performing tasks that humans could not accomplish in a reasonable period of time 5) Use innovative approaches Other
5	Non-AI tool users Obstacles	(If answer to Q3 is Yes) What is the obstacles to use the AI tools? Why aren't AI tools being used currently?	Select All	1) Don't know how to use the tools. 2) Don't feel necessity to use the tools. 3) Don't know how useful it is. 4) Don't know how to integrate them to operation. 5) Human resource limitation 6) Technically not available. 7) Not useful at all. 8) Output is not reliable. Other
6	Non-AI tool users Awareness	(If answer to Q3 is Yes) Does your court know that the AI tools are available at the SINAPSES?	Select	1) Yes 2) No
7	Non-AI tool users Incentive	(If answer to Q3 is No) If any, possible reasons why your court does not consider using AI tools	Select All	1) Don't know how to use the tools. 2) Don't feel necessity to use the tools. 3) Don't know how useful it is. 4) Don't know how to integrate them to operation. 5) Human resource limitation 6) Technically not available. 7) Not useful at all. 8) Output is not reliable. Other
8	AI tool users	(If answer to Q2 is Yes) What is the purpose to use the AI tools?	Select All	1) Existing backlog of work or cases 2) Improve overall quality of decisions 3) Lower transaction costs of an existing program 4) The tool is performing tasks that humans could not accomplish in a reasonable period of time 5) Use innovative approaches Other

9	AI tool users Type of AI tools	(If answer to Q2 is Yes) What kind of AI tools is your court using?	Select All	<ul style="list-style-type: none"> 1) Enforcement: Tasks that identify or prioritize targets of agency enforcement action 2) Regulatory research, analysis, and monitoring: Tasks that collect or analyze information that shapes agency policymaking 3) Adjudication: Tasks that support formal or informal agency adjudication of benefits or rights 4) Public services and engagement: Tasks that support the direct provision of services to the public or facilitate communication with the public for regulatory or other purposes 5) Internal management: Tasks that support agency management of resources, including employee management, procurement, and maintenance of technology systems
10	AI tool users Owner of AI tools	(If answer to Q2 is Yes) Which AI tools is your court using?	Select	<ul style="list-style-type: none"> 1) Tools already available on SINAPSES 2) Tools my court (developer) developed on SINAPSES 3) Tools my court (developer) developed
11	AI tool users Owner of AI tools	(If answer to Q10 is 3) Who developed your AI? And why did you pick that particular source (e.g. internal financial resource, internal human resource) to build your tool?	Open-ended	
12	AI tool users Non-SINAPSES user	(If answer to Q10 is 3) Does your court know that the AI tools are available at the SINAPSES?	Select	<ul style="list-style-type: none"> 1) Yes 2) No
13	AI tool users Why not SINAPSES	(If answer to Q12 is Yes) Why does not your court use the AI tools developed on the SINAPSES?	Select All	<ul style="list-style-type: none"> 1) Don't know how to use the tools. 2) Don't feel necessity to use the tools. 3) Don't know how useful it is. 4) Don't know how to integrate them to operation. 5) Human resource limitation 6) Technically not available. 7) Not useful at all. 8) Output is not reliable. Other

14	AI tool users Frequency of usage	(If answer to Q2 is Yes) How often does your court use the AI tools?	Select	1) Daily 2) Once in a few days 3) Weekly 4) Monthly 5) Else (Describe)
15	AI tool users Satisfaction	(If answer to Q2 is Yes) How much does your court satisfy with using the AI tools?	Select	1) Very satisfied 2) Satisfied 3) Neither agree nor disagree 4) Dissatisfied 5) Very dissatisfied
16	AI tool users Satisfaction	(If answer to Q15 is 1 or 2) What are components of the AI tools are you satisfied with?	Open- ended	
17	AI tool users Satisfaction	(If answer to Q15 is 3, 4, or 5) What are the components of their AI tools are they not satisfied with?	Open- ended	

Although we were unable to test the tool on a large-scale due to cancellation of the research trip from COVID-19 travel restrictions, we were able to get some feedback from a couple of judges that we interviewed. First, some judges noted how they were skeptical of using AI tools because they were unable to find the data agreement and technology safeguards on the website. The users are unaware of the stakeholders who are accountable for the data. Since AI tools need to collect large amounts of data in order to increase accuracy in the decision-making process, data agreements need to be easily accessible to the users to ensure that the tool is safe to use. Second, the AI tools still make some mistakes in the decision-making process. Some judges feel they cannot fully rely on the AI tool to conduct the final decision-making. All the algorithms for the AI tools need to be tested and have high accuracy rates before they go into production. It is necessary to have human intervention during this testing phase to reduce the risks of making a mistake. Lastly, the judges from different courts need to be included in building the AI tools so that the tools can incorporate their needs. If the judges are included in the production of the AI tool, the more judges involved, the more people who will be aware of the tool and they may feel more interested in the use of the tool. Having the judges more informed about the tools built will decrease the hesitation to use the tool as well. Transparency is key in country-wide adoption and including the judges is the first step to do so.

