TASK FORCE

FOR THE DEVELOPMENT
AND IMPLEMENTATION OF
ARTIFICIAL INTELLIGENCE
IN COLOMBIA

El futuro es de todos

Consejería Presidencial para asuntos económicos y transformación digital

TASK FORCE

FOR THE DEVELOPMENT
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IN COLOMBIA

INSTITUTIONAL RESPONSES FOR THE IMPLEMENTATION OF THE ARTIFICIAL INTELLIGENCE POLICY

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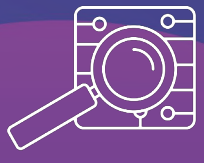
I
INTRODUCTION

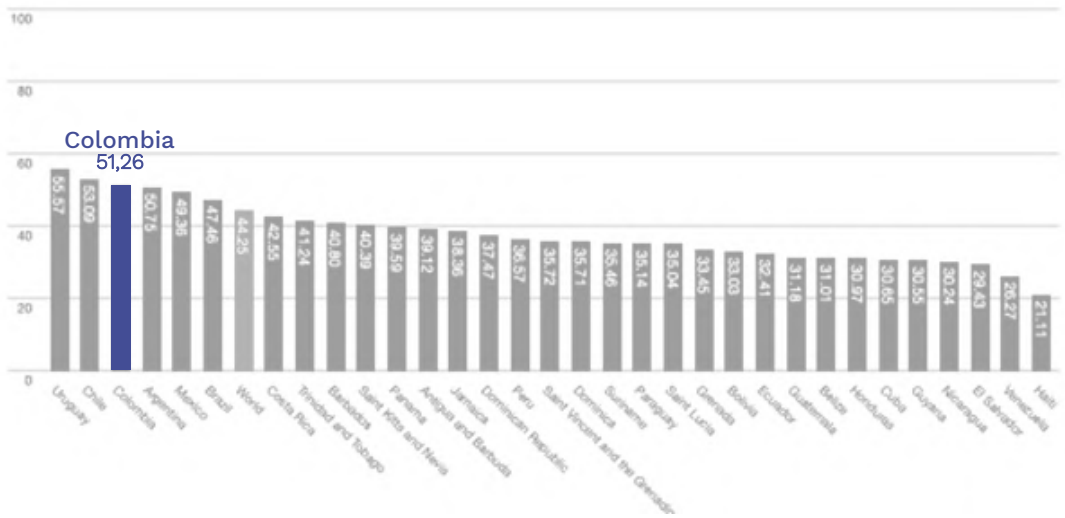


At the end of 2019, the Colombian government approved through the Conpes 3975 its National Policy for Digital Transformation and Artificial Intelligence. The main objective of this document is to promote the strategic use of digital technologies in the public and private sectors, especially emerging technologies. This is expected to boost productivity and promote citizens well being. This policy seeks to create international alliances for innovation, design and implementation of initiatives that promote entrepreneurship and digital transformation. Therefore, this public policy is one of the main advances in the implementation and deployment of technology in the country in recent years. It also shows that for the Colombian government the progress of artificial intelligence is essential to achieve the immersion of the country in the process of the fourth industrial revolution.

The impact of this policy, not only in the country but also in the region, has been demonstrated through different *rankings* and measurements specialized in this technology and carried out by international organizations. For example, the country was selected by the Canadian Government's ICDR and Oxford Insights as an *AI Rising Star,* or a *Rising* Star in Artificial Intelligence, recognizing Colombia as a leader in the region in matters such as national policies and initiatives that use this technology. This index also took into account factors that are directly related to AI and that can serve in the future as a platform to promote such technology, such as data policies and infrastructure development (Government AI Readiness Index, 2020).

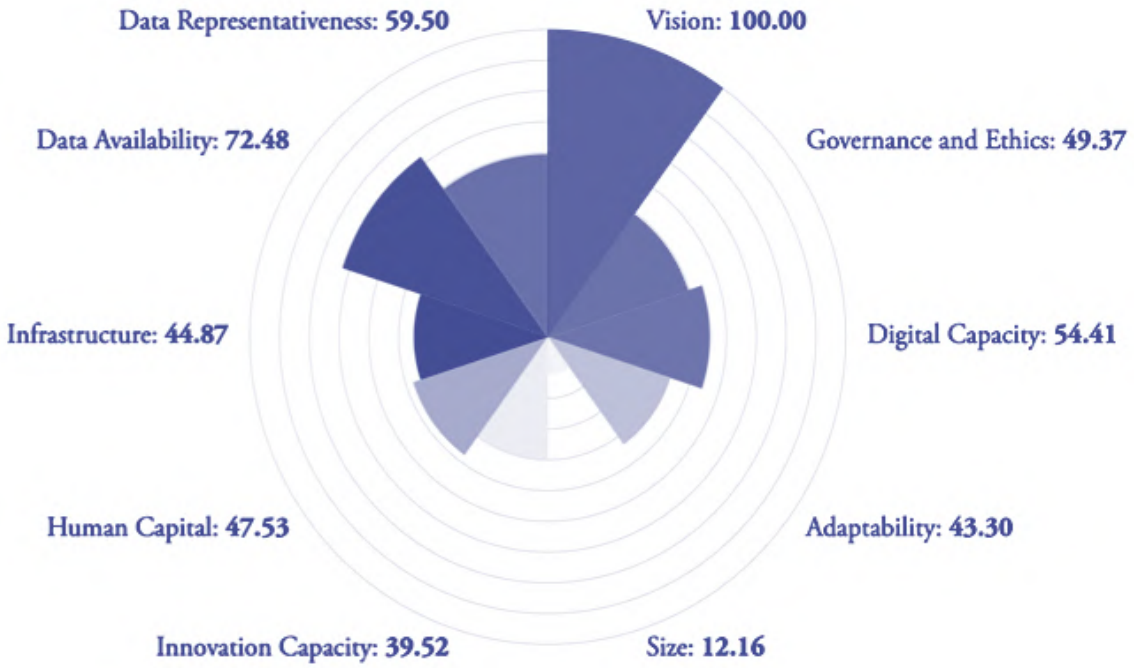
The following graph extracted from this study, shows Colombia as the third country in Latin America and the Caribbean, with a score of 51.26% and only behind Uruguay and Chile, as well as above the world average:

LATIN AMERICA AND THE CARIBBEAN



● Government AI Readiness Index, 2020 p. 34

Among the reasons why this index highlights Colombia, it is worth **mentioning the vision, an item in which the country is recognized as proactive and visionary on this issue.** The table below shows the scores awarded to the country according to this index:



● Government AI Readiness Index, 2020 p. 42

On the other hand, **the Inter-American Development Bank also recognized Colombia as a leader in the region in terms of progress in Artificial Intelligence.** The percentages of progress granted by this organization correspond to an AI advance of **89.1% in Government, 68% in Academia, 47.3% in Ecosystem of Entrepreneurship, and 75% in Civil Society.** According to this ranking, the only country that surpasses Colombia in AI progress in Government is Uruguay, which has 91.5%. (IDB, 2020)

The table below summarizes this overview in the region.

	Gobierno	Academia	Ecosistema emprendimiento	Sociedad civil
Argentina	77,5	52	52,4	75
Brasil	77,4	88	41,8	50
Chile	79,1	76	50,9	75
COLOMBIA	89,1	68	47,3	25
Costa Rica	65,1	75	n/d	100
Ecuador	61,4	60	n/d	75
México	76,4	64	52,1	25
Paraguay	61,8	46,4	n/d	50
Perú	62,6	46,4	45,4	50
República Dominicana	61,6	46,4	45,7	75
Trinidad y Tobago	38,5	60,3	n/d	75
Uruguay	91,5	60	47,2	100

● Inter-American Development Bank, 2020. pg. 21

In sum, the challenge that the country is currently facing in terms of AI is not the creation of an AI policy, but its adequate implementation and the materialization of its main commitments. That is to say, the challenge is not to generate more policies, but to evidence the deployment of AI in the country from the implementation of these instruments.

As such, this task force is part of an effort to turn AI governance in Colombia more dynamic. The main argument is that governments must assume a role in improving the market and must increase the capacities and competencies to implement public policies. Building public institutions that ensure accountability, transparency and predictability in policy creation and involving the private sector in political decision-making processes is key to successful policy implementation. In addition to the institutional systems that allow governments to commit to credible policies in advance, the quality and institutional design of public administration and the public-private interface are crucial ingredients of an effective governance structure (Ahrens, 2002).

As has been shown, the country has the necessary policies, which has been recognized by world experts in the field, but what is now expected from the country is its capacity to implement these measures and have the desired impact. Only this will make the commitments established by Colombia in this area credible and long lasting, which will generate incentives for investment, innovation and scientific work.

II

MAIN CHALLENGES FOR THE IMPLEMENTATION OF IA POLICIES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Academia and the international community have carried out different studies and diagnostics that identify challenges related to the implementation of policies on disruptive technologies, such as AI. It is worth highlighting the report published by the International Telecommunication Union with the support of the Berkman Klein Center in 2018 (ITU, 2018). According to this study, it is possible to identify the following difficulties, which are also present in the Colombian context:

1 Information asymmetries

Knowledge about AI is often in the hands of a few within the private sector, which generates knowledge gaps and information asymmetries, especially with the public sector. This represents a problem for those who create AI policies and regulations, since it is not easy to keep up to date with society's developments and their implications, or with the technical aspects of new technologies, which prevents a deep understanding of the range of possibilities brought about by this emerging technology.

In Colombia the lack of knowledge about technology is still evident. During the consultancy it was possible to identify that within the 186 transformational projects developed by the Colombian Government only 13 consist on the use of AI systems. The type of systems is still limited to *machine learning* systems, without officials being able to determine the usefulness of using other systems representing greater complexity. Likewise, it was possible to establish the low participation of public officials in training programs and the low diffusion of these programs.

Among the solutions that have been identified to overcome this point in the international context and that can be applied in Colombia there are:

- **Create opportunities and incentives for experts in the field to join the government.** For governments, it is often very difficult to compete with the benefits offered by the private sector for AI experts. However, there may be opportunities for short-term public sector jobs that appeal to social responsibility, but do not compete with the private sector. In this case, the existence of policies and institutional responses can demonstrate the seriousness of this type of program and the existence of a consolidated policy on the subject that is also attractive to these professionals. Thus, it is possible to count on the knowledge of these experts for different facets of AI policy implementation.

- **Reduce friction in expert participation.** The bureaucratic processes involved in working in the public sector are often alien to technical experts, and many of these systems are not effective when it comes to short-term job opportunities. Instead of asking AI experts to operate within complex bureaucratic structures, positions can be created outside the bureaucracy, such as Innovation Management and other roles. Thus, they can influence AI governance without having to learn to navigate government institutions or feel constrained by these dynamics.

- **Gain first-hand experience with AI technologies.** Through building AI technologies within the government, visiting AI laboratories and companies, both local and foreign, and testing products, regulators will learn how AI technologies are developed and used, and how they may evolve in the future. This point should be deepened with the realization of regulatory experimentation spaces such as regulatory AI *sandboxes,* which serve as spaces for constant interaction and learning, especially about much more complex and advanced AI systems.

2 . . . . . Unilateral action by the public sector is inadequate: building public-private partnerships

The technical development of AI technologies is largely under the control of the private sector, as well as most knowledge about AI. Even when information asymmetries can be overcome, the participation and support of the private sector is necessary, as it has been already pointed out.

This challenge can be met through different strategies:

- **It is key to develop a terminology shared by all actors.** One of the biggest challenges in describing AI difficulties and developing solutions is that actors do not have a common language. For example, words like "standards" and "experimentation" have very different meanings from science and from regulation. Language must be examined and appropriate in order for all stakeholders to be able to participate equally in discussions about challenges and solutions.

- **We must take advantage of the fact that Colombia is not the first country to face this challenge.** AI operates at different rates around the world and there are

governments that have already faced situations that locally may seem like science fiction. Therefore, it is possible to anticipate developments in AI by understanding what has been done in the public and private sectors in other leading countries. In this sense, the country should not only understand its position in the world in this matter, but also take advantage of it and obtain all the benefits that derive from it.

- **The best thing to do is to keep doors and minds open.** When it comes to AI, no one person understands all the problems, let alone all the solutions. Listening to multiple perspectives will expose policy makers to issues off their radar and to creative solutions they might not otherwise have attempted.

