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|  | A person with a beard and glasses smiling  Description automatically generated |
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**Resumen**

Este documento explora cómo la Inteligencia Artificial (IA) está entre las tecnologías disruptivas más influyentes en las Administraciones de Impuestos y Aduanas (TCAs, por sus siglas en inglés) y cómo llevará inexorablemente a estas organizaciones de ser entidades complejas, impulsadas algorítmicamente y basadas en la eficiencia del siglo XX, a convertirse en las del siglo XXI, caracterizadas por la simplicidad, gobernadas por "AlgorAI", y una automatización de decisiones humanas basadas en reglas orientadas al cumplimiento. Destaca cómo las tecnologías de IA están ahora ofreciendo beneficios tangibles en las Administraciones de Impuestos y Aduanas (TCAs). El documento: a) examina la transición hacia la integración de IA en las TCAs; b) presenta una hoja de ruta para la adopción de IA, enfatizando el equilibrio entre la tecnología y los factores humanos; c) discute el desarrollo de "Espacios de Información Tributaria" digitales; y d) sugiere usar la IA para mejorar, no reemplazar, la experiencia humana a través de "Esferas de Confort". Aborda el equilibrio correcto entre los enfoques Human-In-The-Loop (HITL) y Human-On-The-Loop (HOTL) y recomienda avanzar hacia un nuevo estado de Human-Above-The-Loop (HATL).

El documento concluye que la integración exitosa de la IA en las TCAs requiere un enfoque equilibrado que considere tanto los avances tecnológicos como los factores humanos. El estudio subraya la importancia de abordar las reacciones de los contribuyentes y los funcionarios públicos hacia la IA, recomendando estrategias para navegar estos desafíos y lograr una integración armoniosa de la IA en los procesos tributarios y aduaneros.

**Résumé**

Ce document explore comment l'Intelligence Artificielle (IA) figure parmi les technologies disruptives les plus influentes dans les Administrations fiscales et douanières (AFD) et comment elle les mènera inéluctablement, des organisations complexes, pilotées par algorithmes et basées sur l'efficacité du XXe siècle, vers celles du XXIe siècle caractérisées par la simplicité, régies par 'AlgorAI', et une automatisation des décisions humaines basées sur des règles visant la conformité. Ce document met en lumière comment les technologies de l'IA offrent désormais des avantages tangibles dans les Administrations fiscales et douanières (AFD). Il : a) examine la transition vers l'intégration de l'IA dans les AFD ; b) présente une feuille de route pour l'adoption de l'IA, en soulignant l'équilibre entre la technologie et les facteurs humains ; c) discute du développement d'espaces numériques "d'Information Fiscale" ; et d) suggère d'utiliser l'IA pour améliorer, et non remplacer, l'expertise humaine à travers des "Sphères de Confort". Il aborde l'équilibre approprié entre les approches Human-In-The-Loop (HITL) et Human-On-The-Loop (HOTL) et recommande de progresser vers un nouvel état de Human-Above-The-Loop (HATL).

Le document conclut que l'intégration réussie de l'IA dans les AFD nécessite une approche équilibrée qui tient compte à la fois des avancées technologiques et des facteurs humains. L'étude souligne l'importance de prendre en compte les réactions des contribuables et des fonctionnaires à l'IA, recommandant des stratégies pour naviguer ces défis et atteindre une intégration harmonieuse de l'IA dans les processus fiscaux et douaniers.

AI, The Unexpected Attractor for Tax and Customs Administrations: Taming the Loop

By Ignacio González García and Salvador Duart Crespo

# Abstract

This paper explores how Artificial Intelligence (AI) is becoming the most influential disruptive technology in Tax and Customs Administrations (TCAs) and how it will inexorably lead to a new paradigm. TCAs will evolve from complex, algorithmically driven, efficiency-based organizations of the twentieth century to new ones characterized by ‘Simplexity’, 'AlgorAI' governance, and automation of rule-based human decisions aimed at compliance. It: i) examines the transition towards AI integration across TCAs; ii) presents a roadmap for AI adoption, emphasizing the balance between technology and human factors; iii) discusses the development of digital "Tax Information Spaces"; and iv) suggests using AI to enhance, not replace, human expertise through "Comfort Spheres." This paper addresses the right balance between Human-In-The-Loop (HITL) and Human-On-The-Loop (HOTL) approaches and recommends progressing towards a new state of Human-Above-The-Loop (HATL).