Part IV: Conclusion

1. Challenges and Limitations

Constraints

Our major constraint for this project was time. The entirety of this project was to be conducted during Columbia University's Spring 2020 semester. Given our time constraint, we are satisfied with the level of research and output attained, but we do understand that a holistic AI governance model will take time and further processing to be enacted effectively.

As previously mentioned in our methodology, another major constraint was the fact that we had a limited sample of experts to draw from. Although we were able to gather information on the challenges of integrating AI tools within the Brazilian Judicial system, we could have gathered a more exhaustive list of challenges if we were able to talk to more court representatives. Unfortunately, due to the occurrence of the COVID-19 pandemic, this was out of our control. However, we hope that the continuation of this work can be continued by our clients in safer times to build an even more robust and collaborative system.

Prototype Tools

We have created two prototype tools for the CNJ to use for its collaborative governance model, an AI Assessment Tool to identify algorithms and a User Assessment tool to evaluate awareness and obstacles to AI tool deployment within the Brazilian Judicial System. We have tested these tools internally, but have not sent them to be tested externally (by judges in court systems, for example). We hope that our clients will continue to test and perfect these tools to ensure that they are effective in their tasks and add value to the AI Governance Structure.

Gaps in information

Due to the aforementioned constraints in our research, we would like to acknowledge that there may be some information gaps within our work. As mentioned in our Stakeholder section, we compiled a list of tools that we know are currently in existence, but we recognize that list may not be exhaustive. We hope that the recommendations we provided can be implemented regardless of the tasks a tool undertakes or its level of complexity.

In addition, we were made aware of the role of legal techs and law techs within the Brazilian Judicial system. Evidence on whether these private sector-based technologies are currently being deployed by court systems was inconclusive, however we believe that the CNJ should be aware of that possibility and deploy an explicit framework.

2. Next steps

Agenda Ratification

Taking to account our recommendations for an agenda that sets out the Judicial Branch's principles for the deployment of AI and given that many courts have already deployed tools, it is essential for the CNJ to ratify an agenda as soon as possible to guide the further development of AI tools. We hope that our recommendations within this scope will be valuable and that the CNJ will ensure that these are passed down to the courts as soon as possible to guide the safe and ethical deployment of AI.

Program Deployment

We are aware that the two programs that are integral to the CNJ's AI Governance strategy, the SINAPSES Platform and the INOVA PJe innovation laboratory were soon to be deployed but might have been delayed due to the occurrence of the COVID-19 outbreak. These programs need to be deployed as soon as realistically possible to all courts regardless of their electronic processing systems so that courts are aware of the CNJ's agenda, key principles, and resources for the use of AI.

Revisiting Integration Issues

One of the largest issues hindering the greater collaboration of courts is the lack of interoperability between the different electronic processing or e-Justice systems. Although we understand the rationale behind the universalization of the PJe, we urge that the CNJ revisit this issue and look for ways to facilitate interoperability and decentralize data collection at least within the short to medium term. We have provided a list of recommendations on how to initiate this process, but we hope that this conversation will continue, so as to create a more robust and interconnected digital system within the judiciary.

Appendix

Appendix table 1: Checklists of Six Pillars of AI Integration

Categories	Checklists
(a) Data Integration	<ol style="list-style-type: none"> 1. Are key stakeholders (e.g. users of the AI tools, those who are responsible for data integration) identified? 2. Have the key stakeholders identified and shared the purposes of data integration? 3. What barriers against data integration exists among stakeholders? 4. What kind of systems are being used by the key stakeholders? Are the systems an obscure legacy system? Do the systems need manual processes? 5. What kind of data is being used for the AI tools? Are the data source and type of data (e.g. unstructured or structured, machine-generated or sentiment) identified?
(b) IT system	<ol style="list-style-type: none"> 1. What kind of IT system integration among organizations is necessary to support AI tools adoption? 2. What major differences exist among systems? For example, what kind of electronic judicial process management systems are being used by the organizations? 3. Are the systems interoperable with each other? 4. Will IT systems need to be modified or developed to use AI tools?⁷¹ 5. Do the organizations have the right IT governance? Are there IT system roadmaps? Are the role and responsibility of positions, inventory, ownership, budget, system and operation workflow identified?