3 Reducing the digital gap

The digital gap is not a new concern for decision makers and AI has exacerbated these concerns, both in terms of impact and development. From an impact point of view, AI technologies often require a substantial digital infrastructure to operate. Thus, areas with more data and a more robust digital infrastructure will be the first to benefit from these technologies, while less connected communities will be left behind. From a development perspective, areas without strong technological capabilities may find it difficult to participate in the global governance dialogue and to compete with established market competitors from places like *Silicon Valley* and China.

Possible solutions to this problem include:

- **Not accepting the *status quo*.** IA technologies can offer enormous economic opportunities while reinforcing existing biases and power relations. However, in this period of technological disruption, regulators must not accept the *status quo*. They are in a privileged position to direct power and economic gains to a wider sector and this should be one of the main objectives of any institutional proposal on the subject.

- **Prioritize broad access to technologies.** AI exacerbates existing needs for computers, internet connectivity, and data. The approach to these needs must be inclusive. For example, the agricultural sector should be thought of as a space for innovation to facilitate connectivity in areas outside urban centers. Equity must be considered at every step: regulators can close the digital gap by prioritizing equitable access to a broad set of technologies with every policy decision.

- **Focus on entrepreneurship and innovation, not just AI.** AI alone is one tool of many that innovative companies will use to create the next generation of new industries and jobs. Factors such as intellectual property laws, educational opportunities, and broadband access among others affect innovation and entrepreneurship. The challenge for regulators is that some of these factors may not be in their jurisdiction and others may require significant financial investments, for which cooperation and partnerships are essential. In this sense, it is necessary to identify the broader picture and the true context surrounding this technology and the transformation phenomenon it can generate.

4
Develop a sustained competitive environment

It is necessary to create and maintain a competitive environment. Since AI depends on existing data, privacy and intellectual property regulations, as well as on legal interoperability across jurisdictions, it can have major impacts on the development of AI technologies. In addition, incumbent entities in the market with large amounts of data can leverage that data to create locks. The effect of this is that decision makers cannot support local entrepreneurial efforts in IA technologies, something that should be avoided through institutional responses.

The following solutions will help establish and maintain a competitive market:

- **Experiment with policies and support technical experimentation.** AI policy should be as experimental as the technology it seeks to regulate. It may be tempting to think that the options are binary: either you do not regulate, or you create full regulation today. However, spaces can be created to experiment with policy and regulatory approaches in an iterative manner, allowing the development of new AI technologies while advancing fundamental values such as safety, privacy, consumer protection and due process.

- **Favour principles over rules.** With the pace of technological development in AI, a rules- based approach to governance may become obsolete even before it goes into effect. Instead of rigid rules (e.g., vehicles must follow a minimum distance of 60 meters), flexible principles (e.g., vehicles must follow a safe distance), which are more resilient to technological changes, can be adapted without sacrificing policy objectives.

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- **Emphasize in sharing, collecting and measuring data.** Data is important for AI competitiveness for several reasons. First, it is an essential ingredient for processes such as *machine learning*, encouraging the collection of data and the sharing of high quality open databases can drive the creation of AI technologies. Second, data is important for AI competitiveness because creating effective governance approaches is difficult without an understanding of the problem, and it is difficult to define the problem without a basis for measurement and the ability to measure changes over time (ITU, 2018).

The analysis of these challenges allows us to see that the problems presented by the implementation of AI are not only solved by policy: they require institutional tools allowing overcoming them, and achieving the objectives proposed by the policies. To analyze this situation, it is necessary to start from a methodological and conceptual proposal.

III

CONCEPTUAL MODEL FOR THE DESIGN OF A TASK FORCE IN AI


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The institutional response cannot be traditional, but must be based on innovative elements and a new approach to generating public policy. As it has been pointed out, the policy and institutional response on AI must be as experimental as the technology it seeks to regulate. Usually, the need for institutionalization is considered, materializing in the simple creation of committees or administrative units in charge of the issue. However, it is necessary that these measures, which have traditionally been experimented with, are seen under a new conceptual framework that allows for the best use of the financial and human resources that the national government allocates to this task.

Therefore, the following conceptual model is proposed, which is based on the following criteria

1 • • • • • • • • • • • • • •
Creation of adaptive policies

According to Darren Swanson's *Creating Adaptive Policies: A Guide for Policy-Making in an Uncertain World,* adaptive policies are designed to work effectively under complex, dynamic, and uncertain conditions. They anticipate coming conditions through robust designs that use predictive and integrated analysis, multi-stakeholder deliberation, and monitoring of key performance indicators that trigger automatic policy adjustments. For this author, "not all situations can be anticipated. Unknowns will always be part of policy making. Adaptive policies allow for navigation to successful outcomes in situations that cannot be anticipated. This can be achieved by working in concert with certain characteristics of complex adaptive systems, including (1) enabling self-organization and social *networking* capacity of communities; (2) decentralizing governance to the lowest and most effective level of jurisdiction; (3) promoting variation in policy responses; and (4) formal policy review and continuous learning" (Swanson, 2009, p. 15).

These are valuable and relevant elements in the construction of the task force to be developed in Colombia. Therefore, it is expected that this group will have the possibility not only to design policies that have this vision but also within the national government entities that interact with the development of emerging technologies. It is clear that the fundamental element within this work is to privilege continuous access to knowledge and to recognize the changing character of technology, even of those systems that we consider to be fully known.

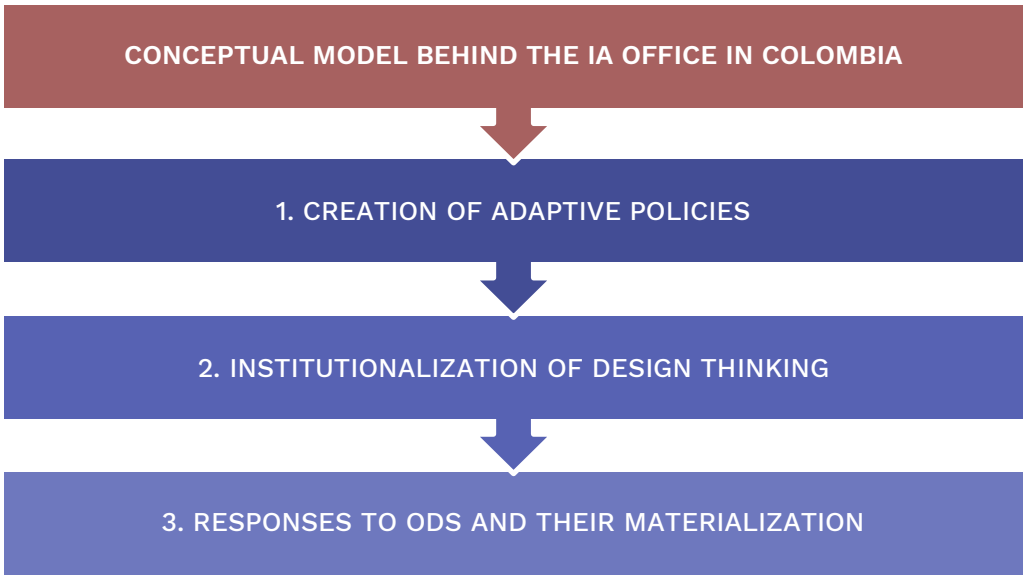
2 . . . . . .
Institutionalization of design thinking

For design thinking to be systematic within decision making, governments must address the following situations: Precise skills must be identified and integrated into the decision-making process, as well as fostered within the public administration. The government must have sufficient budget to institutionalize prototyping and creative experimentation. Space for creative thinking must be available and senior officials must be able to manage simultaneous (possibly divergent) political agendas and various (possibly resistant) bureaucratic cultures. Design thinking must be institutionalized in such a way that it meets other pressing imperatives for government action, such as the principles of legitimate expectations and legal certainty. Design thinking needs to fit with existing procedural requirements. Innovative solutions will face the challenge of overcoming public perceptions and beliefs, sometimes irrational or unconscious (UNDP, 2016).

3 . . . . . .
Respond to the Sustainable Development Goals (SDG)

The scope and ambition of the 2030 Agenda for the Sustainable Development Goals is unprecedented and will require collaboration, innovative systems and incentives to facilitate inter-sectorial action and shared responsibility across different ministries, agencies, levels of government and actors outside the government. A key challenge to the implementation of the 2030 Agenda is that SDG are interconnected (e.g., addressing poverty also requires addressing inequalities, empowering women, and sustainable environmental management). This requires strong interagency coordination. The traditionally isolated approach to development that many countries have opted for in the past has been counterproductive and neglects the comprehensive planning strategy needed to achieve sustainable development. Institutional coordination will require intersectorial synergy through coordinating ministries to ensure that a country's existing development strategies, plans and roadmaps are aligned with the ODS and to work towards coherence within different planning frameworks. In Colombia, an inter-ministerial commission was created and efforts in the SDG were aligned with the Presidential Office to ensure the highest level of commitment as a coordinating strategy to oversee the implementation of the SDG and break down isolation between sectors (UNDP, 2017).

However, these are two considerations that must be taken into account when evaluating the institutional models that are available and establishing how they can be adapted to such needs. Likewise, these innovative elements should not ignore the applicable regulatory and legislative framework and the need for prompt action, so they should conform to current legislation and not wait for legislative changes.



IV

INSTITUTIONAL MODELS TO BE CONSIDERED IN THE DESIGN OF TASK FORCE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Given the context and conceptual framework applicable to this project, it is necessary to identify the models used in other countries for this purpose and the elements that can be adapted in a country with the characteristics of Colombia. At this point it is worth noting that institutional responses are being developed in several countries in order to achieve adequate implementation of AI strategies. Several of these entities seek to facilitate the adoption of AI in the public sector, deepen compliance with ethical principles, or deepen innovation and scientific knowledge in the field.

1 Cases of institutional proposals in AI worldwide

International experiences show that several countries have already developed institutional proposals to achieve the adequate implementation of their AI policies and achieve the main objectives proposed in this area. For example, the United Kingdom has an Office for Artificial Intelligence, the United States has an Interagency Working Group for AI, Germany has developed an AI Observatory (2020) and the Canadian Institute for Advanced Research coordinates and follows up on the implementation of Canada's AI strategy (NITRD). Israel is in the process of developing its own team on these issues and in particular its AI research and development policy (OECD, 2020). Another example worth noting is the creation of a United Arab Emirates Ministry for Artificial Intelligence (World Leaders in AI by 2031, 2020).

This overview shows that Colombia is ahead of the region in generating this type of institutional proposals and is even developing projects such as those that are currently taking place in leading countries in global technological innovation such as Israel. The Israeli Government reported to the Observatory of *AI* Public Policies of the OECD its *AI Strategy Governmental Team,* indicating that it is in the process of consultation and construction. Therefore, through this consultancy Colombia can make the same report establishing the construction of its own office in the matter. This demonstrates the clear leadership of the country in the matter and the desire to establish itself at the same level of leading countries in the field.

Thus, the following table presents six of the main projects in this area worldwide that are in a greater state of maturity, design and development and that can be considered by the Colombian Government:

Country	Institutional Tool Implemented
GERMANY 	**Observatory for Artificial Intelligence:**

The Observatory for Artificial Intelligence (or AI Observatory) is part of the Federal Ministry of Labor and Social Affairs and analyzes the question of what are the effects of AI on work and society.

The Observatory acts as the intersection between policy makers, science, the private sector and society and functions as a catalyst and knowledge broker. It aims to anticipate the effects of AI on the world of work and to identify where there is a need for action. The work unit was inaugurated in March 2020 and contributes to the realization of the goals established in the Federal Government's AI strategy; these include making the use of AI safe and beneficial for the common good.

With the help of formats that facilitate dialogue and participation, the Observatory also seeks to empower and encourage different social actors in approaching AI. The Observatory's major objectives, related to the central themes for the Federal Government, are reflected concretely in its five areas of action:

- **Technology forecasting and technology impact assessment**

  How does AI affect jobs, the workforce and society? How is our interaction with AI designed into operational practice? This area is mainly in charge of the analysis of macroeconomic developments and examines their impact on work and society. It is especially concerned with the situation of employees in companies, which is analyzed in conjunction with social entities and international organizations such as the OECD and ILO. This area of action will include the development of new criteria for the evaluation and implementation of the Federal Government's AI strategy.