The paper concludes that the successful integration of AI in TCAs requires a balanced approach that considers both technological advancements and human factors. The study underscores the importance of addressing taxpayer and civil servant reactions to AI, recommending strategies to navigate these challenges and achieve a harmonious integration of AI in tax and customs processes.

*Keywords: Artificial Intelligence, Machine Learning, Simplexity, Fairness, AlgorAI, Automation, Compliance, Equitable Society, Comfort Spheres, Innovation*

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# INTRODUCTION

We strongly believe that all Tax and Customs Administrations will evolve, following different roads, towards a common structure and vision, that can be characterized in three axes using three new concepts, which we have named with neologisms: *Simplexity, AlgorAI governance* and *Ruled Fairness*. In the first Section of this paper, we will describe these dimensions and the common destiny of the administrations. In the second Section we will suggest ways to urbanize this new world. In the third Section we propose some rules to help Tax and Customs Administration create sustainable human relationships in this context, focusing on the human factor. In the fourth, we will discuss some use cases under this vision, and finally, we will present our conclusions.

# THE PATH TO A NEW REALITY

## From Complexity to Simplexity[[1]](#footnote-1)

Complexity is a predominant characteristic of the 21st century, as highlighted by Seijts (2010). Tax and Customs Administrations (TCAs) navigate complexities both internally and in the burgeoning external environment. It has been widely acknowledged among organizational researchers for decades that entities must evolve alongside their environments, thereby embracing and adapting to complexity. In its Technologic Review (2019), the Office of Tax Simplification (OTS) remarks on the tax system's "bewildering complexity”, adding that “this complexity is starkly illustrated by the vast number of professionals required to guide individuals and businesses through the system.”[[2]](#footnote-2) TCAs are at a crossroads: to embrace complexity, as suggested by Ashby (1956), or to seek simplicity, as posited by Luhmann *et al.* (2001), in both cases leveraging technology, especially AI.

The term "Simplexity" synthesizes "complexity" and "simplicity". Within each Tax and Customs Administration (TCA), we observe a tangible dialectical relationship between theoretical simplicity and practical complexity. This dynamic can be understood through the concept of a 'concrete universal,' which is a key notion in Hegelian philosophy. According to Hegel, a category represents the synthesis of two opposing abstractions - for instance, "becoming" is the synthesis of "being" and "non-being," - ultimately uniting under a higher category through the dialectical process of history. Each ‘concrete universal’, each TAC, is the culmination of a series of "past failures," reflecting the perpetual need for adaptation. TACs are always in tension, continually evolving between opposites. Yesterday's success is today's failure, and organizations move forward by adapting to the 'event' where the potential becomes reality. Nowadays AI is the event generator of the new reality.

We challenge Kasemsap (2017) simplistic definition of AI as a scientific field aimed at enabling machines to solve complex problems effectively. The challenge of navigating a labyrinth, for example, is arduous but not complex, whereas discerning the optimal approach to a problem can be complex yet not laborious. AI excels in resolving tedious challenges but often struggles with issues that humans can easily decipher. Hans Moravec's observation (1988) underscores this point: “*It is relatively easy to get computers to show abilities similar to those of an adult human in an intelligence test or when playing checkers, and very difficult to get them to acquire the perceptual and motor skills of a one-year-old baby.”* AI will letTACs face arduous problems with incredible efficiency, but complex decisions will have to be adopted by humans.

The current approach from AI scientists is aimed at enabling machinesto create potentially useful information through calculus. The notion that "complexity arises from simplicity" (Gribbin, 2004) resonates deeply within this context. This ancient principle, as illustrated through the Taoist concept of progression from one to two, and then to three, that gives birth to the “ten thousand” things suggests that complexity is not merely accumulation. We can also see this in the classic example of the Sorites Paradox involving a heap of sand. Consider the premise that a heap of sand minus a single grain of sand is still a heap. If you accept this premise and remove grains of sand one by one, you seemingly never stop having a heap, even when only one grain remains. This leads to the paradoxical conclusion that a single grain of sand could be considered a heap, or a process with a phase complex, which contradicts our intuitive understanding of what a heap is. Rather, it's the interplay between the simple and the complex that fosters true complexity. Machine learning and AI utilize data (the grain of sand) to establish correlations between facts, which, in the terms of Hegel, represent the most basic form of knowledge, thereby achieving complex outcomes, heaps, information. In the term ‘Simplexity’ we express the dialectical relationship between the simple and the complex, a relationship that has significant practical implications.