⁷¹ Jeremy Howard, “Data Projects Checklist”, Fast.AI, January 7, 2020. <https://www.fast.ai/2020/01/07/data-questionnaire/>

(c) Centralized organization	<ol style="list-style-type: none"> 1. What is the ideal scenario about the AI integration for the centralized organization (i.e. CNJ)? 2. Does the organizational structure have sufficient staff, funding, resources, and expertise in the fields of technology, data science, law?⁷² 3. To what extent can CNJ overstep the IT management of the courts? 4. What kind of monitoring and evaluation schemes regarding IT development are working between CNJ and the courts? 5. Is CNJ providing consultative support to the courts regarding the development and implementation of AI tools? 6. Is CNJ receiving and reviewing feedback from courts about AI tools and taking an action to reflect the feedback? 7. To guide and manage the deployment of AI tools to multiple courts, what organizational constraints in CNJ exist (e.g. culture, skills, or structure)?⁷³
(d) Policy Integration	<ol style="list-style-type: none"> 1. Is the relationship among relevant policies clearly defined? Such policies include the National IT Strategy, the National Strategy for Information and Communication Technology of the Judiciary, AI lab network⁷⁴, and the new AI Strategy.⁷⁵ 2. Are the scope and goals of the policies clearly defined? 3. Are the role and responsibility of each of the agencies clearly defined? 4. What kind of policy coordination has happened among agencies? 5. Is the priority among the policies clearly defined?⁷⁶
(e) Key principles	<ol style="list-style-type: none"> 1. Are the OECD Principles* properly implemented? 2. What kind of monitoring and evaluation schemes exist? 3. Which agencies have a responsibility to monitor and evaluate it? How do the agencies provide feedback on the results? 4. Are these processes transparent to the public? 5. What kind of information regarding AI usage is publicly available?

⁷² “Automated Decision Systems Task Force Report”, New York City Automated Decision Systems Task Force, November 2019. <https://www1.nyc.gov/assets/adstaskforce/downloads/pdf/ADS-Report-11192019.pdf>.

⁷³ Howard, Jeremy.

⁷⁴ Mari, Angelica. “Brazilian government announces creation of AI lab network.” ZD Net. November 8, 2019. <https://www.zdnet.com/article/brazilian-government-announces-creation-of-ai-lab-network/>.

⁷⁵ “Secretary of Telecommunications, Ministry of Science, Technology, Innovations and Communications”, Pedro Gontijo Menezes, January 2020. <http://www.participa.br/estrategia-brasileira-de-inteligencia-artificial/blog/apresentacao-e-instrucoes>.

⁷⁶ New York City Automated Decision Systems Task Force.

*Excerpt of the OECD Principles:

1.1 Inclusive growth, sustainable development and well-being

Stakeholders should proactively engage in responsible stewardship of trustworthy AI in pursuit of beneficial outcomes for people and the planet, such as augmenting human capabilities and enhancing creativity, advancing inclusion of underrepresented populations, reducing economic, social, gender and other inequalities, and protecting natural environments, thus invigorating inclusive growth, sustainable development and well-being.

1.2 Human-centered values and fairness

- a) AI actors should respect the rule of law, human rights and democratic values, throughout the AI system lifecycle. These include freedom, dignity and autonomy, privacy and data protection, non-discrimination and equality, diversity, fairness, social justice, and internationally recognized labor rights.
- b) To this end, AI actors should implement mechanisms and safeguards, such as capacity for human determination, that are appropriate to the context and consistent with the state of art.

1.3 Transparency and explainability

AI Actors should commit to transparency and responsible disclosure regarding AI systems. To this end, they should provide meaningful information, appropriate to the context, and consistent with the state of art:

- i. to foster a general understanding of AI systems,
- ii. to make stakeholders aware of their interactions with AI systems, including in the workplace,
- iii. to enable those affected by an AI system to understand the outcome, and,
- iv. to enable those adversely affected by an AI system to challenge its outcome based on plain and easy-to-understand information on the factors, and the logic that served as the basis for the prediction, recommendation or decision.

1.4 Robustness, security and safety

- a) AI systems should be robust, secure and safe throughout their entire lifecycle so that, in conditions of normal use, foreseeable use or misuse, or other adverse conditions, they function appropriately and do not pose unreasonable safety risk.
- b) To this end, AI actors should ensure traceability, including in relation to datasets, processes and decisions made during the AI system lifecycle, to enable analysis of the AI system's outcomes and responses to inquiry, appropriate to the context and consistent with the state of art.

	<p>c) AI actors should, based on their roles, the context, and their ability to act, apply a systematic risk management approach to each phase of the AI system lifecycle on a continuous basis to address risks related to AI systems, including privacy, digital security, safety and bias.</p> <p>1.5 Accountability AI actors should be accountable for the proper functioning of AI systems and for the respect of the above principles, based on their roles, the context, and consistent with the state of art.</p>
(f) Decision-making process	<ol style="list-style-type: none"> 1. To what extent, are the courts using the AI tools? What is the main objective of using them? Do the courts embed AI tools into the formal decision-making and execution process? 2. Can the courts use data effectively to support the goals of the AI tools work? 3. Are AI tools used on a day-to-day basis? 4. Have CNJ and the courts mapped where all potential AI opportunities lie? 5. Do the courts trust AI-generated insights?