- **AI in labor and social administration**

  How can AI improve administrative processes for the public? On what criteria is the selection of AI applications based and how do we use them? What requirements must be met in terms of quality, comprehensibility and fairness? This area seeks to address those questions. To achieve this, best practice examples are identified and potential applications are developed, both nationally and internationally.

Country	Institutional Tool Implemented
ALEMANIA 	• **Framework for AI/Framework for the design of socially minded technologies** One of the goals of the AI strategy is this technology to be transparent, consistent and secure. The framework seeks to formulate the criteria and mechanisms by which these requirements can be implemented at work and in society. The IA White Paper process will also discuss a future framework for addressing IA at the European level, in which the IA Observatory will participate. In the area of socially minded technological design it addresses the question of how humanity and machines will work together in the future and what principles we should apply when designing socio-technical systems. People and AI systems are going to interact in the future, especially in production and service, but also in the social context. This profoundly changes the relationship between people and machines and creates new socio-technical systems. This situation highlights the need to question existing principles and rules and to create new ones if required. • **Development of international and European structures** What European and international rules and institutions are needed for interaction with AI? The area of developing international action and European structures will embed Germany's work in international contexts and structures, from the OECD, to the ILO, to the EU. Part of this process will be to establish international monitoring structures for the use of AI, which will also serve the development of international quality standards. In addition to the EU member states, key countries for these discussions are the United States, Canada - following the transatlantic dialogue of the Policy Lab - and Japan. • **Social dialogue and interconnectivity** How are stakeholders allowed to participate in the debate around AI policy and how can they be involved? How is it possible for all of society to use AI? Through the Social Action Dialogue and Interconnectivity area, the widest possible circle of population groups can be integrated into the work of the IA Observatory to keep it up to date on current developments in IA issues and, for example, to provide information on issues such as education and participation (Navigation and Service, 2020).

Country	Institutional Tool Implemented
UNITED KINGDOM 	**Office for Artificial Intelligence:** It is a joint unit between the BEIS-DCMS responsible for overseeing the implementation of the AI Challenge and Big Data. Its mission is to drive the responsible and innovative implementation of AI technologies for the benefit of the entire United Kingdom. **The AI Office achieves this by collaborating with organizations, fostering growth, and providing recommendations on data, skills, and technology adoption in the public and private sectors. This includes** • **Society:** making sure that AI works for people; ethics, governance and the future of work. • **Demand and implementation:** support of adoption in all sectors, including through 'Missions'. • **Basics:** ensuring the best environments for building and deploying AI; skills, data, investment and leadership. (Office for Artificial Intelligence: IAB UK).
UNITED ARAB EMIRATES 	**Ministry of Artificial Intelligence (The National AI Strategy 2031):** The development of a roadmap for the UAE's role required contextualization of the global debates about the challenges and opportunities of AI. The UAE seeks to become a rapid adopter of AI technologies in government, as well as to attract the best AI talent to experiment with new technologies and work in a sophisticated and secure ecosystem to solve complex problems. Therefore, in the year 2019 it developed the first Ministry of Government in AI. Based on being a leader in generating talent, as well as improving AI governance, this country seeks to create the conditions conducive to the development of new AI solutions over the course of this decade and beyond. These innovative technologies have great economic potential, including through licensing and exports. The UAE's vision is to become a

Country	Institutional Tool Implemented

EMIRATOS ÁRABES UNIDOS

world leader in AI by 2031, creating new economic and social opportunities for citizens, governments and businesses and generating extra growth of around 335 billion EDA. At the annual Summit of World Governments in February 2018, the UAE announced the key elements of its strategy: to be a welcoming destination for the development of AI products, new education programs and advocacy for good governance.

Developing a fertile ecosystem for AI in the UAE:

For the Ministry this starts with improved access to local data infrastructure and funding for projects that make better use of it, leading to opportunities for new businesses. Governments can play an important coordinating role by providing access to networks; data and funding that can help overcome barriers. A combination of funding, knowledge and strategic support will be needed for the development of a domestic AI ecosystem.

(World Leaders in AI by 2031, 2020)

CHINA

AI Plan Promotion Office:

Organization and Leadership: As deployed by the Central Government and State Council and coordinated by the *Steering Group for National Science and Technology System Reform and Innovation System Building,* the Office reviews and makes decisions on major tasks, policies, issues, and work arrangements; promotes laws and regulations related to AI; guides, coordinates, and monitors related departments to make coherent plans.

Supported by the Joint Inter-Ministerial Conference on the National Science and Technology Management Program, the Ministry of Science and Technology and related departments will carry out the largest science and technology programs on next-generation AI, improve their linkage to other plans and objectives, and organize the Office of AI Planning and Promotion in the Ministry of Science and Technology to facilitate implementation, will set up an IA Strategy Advisory Committee to study strategic and prospective issues and evaluate major policies on IA, facilitate the construction of think tanks for IA, support various think tanks studying major issues of IA and provide strong intellectual support for the development of IA (MOST, 2017).

Country	Institutional Tool Implemented
UNITED STATES 	**White House Office of Science and Technology Policy (OSTP)-Artificial Intelligence Interagency Working Group (AI IWG):** The White House Office of Science and Technology Policy and the National Science and Technology Council (NSTC) are responsible for interagency coordination and the development of technical reports, strategy documents, and policy briefs on various science and technology topics of importance to the nation. On February 11, 2019, President Trump signed Executive Order 13859 announcing the American IA Initiative -- the U.S. national strategy on artificial intelligence. This strategy is a concerted effort to promote and protect AI technology and innovation in the country. The Initiative implements a government-wide strategy of collaboration with the private sector, academia, the public, and like-minded international partners. It directs the Federal Government toward **five pillars to advance AI:** 1. **Investing in AI research and development** 2. **Unleashing AI Resources** 3. **Removing barriers to AI innovation** 4. **Training the workforce in AI** 5. **Promote an international environment that supports U.S. AI innovation and its responsible use** The U.S. also encourages AI to help make the federal government's work more sensible in its own services and missions in reliable ways. The Interagency Working Group for Artificial Intelligence (AI IWG) was formed in 2018 to coordinate AI Research and Development at the federal level with 32 participating agencies to support activities mandated by the NSTC's AI Select Committee as the Machine Learning and AI (MLAI) Subcommittee. Guided by eight strategic priorities of the National IA Research and Development Plan: 2019 Update, the IWG collects information from IA experts to ensure that government investment in IA Research and Development results in opportunities and promotes U.S. leadership and global competitiveness (NITRD).

Country	Institutional Tool Implemented
CANADA 	**Canadian Institute for Advanced Research CIFAR**

The Canadian Institute for Research (CIFAR) has the AI Chairs Program, which is an important part of the country's AI strategy. A total of $86.5 million over five years has been allocated to this program to attract and retain world-leading AI researchers to Canada. The team members announced to date are conducting research in a variety of fields, from *machine learning for* health, autonomous vehicles, artificial neutral networks, climate change and more.

A key component of the Pan-Canadian AI Strategy is the National Program of Activities, which consists of a series of workshops, training programs, conferences and other events that bring AI researchers from across Canada together to foster collaboration, increase the number of highly competent AI graduates and advance AI research and innovation.

National AI4Good Training Program

CIFAR is working with researchers and organizations across the country to support training programs for the next generation of AI researchers at both the undergraduate and graduate levels, with a special focus on programs that advance AI equity, diversity and inclusion and generate positive social impact.

AI4Health Task Force

Led by CIFAR this task force proposes a strategy that allows Canada to take advantage of the highest AI research for health.

CIFAR AI Catalyst Grant Program

In February 2020, CIFAR issued a call for interdisciplinary research collaborations to encourage innovative and high risk/high reward ideas and projects to work with Canada CIFAR AI Chairs.

Country	Institutional Tool Implemented
CANADÁ 	**AICan Symposium** The third annual meeting of the Pan-Canadian AI strategy will be held in January 2021 and will highlight new developments in *machine learning* research by world leaders in the field. **CIFAR IA & Society Program** This program brings together experts from all sectors, from industry and government, to law and ethics, to generate in-depth discussions on some of the most important and urgent challenges that IA brings to society. These include the implications it may have on medicine, democracy, climate change, children and other vulnerable populations, and many more. AI Policy Initiatives; CIFAR collaborates on a variety of national and international AI policy initiatives towards the responsible, ethical and economic use of AI. (Pan-Canadian Artificial Intelligence Strategy)

As can be seen, the institutional possibilities are multiple and highly dependent on the needs and objectives of each country. Thus, it is possible to find figures from working groups, government coordination offices or even ministries specialized in the subject. In any case, some objectives and common points can be identified that should be considered by the Colombian government in the design of its own task force:

1. **The institutional figures identified and analyzed serve for the implementation of a plan or policy already consolidated.** Therefore, they follow the public policy objectives already defined. Colombia has already surpassed this aspect with the construction of the Conpes 3975 document of 2019 and the advances it has made in its implementation.

2. **All these entities seek to facilitate the use of AI in the public sector.** In order to achieve this goal, they generate different tools, trying to solve the problems that can be found in this purpose. As will be seen later, the country has made important efforts in this area by identifying transformational projects that use technology from the Presidential Advisory Office on Economic Affairs and Digital Transformation.

3. **Several of these entities seek to address ethical issues around the design, use and implementation of this emerging technology.** This has been done through the generation and promotion of mechanisms to adopt ethical principles in the matter. Colombia is making great progress in this area with the creation of an ethical framework for AI, the final product of which should be a priority for this office.

4. **The entities seek to resolve and address regulatory issues directly related to AI and its deployment within society.** In this sense, they generate essential inputs to address the current regulation that impacts this technology and the one that may occur in the future.

5. **One of the main objectives of these entities is the generation of scientific knowledge and the deepening of programs in science and development of knowledge in the field.** Likewise, they seek to deepen the development of infrastructure, especially access to data and the generation of this infrastructure.

6. **Several of these entities seek to prioritize and generate efficiencies in the use of resources and the investments that have been made in this area, especially through national AI strategies.** In this way, rather than being an entity in charge of allocating resources, it monitors the use of these resources and the way in which the entities manage and prioritize them.

7. **All these institutional proposals seek to facilitate the coordination of different entities in the field and to speed up a coordinated response to the different challenges presented by AI.** In this sense, the country has already generated progress with the creation of a figure from the Presidency of the Republic as the Presidential Advisory for Economic Affairs and Digital Transformation. This entity has already been coordinating many of these efforts, which shows the importance of considering that this office works from this entity and that the coordination and rapid action that has already been achieved is not wasted. This topic will be developed later in this document.

8. **Finally, many of these entities facilitate international cooperation and coordination of international efforts in the field.** This office allows the relationship with their peers or similar entities in other countries. In addition, it allows for the definition of interlocutors on the subject who can be easily contacted by international actors interested in investing and collaborating in the country.

2 • • • • • • • • • • • • •
Institutional figures to be considered in Colombia

Next, a series of institutional figures will be analyzed, many of which have already been used in Colombia and which can meet the needs already described towards the creation of a specific task force for the policy and use of Artificial Intelligence in Colombia:

Generation of intersectoral committees or commissions

This type of proposal seeks the convergence of diverse actors that build the technological and innovation ecosystem, such as the private, public and academic sectors, among others. In this case, the aim is to generate room for these actors to share experiences and concerns and to generate synergies. One of the countries that owes the success of its innovation policy to this model is Sweden. For several Swedish academics and experts, the success of the country and its industry consists largely on the model known as the triple helix.

The Swedish system works as follows: innovative processes are encouraged within areas of limited expertise (nations, regions, districts) with the existence of institutionalized collaborative networks between academic research and universities, private industry and venture capital, and government organizations. These networks are the cornerstones of the 'system' and are sometimes known as 'triple helix models', in which the product (research) of the 'entrepreneurial university' is transformed into an industrial output (products and services) by entrepreneurial actors (equally entrepreneurs). The spatial dimensions are not only important to identify the locus, but also emphasize that the different geographical 'systems' operate in an economically global and competitive world (Hall & Löfgren, 2016).