## AlgorAI from Algorithmic Governance to AI Governance

KPMG's analysis[[3]](#footnote-3) reveals a swift transition from experimental to applied AI technologies in large corporations. Currently, only 17% of companies use AI/ML on a large scale, but 30% have implemented it in selected functions. Encouragingly, 50% anticipate scaling AI within three years. Similarly, an OECD survey across 59 economies has studied strategies and governances in the use of AI in Tax Administration andindicates a significant trend towards AI adoption in tax administrations, with nearly 75% either using or planning to implement AI to minimize human intervention.

We introduce a second neologism, “AlgorAI”, which represents the synthesis of ‘algorithm’ and ‘AI’. We will use this term to characterize TCAs in the future, naming it the second axis of our vision. It is crucial to distinguish between organizations that utilize algorithms—encompassing all current Tax Administrations—and those that employ Artificial Intelligence, which are comparatively few. An algorithm is a clear set of instructions designed to solve specific problems, akin to a recipe or mathematical procedures taught in schools. These algorithms form the backbone of Algorithmic Decision Systems (ADS), which make rule-based decisions in various applications, including the assignment of circuits to Single Administrative Documents (SADs) in Customs or the validation of fields in the admission of a Tax Form. Algorithms are so omnipresent that Danaher (2017) has termed the era we live in 'the algorithmic age’. The discourse in the public sector heavily leans towards algorithms themselves, (Bankins *et al*, 2024), rather than the organizational frameworks surrounding their use (Fink, 2018; Janssen, Marijn and Kuk, 2016).

This paper aims to marry the ‘technical’ (AI) with the ‘structural’ (Organization) to harness potential synergies. We take into consideration that in June 2023, the European Parliament enacted legislation to regulate the design and usage of AI. This legislation mandates the development of “algorithmic governance” by AI users and designers. This move underscores algorithmic governance as a foundational layer for AI Governance, emphasizing that while AI extends beyond mere algorithms, its governance remains a critical precursor. Given this backdrop, a crucial question arises due to the critical importance of distinguishing between the two types of governance.

Who coined the term ‘Artificial Intelligence’, and what have been its consequences?

The act of naming wields considerable power, encapsulating not just the identity but also the essence of its subject. In the Judeo-Christian tradition, Adam's task of naming the animals - as described in the scriptures and reflected in Milton's "Paradise Lost" - highlights the profound significance and authority embedded in names. Similarly, the Kabbalistic tradition views naming as a performative act, where the utterance itself infuses life into beings.

John McCarthy convened a seminal conference at Dartmouth College in 1956, where he introduced the term "artificial intelligence." Seeking a novel concept distinct from the then-prevalent "cybernetics," McCarthy aimed to secure funding from the Rockefeller Foundation. The term quickly gained popularity, though its precise definition remained somewhat ambiguous. Public interest in the concept might have shifted if the “five pioneers” had used terms such as “cybernetics,” “reinforced learning,” “autolearning,” or even “tools designed to reduce staff in organizations.” The term “artificial intelligence” provided a utopian vision. Administrations must decide with a functional vision, not influenced by marketing, or swayed by nominalisms.

## From Procedures to Ruled Fairness

The third pilar in our analysis, after organization and technology, is the human factor and its determination of fairness throughout history.

The European Commission defined its "made in Europe" AI vision on April 25, 2018, and December 7, emphasizing AI developed or deployed within Europe. A 52-expert group was formed to draft Ethical Guidelines on AI and Policy and Investment Recommendations. This initiative, grounded in the EU Charter of Fundamental Rights, promotes a human-centered AI approach focusing on reliability, with ethics as the foundation for trustworthy AI. AI's reliability hinges on legality, ethics, and robustness. One of the components of ethics is fairness. In the realm of TCAs, the problem of fairness is an insidious challenge because of its relationship with the nuances of Customs Law and the exercise of discretionary powers.