Colombia has already seen this type of model, an example of which is the Comité Universidad Empresa Estado (University Company State Committee) that has been created in Antioquia (CUEE). The CUEE was created in 2003 "in the framework of the Technological Management Program of the Vice-Rectory's Office of Extension of the University of Antioquia, as an initiative led by the Superior Council of the Institution, which at that time considered it strategic to seek alternatives to solidify relations with the social and productive sectors of the region, under the conviction that by this way, the University would not only feed back its knowledge and research practices, but also could project itself directly in society, by linking its tasks with the demands of the socioeconomic environment" (CUEE Antioquia, 2020). Thanks to the success of the CUEE, whose creation was made possible by the support of business leaders Manuel Santiago Mejía and Luis Carlos Uribe, CUEE 2.0 has been created. This new version of the Comité Universidad

Empresa Estado is characterized "for working under the foundations generated by credibility, trust and articulation. Through three worktables, CUEE 2.0 seeks to generate socioeconomic growth in Antioquia based on Science, Technology, and Innovation: Human Talent Table, Financing Table and Platform Table. The Committee is possible thanks to its directive members, "in charge of following up, presenting advances, giving strategic guidelines and work routes, around the superior purpose, to generate a socio-economic growth of the region based on Science, Technology and Innovation" (CUEE Antioquia, 2020).

However, the benefits of such a committee are varied and attractive. The coordination that is achieved and the way it impacts different sectors, beyond the government, are effects that are attractive. However, there are limitations in this model and they are evident with the adoption for a committee of these characteristics for Artificial Intelligence, such as the following:

- **Decision-making capacity:** the committees do not have much decision-making capacity in the end, just as they seek to play a more supervisory role and evaluate the efforts made by different entities. Decision-making may be limited and may not be agile, which has been seen as necessary to meet the challenges of changing technology. This is why this type of response answers more to large, long-term objectives, such as the generation of an innovative ecosystem or the creation of a science and knowledge policy, among other major goals.

- **Management:** together with the above, a committee is not necessarily a management body, but is seen as a body that seeks to bring together different considerations and perspectives.

- **Accelerating results:** these types of bodies lack the elements to accelerate policy implementation and respond mostly to long-term objectives.

Execution Units :

Another model that may be attractive, especially for the fulfillment of Public Policy objectives, is the creation of an Execution Unit for Artificial Intelligence. An execution unit has been defined as a small group of highly qualified individuals who work at the center of government to help line ministries achieve results in various initiatives that the leadership team considers to be "mission critical" or a high priority (Kohli & Moody, 2016). They may operate at the department, local, or national level and address a range of issues, including major capital projects, election promises, citizen concerns, and classic objectives such as improving education result.

The main examples of these units have been in the United Kingdom and Malaysia. The one in the latter country has been called PEMANDU and is interesting given the effort to achieve an economic transformation and prioritizes the use of new technologies. The Performance Management and Execution Unit in Malaysia (PEMANDU) was established in September 2009 with Idris Jala as its chief executive. PEMANDU, whose acronym also means "guide" in the local language, is formed in the belief that the methods and approaches used in the private sector can be successfully applied to the public sector. For certain areas of the PWG and ETP, PEMANDU designs and conducts detailed pilot projects to arrive at an appropriate method or to identify the KPIs associated with the programs. It also monitors the progress of all programs related to the PWG and ETP (Malaysia's Performance Management And Delivery Unit).

The public impact that PEMANDU has achieved since 2009 has been significant:

- It supported law enforcement in achieving a 35 percent drop in reported street crime in one year.
- According to Transparency International's 2010 Global Corruption Barometer survey, 48 percent of Malaysian citizens felt that the government's efforts to fight corruption were effective, a significant increase from 28 percent in 2009.
- In rural areas, approximately two million people benefited from projects that provide clean consumable water, extended electricity service, constructed roads and restored housing, as well as access to technology (Malaysia's Performance Management And Delivery Unit).

In the Colombian context, this model is not entirely unknown, since the government has established its own compliance unit through the Presidential Advisory for Management and Compliance. The functions of the Presidential Counselor's Office for Management and Compliance are to advise the President of the Republic and the Director of the Administrative Department of the Presidency of the Republic, in the implementation of government policies and strategies in charge of ministries, administrative departments and other entities; to advise and support government entities for the effective execution of policies and strategies that are a priority of the President of the Republic.

Leaving the monitoring of the artificial intelligence policy in the hands of the Presidential Advisory for Management and Compliance could bring different advantages, given the mechanisms that the entity has already generated for the monitoring of this type of task. However, the technical knowledge of the subject, the path in the construction of the policy and the monitoring of the artificial intelligence issue has been part of the work of

the Presidential Advisory Office for Economic Affairs and Digital Transformation. Therefore, to leave this task in the hands of that entity would be to ignore years of learning and work that, as was already evident, have allowed the country to position itself on the subject.

Nevertheless, from this analysis an important conclusion emerges from this consultancy: the office that is designed in the subject of artificial intelligence must be established in the Presidency of the Republic. There are specifically four elements that justify this:

- **As artificial intelligence is a crosscutting and highly disruptive technology, it requires a coordinated response from different entities.** It is clear that such coordination within the Colombian State can only be achieved from the Presidency of the Republic. We have already seen the institutional response in other countries that prioritizes such coordination among different entities.

- **The knowledge and leadership on the subject of public policy in artificial intelligence is high compared to the rest of the Colombian State entities.** This is recognized not only in its leadership in the design of public policy on this technology, but also in the recognition it has obtained internationally and by the private sector. Likewise, there are several public sector entities that have decided to go to the Ministry to develop projects in this area.

- **Within the Presidency of the Republic there is already an execution unit from which important elements can be obtained for the follow-up of the commitments in this area.** Furthermore, the existence of this unit within the Presidency already demonstrates the need for an enforcement office of this kind not to be established in a ministry or a new entity. This has happened in different countries, given the hierarchical order of the States in which the head of the executive branch is the one empowered to achieve this type of follow-up effectively.

- **The Presidency of the Republic has the possibility to generate guidelines and directives for the implementation of technology in the sector and to identify actors who are developing it.** Its coordination work facilitates that these guides can come to standardize and provide clear and unified guidelines for the use of technology in the public sector, generating even greater attraction to investment in technology.

The above has been highlighted by international entities that are experts in the field. The OECD has already pointed out on several occasions the importance of a coordinating body for public policy on digital transformation and emerging technologies: "Sound governance would be a key requirement for a mature digital government. Organizations responsible for digital government must be integrated into appropriate institutional models to ensure the leadership, coordination, resources and legitimacy needed to transform high-level policies into coherent digital public services". (OECD, 2020, p.4).

In addition to this, there is also what has been done in other countries with ambitious digital transformation agendas, such as Germany. The German Digital Council proposed to the German government to improve coordination, for which it proposed an innovative approach in which the entity in charge of leading this agenda was the Federal Ministry of the Interior, an entity that had not traditionally been considered in this type of task. At this point, it is considered that the crosscutting focus of the policies and given the involvement that should exist among multiple agencies and federal ministries justified it (Digital Government Factsheets, 2019).

Government entities specialized in AI (Ministry, Administrative Unit, etc.)

Given the international experience and specifically considering the example of the United Arab Emirates, it would be possible to consider the creation of an entity with the characteristics of a Ministry of AI. In the case of UAE, the ambitiousness of its AI agenda and the existence of resources make this model possible.

However, in Colombia this model may not be the most profitable at this time and considering the need to achieve coordinated changes between different ministries and entities. The creation of a new Ministry does not seem to ensure this type of result and this joint work in a rapid manner. Likewise, the budgetary burden that this project would mean in the current context does not seem to be justified. It is clear that this type of institutional project may be required, especially when the issue requires significant management and adoption, considering that it becomes an issue of essential access for all Colombians.

However, it is not surprising that every time more proposals emerge as was the case in Germany, where no specific Ministry of IA has been generated but a State Ministry for the digitalization of the Chancellery. This Ministry, created in 2018, is already beginning to fulfill

several of these functions around artificial intelligence (DW, 2018). It is possible that once the use and adoption of AI increases within a society, this type of proposals will emerge with greater emphasis. All these models allow affirming that the institutionalization and the creation of entities within the public sector in charge of a matter such as artificial intelligence are something to which countries will increasingly adapt.

However, this does not seem to be the moment that Colombia is currently experiencing. Likewise, the efforts such as those of a specialized office within an existing government entity are already significant. This office or group can obtain the knowledge and experience to achieve a state of maturity in the future that will allow it to develop and justify such a response. In that scenario, the costs of creating a Ministry type entity would be lower since the specific purposes and goals of such an entity are already understood. For the time being, it is necessary to start with an institutional proposal that responds to current needs.

Therefore, it is especially valuable that a country like Colombia is contemplating the creation of an office or task force especially dedicated to artificial intelligence. This will allow the entity to obtain a high level of knowledge on the subject and to be a pioneer in exploring this type of institutional framework that will provide it with relevant experience in the region and in the world. As can be seen, this group may be just the beginning of a series of changes that technology may bring to the institutional structure of the Colombian State, as is already happening in other countries.

In addition, it is important to emphasize that the models described above are not exclusive, but that the institutional proposal is necessary since it allows for the generation of state policies, the coordination of different actors and is not limited to being an actor that only follows the implementation of the policy. Likewise, it is required that the entity where this group is developed has a high level of knowledge on the subject, leadership, coordination and convening capacity. Therefore, the need for the institutional response to be created is identified, as being within the Presidency of the Republic and more specifically, that it is related to and working constantly with the Presidential Advisory for Economic Affairs and Digital Transformation.

V

A TASK FORCE WITHIN THE PRESIDENCY OF THE REPUBLIC OF COLOMBIA- GOVERNANCE

1 Proposal according to the legal and valid institutional framework

As we have seen, the objective at this point is to identify how an AI *task force* would operate and be created within the Presidency of the Republic and more specifically in the Presidential Advisory for Economic Affairs and Digital Transformation. From the research carried out within this consultancy, an identification of the institutional framework that exists in the Presidency of the Republic and the rules that delimit it was made.

In this way, and based on the analysis of this research, it was possible to establish that the figure that best adapts to all the needs already indicated and to what should be the main objectives of this institutional response is an Internal Working Group.

The Working Groups were already defined within Law 489 of 1998 which established in its article 115 that:

> ***In order to meet the needs of the service and effectively and efficiently fulfill the objectives, policies and programs of the agency or entity, its legal representative may create and organize, on a permanent or transitory basis, internal working groups.***
>
> ***In the act of creation of such groups, the tasks to be carried out and the consequent responsibilities and other rules necessary for their functioning shall be determined".***

The Internal Working Groups have been developed in recent years in order to generate input and coordination in the achievement of specialized tasks and that for technical reasons require a group of people specifically dedicated to fulfilling the tasks entrusted to them. Within the Presidency of the Republic these groups depend hierarchically on different instances, among them the Presidential Advisories.

This has even been defined by the Administrative Department of the Presidency of the Republic in its own concepts on the subject

> ***The internal working groups, proceed by resolution of the head of the respective agency, and its justification is based on technical reasons, since the existence of the groups originates in the need to supply within the organization of the entities intermediate levels that facilitate the provision of service and meet efficiently and effectively the objectives, policies and programs, in flat and flexible structures to which global plants correspond; and in the act of creation of such groups, the functions and tasks that they must fulfill and the consequent responsibilities will be determined, subject to the functions of the job according to the level to which it belongs, as well as the other norms necessary for its operation" (Presidency of the Republic, 2019).***

Currently, the Presidency of the Republic may establish this type of Working Groups through a Resolution, in accordance with the legal powers granted by Law 489 of 1998, Decree 179 of 2019 and Resolution 0093 of 2019.

One of the main requirements to be considered is the requirement of staff for personnel working within this type of group. Decree 2489 of 2006, indicated that the agencies and entities to which this decree applies create internal work groups, the integration of these may not be less than four (4) employees, intended to fulfill the functions determined by the act of creation, which will be related to the area on which they depend hierarchically.

Therefore, the need to generate a working group should be considered through a resolution will involve the clear definition of functions and the need to have the minimum necessary staff for that purpose. What is interesting and relevant about this model is that it uses the already existing normative measures and uses a figure that has been arranged to generate technical equipment such as the one being sized. Therefore, the main challenge is to obtain the required equipment and generate the indicated resolution. In no case is it necessary a high normative production or the generation of a law or decree for this purpose. Likewise, this effort does not imply a significant change in the current organization of the Administrative Department of the Presidency of the Republic, but rather an addition to the work of the Presidential Advisory on Economic Affairs and Digital Transformation.

That is why this institutional figure makes it possible for this model to begin operating in a short time, generating time and cost efficiencies and in coordination and under the leadership of the Ministry that has led the main efforts on AI policy and deployment in the country.

2 Functions

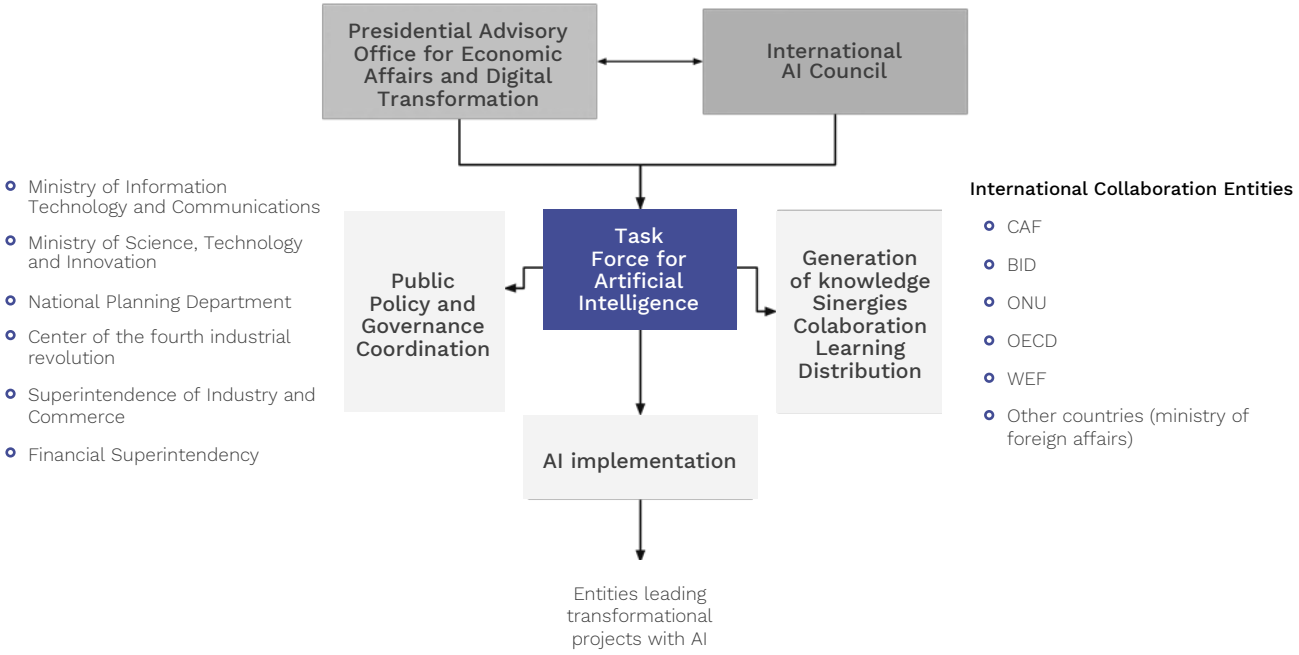
Based on the public policy objectives that have been established for AI in Colombia and the various initiatives that have been developed in this area, the Internal Working Group on Artificial Intelligence must fulfill the following technical and coordination tasks

- **Generate** mechanisms to accelerate the implementation of the AI public policy and follow up on the actions carried out by different entities of the national government in this area.
- **Establish** plans to accelerate the construction of a data infrastructure that facilitates the design, development and implementation of AI, as well as all the infrastructure required for this purpose.
- **To propose** public policies, strategies and actions that allow the design, implementation and deployment of AI in Colombia.
- **Coordinate** programs for the preparation and training of the public sector in AI and officials working in public entities.
- **Propose** technical guidelines and evidence for the development of regulatory proposals in the field and analysis of the current regulation that impacts the design and development of AI.
- **Establish** mechanisms and procedures for the implementation of AI in national government entities.
- **Establish** programs and tools for the adoption of ethical principles of AI that are promoted by the national government.
- **Coordinate** the work of national entities that develop AI plans and programs, generating a specific governance model in this area.
- **Manage** the monitoring tools for transformational projects of national government entities that use AI systems.
- **Establish** guidelines and guides to define policies and plans for investment in development research in science and knowledge related to AI.
- **To propose** mechanisms of collaboration and association with private entities for the implementation and development of AI in Colombia.
- **Assist** the Presidential Advisory for Economic Affairs and Digital Transformation in the relationship with international entities expert in the field and the work plan of the International AI Council.

- **To promote** cooperation agreements with multilateral organizations, with other countries, international technical assistance agencies, universities and other entities that contribute to the development and strengthening of the Group and its functions.
- **Elaborate** studies, research, inducers and other instruments on the development of AI in Colombia.
- **Development** of tools to establish the maturity of AI projects in national government entities and to define the corresponding impact metrics for their analysis.
- The others assigned by the Presidential Advisory for Economic Affairs and Digital Transformation, according to the nature of the group and its characteristics.

The objective is that these functions be considered in the design and development of this Internal Working Group. These functions not only comply with the practices that have been seen at an international level in groups or offices with similar characteristics, but also allow it to be a true technical support to the tasks that the Presidential Advisory Office on Economic Affairs and Digital Transformation already carries out in this area.

3 Governance of AI relationships with other entities



Within this model of governance and coordinated relationship, the Task Force seeks to recognize the leadership and oversight exercised over this team by the Presidential Advisory Office for Economic Affairs and Digital Transformation and the International AI Council that is being developed within the Presidency of the Republic in compliance with Conpes 3975 of 2019. At this point the Working Group will have to be making reports on the progress of its main functions and the impact obtained. It is possible that at some point its relationship with the International Council will be mediated through the Presidential Council or it could be direct. Therefore, mechanisms should also be generated to report to both instances, which will be developed later in this document.

Given the diagnosis that has been made on the governance of public policy in AI and the work done with entities such as the Presidential Advisory Office for Economic Affairs and Digital Transformation, it has also been established that the following entities are the ones with which the President's AI Working Group will have to relate Ministerio de Tecnologías de Información y las Comunicaciones

- **Ministry of Information Technology and Communications**
- **Ministry of Science**
- **National Planning Department**
- **Ministry of Education**
- **Center of the Fourth Industrial Revolution**
- **Superintendence of Industry and Commerce**
- **Financial Superintendence**
- **Entities leading transformational projects with AI**

As noted, the purpose is for this relationship to determine and energize the governance of AI in Colombia. One of the main purposes is for this group to support the coordination work that the Presidential Advisory Office for Economic Affairs and Digital Transformation already carries out on public policy issues regarding this emerging technology. Likewise, it will constantly interact with these entities that may be involved in regulatory tasks that may impact this technology and for which constant coordination is expected.

In the international arena, the Group will have to interact with the following entities, given their relevance to AI issues and the involvement they have had in this matter in the country. The task force should become a *Key Contact* for these entities in terms of AI in Colombia.

The main objectives of this relationship are to obtain dissemination of AI projects, obtain technical cooperation and achieve exchange of knowledge and experiences:

- **Andean Development Corporation:** CAF's technical support has been essential to the development of AI policy in Colombia. Among other initiatives, the preparation of the ethical framework for AI and the conceptual model for sandboxes have given important dynamism to the subject (Andean Development Corporation 2020).

- **Inter-American Development Bank:** through fAIirLAC this organization has been contributing to AI projects and their responsible and social use in the region. In Colombia, the impact of this initiative is considerable and it continues to deepen in different projects. Therefore, greater involvement with this entity and the initiatives it has been developing is necessary (fAIrLAC, 2020).

- **United Nations:** this international organization has been developing important efforts in this area and wishes to generate scenarios of participation and international consensus in which Colombia should actively participate through this type of initiative. In this sense, the initiative for Digital Cooperation stands out. (Report of the Secretary General of the United Nations, 2020).

- **UNESCO:** this entity has been leading what can be considered as the main proposal of AI ethics given its global implications. The recommendations proposed by the entity may have a deep impact on the deployment of this technology, which makes it necessary to follow up and have a constant relationship with this entity, more so from a *task force* exclusively dedicated to AI (UNESCO, 2019).

- **World Economic Forum:** the collaboration and joint work with this international entity is constant and there are several points where it can be deepened. The entity has believed in the commitments made by the Colombian Government and has supported and proposed initiatives whose results are essential for the future of this emerging technology (World Economic Forum, 2018).

- **OECD:** The access to knowledge and good practices in AI issues that this organization has generated in the country is substantial for an AI team within the Presidency of the Republic. In addition, this year the Observatory of Public Policy on AI was launched, which has all the characteristics to become the main center for the analysis of public

policy in this area in the world. Therefore, it is essential that this team deepens its relationship with the entity and with the Observatory, knows how the reports to this entity are made and the results of the recommendations of the expert groups that have been generated within this observatory (OECD, 2020).

- **Organization of American States:** this entity has a fundamental role in the generation of good practices in various topics such as data protection and digital security in the region. Therefore, it is important to learn more about the efforts being made by this entity in this area and how they impact the governance of AI at a regional and global level (OAS, 2009).

- **Unicef:** the entity has been developing the *Policy Guidance on AI for Children,* one of the most ambitious and important models in principles on the use of *AI for* children and adolescents. Considering this initiative, Unicef has consolidated itself as the main entity to evaluate the impact of this technology on this population and to adopt good practices in this regard (Dignum, 2020).

- **AIDA-European Parliament:** Given the leadership that Europe has gained in ethics and regulation of AI use, it is essential to deepen the relationship with the European Community and especially with the newly formed *Artificial Intelligence Special Committee* (AIDA) within the European Parliament. The task force should serve as a vehicle to facilitate this technical contact and coordinate with entities such as the Ministry of Foreign Affairs in this type of approach and in obtaining synergies with the European Digital Agenda and the projects being developed in the country. (About AIDA)

- **Other countries:** it is clear that this task force is called to relate to other entities that develop similar activities in other countries. As we have seen, there are international offices, observatories and even ministries with which this task force can relate and identify common points and even build joint and collaborative projects. It is worthwhile that this model of collaboration between countries is already being deepened and it is worth highlighting the effort that Japan, Germany and France have made with the *Trilateral French-Japanese German Research Projects on Artificial intelligence.* This initiative seeks to carry out AI research that brings together experts and entities from the three countries, given that each country can contribute different and enriching elements to this task (Call, 2019). An AI task force in Colombia will allow to deepen in this purpose and work to materialize this type of proposals with other countries. Likewise, it can provide valuable knowledge and experiences for other countries in the region with similar characteristics to those of Colombia that wish to explore the development of this type of institutional proposals.

VI

NATURE AND CHARACTERISTICS OF THE INTERNAL ARTIFICIAL INTELLIGENCE WORK GROUP

1 Elements to be considered in the design of the Internal IA Working Group

Once the nature of the AI *task force is* defined, it is necessary to establish its main characteristics according to the proposed conceptual model and the objectives that should be proposed:

Feature	Description
A RESPONSIBLE AND ETHICAL TASK FORCE	Since this task force will be one of the main implementers of AI policies and programs, such as the ethical framework, these types of elements must be considered in its formation. However, in order to ensure that the group complies with the standards of responsibility and ethics, it is proposed to follow a model such as the Singapore model (CPD, 2020). Under this model there is responsibility and oversight over the different stages and activities involved in AI deployment. Staff and departments that have internal AI governance functions should be fully aware of their roles and responsibilities, have adequate training, and have the necessary resources and guidance to fulfill their duties. Likewise, a Code of Ethics is promoted for the members of this type of team. This type of initiative makes the principles part of the team's day and in the performance of their tasks and relationship with technology. This is essential since it will allow the entity to promote its own model of implementation of ethical principles and to define the effectiveness of this type of proposals, generating a culture of ethics in the design, use and deployment of AI in Colombia.
INCLUSION AS AN ESSENTIAL ELEMENT (SMITH, 2020)	Following the ethical postulates, one of the characteristics that should predominate within the formation of the task force is that of inclusion. People with similar concepts of the world and similar education are more likely to have the same blind spots, given that they share biases and world views. It is sought that the group's vision is not limited by this type of problem. This type of bias can be mitigated by a diverse workforce contributing a wide range of possible life experiences. Diversity does not just mean making sure that there are different gender members of a team, or that people look different, although these attributes are important. Other factors to consider are variety of life experiences, disability status, social status, and experience of what it means to be the user of this technology. This then implies extending the threshold of experience and talent. A group of individuals with different backgrounds will be able to imagine and promote a wide range of uses and disuses of these systems, especially in the public sector. A workforce that unites talented and experienced people will also reinforce the ethics of the technology.