The most influential Catholic angelic hierarchy was described by Pseudo-Dionysius the Areopagite in his book "*De Coelesti Hierarchia*" (On the Celestial Hierarchy). One of them (The third level in the middle tier) is “Powers”. The term used in Latin, *Potestates*, survived in Spanish as “potestades,” and it is used in Tax Law as in “*potestades administrativas*”[[4]](#footnote-4). In Latin, it denotes not a general authority, but a specific form of power designed to restrain evil forces. With this vision, Tax Law fights malevolent forces with rigid obstacles (rules) and the use of “discretionary powers”. The challenge arises in controlling these discretionary powers in systems where decisions are adopted in a context where AI has a significant role, where decisions are not made directly in the real world with qualitative values, but in an abstract computational space inhabited only by numbers. We foresee an 'inexorable evolution' of TCAs from complex, algorithmically driven, efficiency-based organizations of the twentieth century to those of the twenty-first century characterized by simplicity, governed by 'AlgorAI', and an automation of rule-based human decisions aimed at compliance. This shift is expected to evolve towards a 'reinforced learning' of fairness.

 

*Figure 1. The attractor*

Currently (twentieth century), in the bottom left corner of Figure 1, we observe large and complex organizations that use AI marginally, alongside other complex organizations actively implementing AI. Additionally, there are smaller and simpler Tax Administrations organized merely by functions, which do not utilize AI. We believe that AI will act both as a catalyst and a unifying force, driving the convergence of TCAs, in the twenty first century, toward a common reality, as measured along the three axes described.

## In, On or Above the Loop

All TCAs in the process of evolving towards this new reality will need to define the relationship between human and artificial intelligence. In the realm of Artificial Intelligence (AI), the concept of Human-In-The-Loop (HITL) plays a critical role, especially during the phases of training, data selection, and testing of Machine Learning (ML) solutions. This process necessitates human intervention to evaluate outputs and provide continuous feedback, thereby enhancing the performance of AI applications. Many citizens only accept AI if controlled by humans, in some cases moved by fear and in others by dignity, yet humans habit the reality of an inhuman world. General Terrence J. O’Shaughnessy’s insights, shared during a Senate Armed Services Committee hearing, highlight a strategic pivot towards a “Human-On-The-Loop” model. This approach modifies the extent of human control in automated decision-making processes, allowing AI systems to initiate actions without prior human approval, yet maintaining overall human oversight. In this model, supervised decisions that will affect the lives of persons will be adopted in real time by AI, although “supervised”. This paradigm shift reflects a significant evolution from traditional wisdom, underscoring the nuanced roles humans can play in conjunction with AI systems (Barnett, 2020.)

Beyond these established models, we contemplate a third perspective that resonates with philosophical underpinnings of mechanism, determinism, and idealism. This third perspective recognizes the ontological essence of human consciousness — not as a deterministic force but as an “observer” capable of mediation and reflection. This notion, described by Patañjali in the Yogasutra, highlights the human potential to stand outside the purely mechanical and determinate cycle, embodying a “Human-Above-The-Loop” approach.

# TAX INFORMATION SPACES AND THEIR INHABITANTS

In the past, Administration faced the “real” of taxable bases defined for tangible elements. Nowadays they also deal with ‘risks’, ‘nudges’, projections, and other inhabitants of numeric abstract spaces. Their outputs must satisfy the current ease of use and ethical demands of taxpayers. We will analyze the way in which TCAs have had to adapt to this new reality.

Slavoj Žižek has provided a comprehensive explanation of a critical aspect of Jacques Lacan’s theory: “*[…] the reality of human beings is constituted by three intertangled levels: the Symbolic, the Imaginary, and the Real. This triad can be nicely illustrated by the game of chess. The rules one has to follow in order to play it are its symbolic dimension: from the purely formal symbolic standpoint, 'knight' is defined only by the moves this figure can make. This level is clearly different from the imaginary one, namely the way in which different pieces are shaped and characterized by their names (king, queen, knight), and it is easy to envision a game with the same rules but with a different imaginary, in which this figure would be called 'messenger' or 'runner' or whatever. Finally, the Real is the entire complex set of contingent circumstances that affect the course of the game: the intelligence of the players, the unpredictable intrusions that may disconcert one player or directly cut the game short.”*

Tax Administrations must engage with the “real” (i.e., income taxes), and adapt themselves to an imaginary world of taxpayers’ expectations by applying and proposing new rules, thus creating a symbolic realm. Every piece of data—whether about objects, or taxpayers—and each word can be conceived as a point within an abstract information space. Digitization extends "information spaces" associated with our lives, and technology allows us to interact in spaces that were previously difficult or impossible to access, enabling us to operate with vectors instead of words. The relationship between Information Spaces and Real Spaces is utilized and exploited in the field of the Internet of Things (IoT).