Feature	Description
ADOPT A CODE OF ETHICS FOR TECHNOLOGY (PDCP, 2020)	This is the first step to enable teams to make better decisions with more confidence and that they are ethical. Technology ethics is designed specifically for software development and emerging technologies. It allows teams to be aligned so that they can set appropriate standards for IA systems. Sharing a code of ethics for technology serves as a central guide when making decisions. Working with different people enables the ability for innovation and creative thinking. Therefore, ethics can be used as a bridge between differences and strengthens the team by creating shared knowledge and common ground.
VALUING CURIOSITY (SMITH, 2020)	AI systems will be created and used by a wide range of individuals and inappropriate uses will come from potentially unexpected places. The adoption of technology ethics is not enough to make AI systems safe. Ensuring that the teams that build these systems are capable of imagining and then mitigating these problems is profoundly important. Therefore, this must be considered in an Internal Group that will serve as one of the main promoters of these technologies in the country. The term "curiosity experts" refers to people with a wide range of skills and qualifications including: cognitive psychologists, digital anthropologists, professionals in human-machine and human-computer interaction, and user experience researchers and designers. Curiosity experts have as their main responsibility to be curious and speculative within the ethical and inclusive environment created. They can partner with advocacy experts to do research that helps make interactions more usable.
FORMING A MULTI-DISCIPLINARY TEAM (SMITH, 2020)	Multidisciplinary teams tend to increase the creativity and effectiveness of each individual. The diversity of knowledge in this sense has to do with skills, education (in terms of institution and program) and approach to problems. Coming together with different ways of seeing the world helps teams solve difficult problems faster. However, the multidisciplinary approach in teams must be balanced, avoiding integrating into the team one or two individuals significantly different from the rest of the group who may generate tension or who may not achieve the desired synergies.

Feature	Description
RETHINKING THE WORKFORCE AND WORK DYNAMICS (SMITH, 2020)	It is expected that the Internal Working Group will be made up of members who can be curious and speculative in imagining scenarios at the limits of AI, which will help prepare for the actual use of the system in a public sector entity. When considering how a variety of use cases will be handled, framing the conversations within the ethics of the technology will provoke serious and contentious discussions. These discussions are key to aligning the team before facing a difficult situation. The AI sector needs to think about the workforce in different ways and this group is no exception. Clear communication and alignment on the objectives of an AI system is the best way to bring disparate groups of people to a common understanding and to create AI systems that are human responsive, risk-free, respectful, safe, honest and trustworthy. It is also worthwhile to generate a dynamic work environment that is open to change. An example of this is to periodically and according to the needs invest the established roles. In this way, if the priority is to develop an ethical program in the public sector, the person who leads this program becomes the leader of the Group and everyone is available to make this possible. If, on the contrary, the objective is the deployment of some specific type of technology, all members can lend their work and collaboration to help the people in charge of these objectives to develop them in a prompt way and follow the instructions that are required at that specific moment.
CHALLENGE THE ASSUMPTION THAT AI IS ALWAYS SUPERIOR TO HUMANS (WILSON & DAUGHERTY, 2019)	Leaders as well as other members of the working groups that develop this technology often tend to accept this assumption. However, there are cases and evidence to the contrary. For example, one experiment has proven that a group of physicians who initially attributed AI errors to their human colleagues. However, as they continued their work with AI and understood its power and limitations, they recognized the source of the errors and how to resolve them. It is expected that the Internal Working Group will be characterized by an understanding of these limitations and be able to contribute to the best constant of these systems in the country. Rather than supplanting human skills, such collaborative systems can increase the value of those skills and improve AI performance. This should be one of the main purposes of the Internal Working Group at an early stage of its development.

Feature	Description
HARNESSING THE INTRINSIC MOTIVATIONS OF WORKERS (WILSON & DAUGHERTY, 2019)	In the same medical experiment mentioned in the previous point, a symbiotic coding system was designed based on the desire of nursing professionals to apply their medical knowledge to the development of technology. As a result, they felt committed to their new roles, considered that they had control over the tool they were using, and felt positive about the use of technology in their daily lives. After working as system trainers, most medical programmers felt more positive about working with AI on a daily basis and two-thirds felt positive about future job opportunities. The Internal Group must generate this type of dynamics in other entities, starting with the Group itself. There must be clarity in the functions, a participation in its construction and in what we want to obtain with the AI systems that are being promoted and analyzed. This will serve to characterize this as a group that is truly motivated in its functions and tasks.
INVESTING IN PEOPLE (WILSON & DAUGHERTY, 2019)	Investing in the team and in the generation of greater skills so that they can build relationships with AI within their roles is a long-term strategy that can unleash expertise and value within the previously unexploited workforce. In this way, spaces of constant training and knowledge exchange must be provided to allow team members to continue developing policy implementation programs and use of technology.
FOCUS ON FUNCTION, NOT SOPHISTICATION (WILSON & DAUGHERTY, 2019)	Successful symbiotic systems will put simplicity over sophistication and value transparency and ease of use over complexity. Data scientists and designers will need to work closely together to create symbiotic, human-centered AI systems allowing human experts to continuously train and improve the systems without needing extensive training. In the meantime, data scientists will be able to use their talent and time to identify new business opportunities instead of operating and maintaining existing AI systems. The technical experts in data science, programming and related disciplines that participate in the Internal Working Group should privilege this function, understanding the objectives of this institutional project and of the coming months in terms of technology deployment.

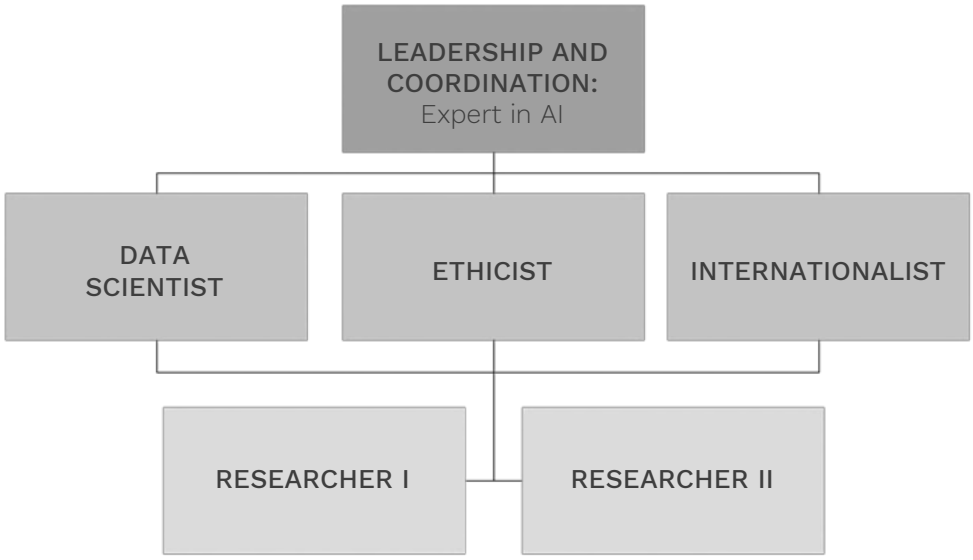
Feature	Description
CO-CREATE AND EXPERIMENT (WILSON & DAUGHERTY, 2019)	Once the processes and workflows have been identified, it is necessary for all actors to work and experiment together from the beginning: that designers and data experts collaborate as early as possible to ensure that a useful and easy-to-use system is created; that users participate in co- creating with the team to ensure that their needs and motivations are heard and incorporated into design decisions; that how people use the system is evaluated, measuring not only productivity but also the qualitative aspects of the experience; that feedback is collected from users and if there is burnout, boredom or dissatisfaction, react and redesign as necessary. The same is expected in the elaboration of public policies or regulatory proposals. It is expected that the Group can generate this type of dynamics so that there is a process of regulatory creation and innovation that includes different perspectives.
VISIONARIES TEAM- LOOK-ING TO THE FUTURE (WILSON & DAUGHERTY, 2019)	It is recommended that within the group it is possible to generate a look towards the future and to anticipate, as far as possible, the technological development. To this end, it is necessary to think about generating roles and responsibilities that may be necessary in three to five years in the future, but that already allow for generating a vision of what the future may hold. Through this vision of the future, space can be created for creativity, for *testing,* and for design processes and tasks for maximum collaborative intelligence.
PRIVILEGE ANALYSIS WITH EVIDENCE AND COST-BENEFIT (SUNSTEIN, 2019).	The work of the team should be characterized by the development of an important national and international evidence collection on artificial intelligence, its development and challenges. The Group should become a great generator of information and an identifier of the latest trends that have been generated in the implementation of technology and public policy in the field. In addition, the Internal Working Group is expected to be one of the main promoters of a cost-benefit approach to the issue. Rather than making proposals based on assumptions and intuition, the Group needs to be characterized by the collection of information that will allow it to determine the costs and benefits of the various initiatives it promotes. This includes generating cost-efficient proposals on the use of technology in different public sector entities, as well as having precise arguments for regulatory or policy proposals promoted by the Group. It is expected that all regulatory proposals consider their impact on innovation and their adoption in the country. Likewise, this Group should tend to generate this vision in other State entities that impact this technology and its development.

Feature	Description
	precise arguments for regulatory or policy proposals promoted by the Group. It is expected that all regulatory proposals consider their impact on innovation and their adoption in the country. Likewise, this Group should tend to generate this vision in other State entities that impact this technology and its development.

2 Structure and profiles of the Internal Working Group

Once these characteristics are defined, it is necessary to establish a series of roles, structure, leadership and functions of the members of the Internal Working Group. The following proposal follows the characteristics already mentioned and the international examples against which it has been possible to obtain valuable elements in relation to the positions that have been created and the functions that should be fulfilled.

As a result, the proposed structure is as follows:



Leadership and Coordination of the Internal Working Group

The group should be led by an expert in public policy and regulation because the main objectives of the group are to accelerate the implementation of this policy and achieve the adoption of this technology in the public sector. Therefore, it is necessary that the person who fulfills this position has knowledge on public policy on the subject and on the governance that surrounds this process in the country. Likewise, he or she must have experience in the relationship with the Ministry of Economic Affairs and Digital Transformation and its work team. This is necessary since the objective is to be efficient in the work to be done and to make the most of the knowledge that this team already has. Likewise, this person is expected to have essential knowledge about the operation of this technology, its main technical characteristics and the minimum infrastructure required.

Similar to the director of the UK Office for AI, the duties of the leader of this Internal Working Group will include:

- Establish a new intergovernmental team, set its vision, provide strategic leadership, and lead flexible policy and program delivery development.
- Recruit and develop the inter-governmental team, including bringing in skills and expertise from industry and different sectors.
- Develop and deliver an analysis and development of policies that should be developed or implemented to address critical questions for AI growth in Colombia.
- Develop and conduct a detailed implementation plan to deliver a series of budget and industry strategy commitments.
- Build excellent relationships and partnerships between government departments and with industry, research and academic institutions.
- To be a technical expert with a lot of credibility in the field of AI policy and in front of international organizations.
- Influence change in multiple government departments at much higher levels, in order to meet their deliverables. (Civil Service HR, 2018, p. 10).

Under his leadership, the task force should also focus on:

- To promote the analysis and strategic development of AI policies
- Leads the delivery of ambitious, timely and effective advances.
- Encourage the adoption of AI technologies across the public and private sectors.

- To be a highly visible public face for AI, a reliable partner for the industry, providing clear lines of access to the government.
- Provide a holistic view of the complex technology sector, to predict emerging problems and act across government and sectors to deliver results.
- It will become the government's center for AI expertise, ensuring it is a highly credible partner capable of challenging assumptions.
- It will support Ministries and senior leaders to promote the use of AI in all sectors. (Civil Service HR, 2018, p. 10).

This person should also be in charge of risk management and the generation of internal controls to achieve an adequate implementation of AI in the public sector, as well as an adequate governance of the team. According to the governance model proposed by the Singapore authorities, the following tasks should be prioritized:

- Use of reasonable efforts to ensure that the data sets used for model IA training are adequate for the intended purpose and to assess and manage the risks of inaccuracy or bias, as well as reviewing exceptions identified during model training. Virtually no data set is completely free of bias. Organizations should strive to understand the ways in which data sets may be biased and address this in their security measures and deployment strategies.

- Implementation of monitoring and reporting systems as well as processes to ensure that the appropriate level of management of each entity is aware of performance and other issues related to AI deployment. If appropriate, monitoring can include a self- contained system to effectively reduce human error. IA systems can be designed to report on the confidence level of their predictions and the explainability properties can focus on why the IA model had a certain level of confidence.

- Ensure adequate knowledge transfer when there are changes in key team members involved in AI activities. This will reduce the risk that changes in the team will create internal governance gaps.

- Review of the Group's internal governance structure and measures when there are significant changes to the organizational structure or key team members involved.

- Periodic review of internal governance structure and measures to ensure their continued relevance and effectiveness (CPD, 2020).

Scientific or Data Scientist:

The role of this expert is to create analytical solutions that range from developing code and models to researching their results to finding meaningful information and translating it into executable plans (UN Jobnet, 2020). The person in this role will be immersed in complex data sets from a variety of industries and functions. It is essential that this person be involved in the design of solutions tailored to national needs.

Their functions, considering what such a consultant does in international organizations such as the World Bank, will include:

- Contribute to the identification and acquisition of data related to the main AI systems implemented in the country. This task will include the development of scripts for API automation, querying, and *web scraping.*

- Generation of data sets (*feature engineering)* derived from data from multiple sources and types. The goal of this task is to make large and complex data sets more affordable and reusable. The focus will be on the generation of new variables to be used in predictive models (*feature engineering*). These datasets will come from: geospatial data (satellite images), text data (by applying sentiment analysis, text extraction, model classification, theme models and other approaches to the text corpus); data sources may include news, social networks and research and project documents.

- Define the maturity state of the data infrastructure of different public sector entities for the development of AI solutions and provide technical tools to strengthen this infrastructure and improve its quality

- Data standardization (storage, formatting) to facilitate integrated use of data from different sources.

- Documentation of datasets using structured metadata and publication of the data and metadata in the FVC Data Platform (a World Bank online catalog).

- Provision of technical support for users of the Data Platform when it is a relevant Contribution to the production of defence and training materials

- To train other members of the Internal Working Group and Government in the latest technological developments in the field and how they impact their work (UN Jobnet, 2020).

AI ethicist

At present, the role of *AI Ethicist is being* developed within this type of work team. In general terms, an AI ethicist advises on ethical AI practices and designs tools against bias, unintended consequences and ensures accountability within the team in terms of compliance with ethical principles (Hickok, 2020). She also specializes in benchmarking the ethical principles being promoted in the country and the practices being presented in the design, development or implementation of these systems. This provides valuable knowledge to identify best practices and efforts to be made in this regard.

The duties of an ethicist will include:

- **Align the values.** You must ensure that the values, principles, codes and culture of the group are aligned with a socially and ethically responsible operation. It is capable of supporting innovation and value-based decision making.

- **Reputation and trust building in AI.** It helps protect the group's reputation by working to prevent potentially unethical designs or product bias. High impact algorithms especially can result in unintentional discrimination or deepening of structural imbalances. It also provides confidence in the projects in which the Internal Group participates and in the predominance of ethical principles in each of these.

- **Legal aspect.** Prevents any negative legal consequences and legal liability as a result of biased algorithms. The creation of new legislation in the field gives clarity about what behavior is unethical.

- **Relationship.** In a positive light, create connections with diverse communities, employees or contractors, and actors outside the organization who can bring new ideas and perspectives. (Hickok, 2020)

- **IA Ethical Framework.** This person would lead many of the initiatives around the ethical framework defined by the country and the tools provided for its implementation. He or she will be responsible for promoting its adoption, establishing its impact, and proposing any revisions that are deemed necessary.

Following the Singapore model, this person can also take on the following tasks:

- Encourage the use of existing risk management frameworks and application of ethical risk control measures to

    - Assess and manage the ethical risks of AI deployment, including any possible adverse impacts
    - Decide on the appropriate level of human intervention in decision making augmented by AI
    - Manage the training process and selection of AI models

- Maintenance, monitoring, documentation and review of the AI models that have been deployed, with a view to taking remedial action if necessary.

- Review of communication channels and interactions with stakeholders to provide outreach and effective channels of feedback, especially regarding the ethical components of the project and their assessment.

- Adequate training for staff who must deal with AI systems. When necessary, those who work and interact directly with IA models should be trained to interpret the products and decisions of the model and to detect and manage biases in the data. Other team members whose work uses the IA system should be trained to at least be aware of and sensitive to the benefits, risks, and limitations of IA use so that they know when to warn experts in the field. (PDCP, 2020).

Internationalist

Given the high relationship that an Internal IA Working Group must have with international entities, it is necessary to have in the team a person with knowledge in international relations and diplomatic relations to interact with these entities and establish joint work agendas.

This person is expected to perform functions such as the following:

- Define points of contact with international entities with which the Internal Working Group will interact.

- Establish direct communication channels with international entities and manage official contact with them.

- Mechanisms for the diffusion and international presentation of the efforts that Colombia is making in this area, managing the information included in the Observatory of AI Public Policies of the OECD.

- To coordinate the information obtained and reported at an international level on the subject of AI by different public sector entities involved in the subject.

- To produce documents and executive summaries of the main reports and papers produced by the main international entities and experts in the field.

- Establish a roadmap for organizing and socializing the work of the International AI Council.

- To make contacts with international academic entities that are experts in the field and provide them with access to the latest projects being developed in Colombia in this area

- Track international AI indicators and establish mechanisms to facilitate access to information and obtain feedback on country performance in these measurements

Researchers in AI (2 people)

The Internal Working Group must have the support of two researchers who can help in achieving the main tasks of this group and its members. Among its main tasks are:

- Collect technical information on issues related to the implementation of policies for the technology sector, especially AI.

- Report on the technical and public policy work carried out by the national government and facilitate its diffusion.

- Keep the Internal Working Group team updated on the main international initiatives in this area.

- Identify and report on the follow-up carried out by the private sector on the fulfillment of the national government's commitments on artificial intelligence issues.

- Assist in the evaluation of data sets to be used in the design and implementation of artificial intelligence systems.

- Know the main characteristics of the technology and the latest AI systems in order to support public sector entities with transformational projects based on the implementation of this technology.

- Analyze the impact that international initiatives would have on the proposals made by the Internal Working Group.

VII

TOOLS FOR THE DEVELOPMENT OF THE TASKS OF THE INTERNAL WORK GROUP


215.6
criptions

As it has been observed, the tasks and functions that would be developed by the team that would conform this Internal Working Group require a series of tools that would facilitate it. Below, the main tools that this Internal Group should have at its disposal in order to quickly fulfill the proposed objectives are indicated and described:

1 Model of public policy implementation based on problem analysis

At this point, the Group seeks to have at its disposal a tool to measure the implementation of public policy in AI and make this process more efficient. To this end, a model is being developed that will allow the materialization of the model proposed by Matt Andrews, Lant Pritchett, and Michael Woolcock within the Building State Capability (BSC) Program of Harvard University and which they presented in their 2017 study. For these public policy experts, there is a direct relationship between the effective implementation of policies and the state of capacity of a country and its institutions. Thus, the authors believe that countries have succeeded in identifying the importance of certain policies and have committed themselves to their implementation, but have not obtained the expected results for various reasons:

> "For example, governments in developing countries have adopted similar "best practice" budget rules, but many still fail to execute their spending plans. Other governments have adopted common policies to increase the number of trained teachers in schools. They have succeeded in training these teachers, but cannot guarantee their active and effective presence in classrooms. Similarly, governments around the world have made significant progress in introducing policies aimed at increasing the availability of life-saving medicines in their countries, but are failing to bring the medicines to health posts or to ensure that the medicines are being used and dispensed correctly. More than twenty-five years after signing the global convention on children's rights and committing to register all children at birth, countries such as Bangladesh, India, Mozambique, Nigeria, Pakistan, and Uganda still register less than 40 percent of children. They have the policy ideas and commitments that were sufficient for the success of other countries, but they simply cannot implement them consistently and effectively"
>
> (Andrews et al., 2019, pg 13-14).

Therefore, for the authors it is necessary to make a recognition and identification of these problems and from these analyze the implementation and the results obtained. In other words, the analysis should focus on identifying those specific problems faced by the implementation of a policy in each country and from there obtain valuable lessons for making specific improvements:

> "We believe that problems force policy makers and reformers to ask questions about ways of doing things, and to promote a search for alternatives that actually offer solutions (rather than just proposing new ways of doing things). (...) Beyond this, the identification of problems provides a rallying point for coordinating distributed agents who would otherwise clash in the process of change. (...) The idea of "problem windows" is reminiscent of Kingdon's (1995) work on public policy change. Applications of his "multiple stream" theory postulate that knowledge of problems brings about situations that change the agenda (Barzelay and Gallego 2006; Guldbrandsson and Fossum 2009; Ridde 2009). Faced with problems they cannot ignore, agents across the political and social spectrum find structural weaknesses they usually do not consider and work together to solve them"
>
> (Andrews et al., 2019, pg 142).

In this way, it is expected that the Internal IA Working Group can have access to an initial model that allows it to make a characterization and specific analysis of the problems faced by the country in the implementation of its IA policy and the solutions that can be provided in this regard. As Andrews et al. point out, it is not that Colombia does not have a series of good practices in AI issues, but it should make efforts to achieve institutional capacity that will allow it to face the specific problems that may arise in carrying out this task.

2 AI Impact Metrics

In addition, we will work on a metric to determine the social impact of AI. AI is highly contextual. An AI technology, for example, that works well for one population or with one geography, can have significant negative impacts elsewhere. Thus, truly understanding the risks of AI requires a multi-dimensional approach that includes risk measures that may not be easily distilled into a number (AI White Paper).

However, traditional approaches to risk governance are often inadequate to address multidimensional, qualitative, ambiguous and uncertain risks. Through that experience, academics and experts in risk governance have developed new frameworks that continue to value scientific data, but in conjunction with other, more qualitative, risk measures. Unlike traditional approaches to risk assessment and management and the precautionary principle, these more expansive risk governance frameworks encompass data and methodologies that are inherently messy, uncertain, and ambiguous. In particular, these risk governance frameworks have three important characteristics: (1) they focus on broadening participation in the governance process, including a range of key stakeholders; (2) they value the qualitative data and policy analysis; (3) use multi-stakeholder deliberative processes. Collectively, these three features are particularly important in addressing the risks of new technologies, which often frustrate attempts to quantify risks (Budish, 2020).

At this point, it is worth noting the studies that have emerged to highlight the importance of a qualitative analysis of impact and risk in the use of AI. Risk" as a cornerstone of AI governance is complicated by decades of debates about how we assess "risk" under conditions of uncertainty, argues Ryan Budish of Harvard University's Berkman Klein Center. "Before committing its strategy to the vague categories of 'high risk' and 'low risk', the European Commission should consider the lessons learned from previous risk governance debates and ensure that they are building a risk governance framework that takes a holistic view of risk, including more qualitative measures," (Budish, 2020) (direct translation by the author), he writes.

Under this framework, impact metrics are essential as they allow for the identification of the risks that are occurring, the social effects and how to mitigate them. They are also mechanisms that allow for the collection of specific evidence on the impact of an AI system on a specific sector and what type of precautions should be considered in the face of the possible risks identified, especially from a qualitative perspective and not just a quantitative one (Mishra et al, 2020).

Therefore, this type of metrics will allow a more precise and qualitative definition of the existing risks and the way they are understood. This will be fundamental in order to advance work on the analysis of AI regulatory proposals in Colombia.