Tax administrations have intensified their interest in data, requiring taxpayers to provide more and more information about themselves and others. This has led to the creation of Tax Information Spaces (TIS), limited by cultural factors and the extent to which technology is available for citizens.

## Humans and their Comfort Spheres

The Bhagavad Gita teaches that intelligence is the capacity to see things from the right perspective. TCAs should promote the use of human domain expertise to create AI-enabled systems (AIS) designed as “comfort spheres.” We should not create hostile environments. Instead, we should create comfortable imaginary bubbles associated with reality. The term 'comfort sphere' refers to a hybrid work practice involving both humans and AI, where cognitive, emotional, and analytical efforts converge to enhance role fulfillment and provide a sense of comfort. Their limits should be continuously expanding, reducing the Doubt, Fear, and Uncertainty. This can be achieved by increasing the skills of workers, reducing technology overload, and AI aversion and deploying user friendly and reliable systems. In one hand, TCAs should avoid present to older or vulnerable people only the inhuman aspect of an impersonal, technical and in many cases murky interface. On the other hand, we should look for the complicity of civil servants. Consider that according to a study made by Frey and Osborne (2017), nearly 47% of jobs globally are at risk of automation. AI is creating fear, and uncertainty in some skilled professionals while promoting fascination in others. Tax civil servants have, in general, a high internal “locus of control” (i.e., the extent to which individuals believe they can influence events in their lives) (Levenson, 1981.) Having been selected through a rigorous process and having job stability, they are likely to retrain and upskill when faced with automation risks (Innocenti & Golin, 2022). TCAs should leverage this fact.

The Challenge-Hindrance Stress Model (CHM) has been widely accepted. The model posits that workplace stressors can be grouped into two categories: challenge stressors and hindrance stressors. Ding (2021) shows that employees who frame AI use as a challenge stressor, rather than a hindrance stressor, are more likely to adopt active coping strategies and become more productive via increased work engagement.

## Fairness, Clarity, and AI as Judge

TCAs should promote Explainable Artificial Intelligence (XAI), a set of techniques designed to clarify how AI functions. The law is full of grey areas. Vague terms such as ‘reasonable,’ ‘material,’ ‘prudence’ and ‘diligence’ are ubiquitous for business lawyers. Clarity is a virtue that, in the legal field, is imperative, although it has limits, and has led to an excess of litigation.

The real world, unlike chess, cannot be restarted indefinitely. It is more akin to a Greek tragedy, always beginning in the middle of something with unfixed rules and ending dramatically. AI, originally, was trained to win board games, but life is not a game and is created and ruled by the Logos. Philosophers, at least in the Western World, have believed in the power of the Logos, the principle of order, knowledge, and rationality that governs the universe. AI outputs should be explained, if necessary, in plain words

The etymology of the English word ‘*explain’* and the Spanish word ‘*explicar’* differ. In English, ‘explain’ derives from the Latin ‘ex’ meaning ‘out of’ and ‘planus’ (flat), suggesting a process of ‘flattening out’ or making clear. In Spanish, ‘*explicar’* combines the prefix ‘ex’ and the suffix ‘*plicare’* (to fold), implying the unfolding or revealing of something. Although the results are the same, in Spanish it reinforces the idea of revealing “layers of meaning.”

In our opinion, Explainable Artificial Intelligence (XAI) can provide the various layers of meaning synthesized in an output, thereby demystifying the AI's decision-making process. This is especially the case if they are used to determine the best approach in litigation or to assess the fairness of an administrative decision. Even if a machine learning method exhibits high accuracy and detects relevant features (at the explanation level), the legal rationale for a decision might still be unsound when deciding between two aspirants “in the Court of Truth.”