3 Methodology to address regulation

The Working Group should have at its disposal a detailed description of the operation, main characteristics and elements to be considered for the use of tools on technology regulation and especially AI. For this purpose, it is proposed to present a set of tools that have been explored in technology and innovation ecosystems such as Fintech and that can adapt to the AI ecosystem (Zetzsche et al, 2020).

Among these measures it is worth highlighting seven specific mechanisms:

- **First,** regulators must identify and modernize inadequate regulation based on an assessment of whether the legacy rules continue.

- **Second,** proportionate regulation, reflected in provisions for market stability and integrity according to the context of risks underlying the regulated activity, creates supportive pathways for the development of inclusive products and services.

- **Third,** an Innovation *Hub* with experts from the regulatory authority is best suited to guide AI firms through the regulatory maze, generate valuable information on market innovations, and evaluate distribution possibilities.

- **Fourth,** testing and piloting regimes allows for leniency in a testing and learning approach to assist innovative firms. Authorities can also decide whether to tolerate innovations by authorized institutions and possibly start-ups by issuing exemptions or letters of non-action on a case-by-case basis, declaring certain activities as permissible or suspending certain rules.

- **Fifth,** a regulatory sandbox such as those already being developed in Colombia, which standardizes the scope of testing and piloting, allows regulators to create a narrowly defined safe space to grant exemptions from specific regulatory requirements for qualified innovative firms.

- **Sixth,** restricted licenses allow viable innovative firms to develop their client and user base in a controlled manner.

- **Seventh,** a full license is essential for innovative firms according to what their size requires and allows.

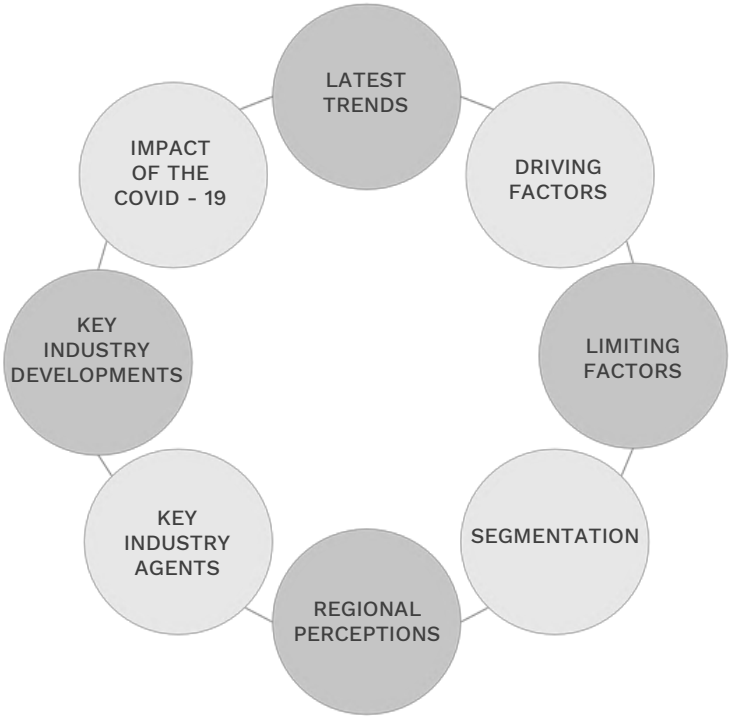
Over these stages, while regulatory rigor and costs increase, so does the maturity of the firms and their ability to deal with risk and compliance, maintaining a level field for the licensed entities (Zetzsche et al, 2020).

It is clear that the regulatory frameworks implemented by Colombia will govern Following the principles of good global practice (mainly activity-based, proportionate and technology-neutral regulation) and regulatory approaches in sequenced stages help create paths for regulatory innovation in the field.

It is expected that the Internal Working Group will have at its disposal tools that will allow it to determine which model to choose in different stages.

4
Tool to observe and analyze AI market behavior

It is expected that the Internal Working Group can analyze the behavior of the AI market, for which it must focus on the following elements that define the behavior of this market:



● Artificial Intelligence Market Size, Growth, Share, 2020

In addition, it is recommended that the elements used by the OECD to analyze the impact of AI on digital markets be followed. Within the Digital Economy Toolkit (OECD 2018) is international organization made clear some of the criteria that can be used to make this type of assessment:

- **Scientific production in Machine Learning:** through this indicator the OECD was able to determine the global volume of scientific production in this area. It also used indicators of "scientific excellence" that focus on the contribution of economies to the most cited publications. With this, it determined that China has increased its production of highly cited scientific results and thus its share in the 10% of the most cited publications went from less than 4% in 2005 to 14% in 2016, becoming the second largest contributor to "scientific excellence" after the United States (OECD 2017). It also established that the research fields with greater potential to revolutionize production as well as contribute to addressing global challenges is in the field of artificial intelligence.

- **Number of patents in AI:** For the OECD it is possible to establish the impact of AI in the digital economy if it is possible to determine the number of patents that are being developed in the field or related to it. This effort resulted in measures for patented inventions in the five highest IP offices (IP5, i.e. the US, Chinese, Japanese, Korean and European patent offices). Thus it was possible to define that in 2016, 26000 IP5 patent families related to AI were registered worldwide. Japan, Korea and the United States had more than 60% of AI-related patent applications between 2014 and 2016. Among the G20 economies, Korea, China and the Russian Federation significantly increased their number of AI-related patents.

- **Digital AI Skills:** This component is essential to determine the availability of labor needed for this industry and to achieve its adequate development. To this end the OECD cites the examples of Canada's Economic Strategy Tables that set ambitious growth targets, identify challenges and propose an executable roadmap. The Digital Industries Economic Strategy Chart has identified industry leadership and public-private partnerships as the basis for impact on the following priority issues: 1. Increase of domestic training in digital innovation. 2. Leveraging the value of data and artificial intelligence 3. Fostering the growth of home-based digital companies. 4. Growing the digital talent base.

Therefore, the internal work group must have available tools that allow it to analyze and determine how to make this type of measurement criteria operable. Its mission is undoubtedly to monitor the nascent AI market that is being generated in Colombia and that is one of the main missions of Conpes 3975 of 2019. These elements provide necessary tools for this purpose.

5 Measuring inclusion projects

In order to materialize the purpose of promoting the development of inclusive AI systems, it is necessary for the Internal Working Group to analyze models already proposed for the topic. At this point, it is worth analyzing the proposal for horizontal and vertical intervention proposed by the Berkman Klein Center, which allows for the achievement of the purposes and objectives of an AI that includes different groups that do not frequently participate in this type of initiative:

Defining the stages of development of an AI system (horizontal) (Artificial Intelligence and Inclusion)

- **Design:** This stage includes both the technical design of AI-based technologies (e.g., how the data will be collected in the model, the target audience for an AI tool) as well as the design of systems that govern AI and the implications that must be considered before proceeding with the development process.

- **Development:** The development stage is the production phase of an autonomous system that follows the design process. Questions in the development category pertain to building more inclusive tools and methods within AI-based technologies, AI development frameworks, and which AI tools are being developed for whom.

- **Deployment:** The deployment stage covers the distribution, use, ubiquity, and implementation of AI-based technologies within society at multiple levels including local, national, and global ecosystems.

- **Evaluation/Impact:** This stage encompasses measuring and understanding the impact of AI technologies, including ways to assess the effects of autonomous systems on different actors within society.

Define proposed intervention mechanisms (vertical) (Artificial Intelligence and Inclusion):

- **Definition and framing ("Back to first principles"):** This encompasses questions that examine the fundamental ways in which concepts related to AI and inclusion are defined.
- **Building bridges:** This mechanism contains questions related to building infrastructure as networks and links between various actors.
- **Education:** These questions highlight both the education of AI-based technologies and the impacts that AI can have on education.
- **Construction of tools:** This mechanism contains questions related to the construction and use of tools that use AI technologies.
- **Policymaking:** These questions pertain to sets of principles, guidelines, laws, or regulatory frameworks that govern IA.

In this sense, there are monitoring and reporting tools that allow for the analysis of these types of trends in the field of inclusion and their variation in certain periods of time and of the algorithmic chain.

6
IA use case mapping and constant progress reporting

At present, the Sigepre model has been developed - Projects Module. This system allows the identification and characterization of the tool used by the Administrative Department of the Presidency of the Republic to identify and classify digital transformation projects, including those based on the use of AI.

The application allows knowing basic information about the transformational project such as financing, impact of the solution and executors, among others. This tool provides a general report of transformational projects with different technologies and it is not focused on

obtaining specific information about the implementation of artificial intelligence. Likewise, it does not present definitions about emerging technologies and what is understood by machine learning, deep learning and robotics (RPA) systems, among others, and the differences between these applications.

Within this consultancy it was determined that this application presents difficulties in its operation and in the loading of information by the entities. This has made it difficult for entities to report and inform the development of Artificial Intelligence projects. It also makes it difficult to provide feedback on the projects reported and their state of maturity. The system then allows to know that there is a reporting means that can be improved and obtain information especially relevant to the implementation of artificial intelligence systems.

The Presidential Advisory on Economic Affairs and Digital Transformation developed a document entitled "Adequate mapping of transformational projects". However, it is expected to contribute in this type of efforts in such a way that a constant report can be generated and that allows to identify greater particularities of the projects that use AI systems.

To facilitate and improve this process, it is proposed to follow the model proposed by the Amsterdam Registry of Algorithms. This registry provides a general perspective of the systems of artificial intelligence and algorithms used by the City of Amsterdam, knowing its advance in real time. Through the registry, you can have a quick view of the algorithmic systems of the city or examine more detailed information of the systems. It also allows citizens and other actors to give their feedback on the AI system used and thus participate in the construction of human-centered algorithms in Amsterdam. The register is still under development, but it is hoped that it can be a document for consideration by the Internal AI Working Group (Algorithm Register, 2020).

7 AI Maturity Model

The IA maturity model is essential for the Internal Working Group since it will allow the analysis of transformational projects that use IA and establish their true state of progress and impact. The proposed model is based on five dimensions of organizational maturity for AI (Introducing the AI Maturity Framework, 2019):

- **Strategy:** there is a project of AI use in the organization with clear purposes and objectives.

- **Data:** it provides the available data infrastructure and its characteristics and limitations.

- **Technology:** it allows establishing the type of technology available, the one that has been decided to use and the way in which they will interact

- **People:** at this point the available human resource is established, its knowledge and capacity to implement the technology and get the most out of it.

- **Governance:** we analyze that there is a clear governance of the project and the use of technology that allows for clear and consolidated decisions to be made during the course of technology implementation.

The organizational maturity for AI advances according to these stages, which allows exploring what AI can and cannot do within an organization. At each stage, an entity's ability to take full advantage of the implemented AI system is assessed so that it has been fine-tuned and made impact. Each dimension has a significant depth that allows determining what can be achieved with this technology within a specific entity.

8
Financing - technical cooperation request

It is essential that the Internal Working Group has access to the essential documentation and requirements for accessing technical cooperation resources and funds. In this case, and given the current situation, it is sought that entities have access to resources from different entities that are interested in financing this type of project.

Therefore, and in order to be efficient in accessing these resources, this access must be provided and the necessary documents must be projected so that the Internal Working Group can make this type of request promptly.

9
Guide to AI Training (Service, 2019)

The Working Group should have tools to train its internal team in policy, ethics and the use of AI. At this point, it is expected that this type of documentation will also serve to train the country's public officials who expect to interact with this technology.

Therefore, it is expected that the material to be considered will have the following content:

- Definition of artificial intelligence and its main characteristics.
- Definition of public policy, main objectives and actions.
- Elements to evaluate if AI is the right solution for an entity.
- Planning and preparing to implement AI systems within the entity.
- Management and development of AI system implementation projects.
- Ethics and safety understanding of AI, identifying main risks and tools to limit them.

10
Report to senior management and the International AI Council

Finally, it is essential that the group may be getting constant feedback from the Presidential Advisory Office for Economic Affairs and Digital Transformation and the International AI Council. To this end, tools must be generated to provide accurate information on the state of progress of the group's main tasks and objectives and to obtain valuable feedback from these entities.

The report that is made must respond to the needs of each one of these entities and to the purposes that define their relationship with the Working Group.

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