Two legal challenges hamper the adoption of XAI techniques for TCAs' AI systems[[5]](#footnote-5). Challenge number one is to keep AI outcomes explainable to prevent perceptions of injustice, and the second one is the ability to explain the norm’s general case to the taxpayer. If these challenges are resolved, it is possible to make the move from Algorithms to AlgorAI more palatable.

A significant part of TCAs' codes consists of bright-line rules, but it is impossible to cover every possible hypothetical situation that must be solved by applying general principles. The demand for clarity imposes the explainability of AI outputs, to avoid the feeling of being unfairly treated (Alarie and Nibblet, 2016; 2017). We believe that the evolution from algorithmic governance to AlgorAI governance will require deepening our understanding of XAI tools.

A relevant question is whether computers can predict legal outcomes. If it is the case litigation would diminish and a feeling of fairness and reliability would grow. “Legal realism” is a legal naturalistic theory predicated on the notion that all law derives from prevailing social interests and public policy, as opposed to purely formalistic legal considerations. With this vision, jurisprudence should emulate the methods of natural science and rely on empirical evidence and social interest rather than on abstractions when deciding a case. Oliver Wendell Holmes Jr. promoted legal realism in American law sustaining the idea that law should be defined as a prediction, most specifically, a prediction of how the courts behave based on realistic, even moral, or biased, considerations. In an 1897 article "The Path of the Law," he famously remarked that the “prophecies of what the courts will do in fact, [...] are what I mean by the law.”

Alarie and Nibblet have explained that over 1 million publicly available Canadian court and tribunal decisions can be found on the Canadian Legal Information Institute (CanLII). There are also thousands of rulings available from regulators such as the Canada Revenue Agency or various securities regulators. These can be considered as data points where a dispute or legal question has been raised. The Blue J Legal Project has developed tools to characterize each dispute, using 30 factors in these data to predict the outcome.

# THE HUMAN FACTOR

## Artificial colleagues and reliable partners

TCAs should promote the “Acceptance and Influence” of their AI solutions (AI-A&I). The interpretation by civil servants and taxpayers of the capabilities and utility of AI in a use case depends on the individuals’ intentions and motivations. On one hand, taxpayers demand reliability and fairness; on the other hand, tax officers and taxpayers believe that AI possesses less emotional sensitivity and a greater capacity for rational calculation. For example, Fumagalli et al. (2022) show that individuals with lower task performance prefer a human recruiter, expecting an assessment of qualitative information that could benefit them. Fraudsters tend to prefer dealing with human auditors, while compliant companies will favor algorithmic control supported by rulings.

Confidence in fairness and approval can be improved with higher human involvement in the decision-making process, known as augmented decision-making. “Outcome transparency” (i.e., demonstrating how successful an AI agent is in its decision-making) may increase worker trust and willingness to delegate work and decisions to algorithmic agents (Candrian & Scherer, 2022; Lubars & Tan, 2019.)

“Technology Acceptance” and “Technology-Organization-Environment” models indicate that workers are more likely to be inclined to use AI when they perceive it as useful and compatible with existing organizational practices and technologies. The most frequently mentioned factor by end users in the technology dimension is the compatibility of AI with suitable IT infrastructure. Believing that AI use will improve one’s performance is insufficient to ensure adoption; workers also need to believe that the technology is easy to understand, that can be learnt with minimal effort (Chatterjee, Chaudhuri, *et al.,* 2021; Chatterjee, Rana, *et al*., 2021), and that will not reduce them to disposable, instrumental and exploited pieces of the system.

Employees in Tax and Customs Administrations do not fear job replacement due to AI but are concerned about potential impacts on their skills, careers, and disruptions to work processes. Particularly, Customs teams, which previously upheld the rules-based system for selectivity, are resistant to new approaches when presented with AI driven alternatives. The notion that AI is a simple "plug-n-play" strategy is a misconception. Companies need to build extensive internal capacities even to start to take advantage of AIaaS (AI as a Service) options.

Famously, Graham Greene wrote 'The Human Factor.' TCAs must take the human factor into consideration and especially “AI aversion” that is defined as resistance to the use of artificial intelligence advice. They should understand the different approach of experts, middle managers, and operational workers.

Domain experts usually have high AI aversion due to perceiving greater accountability for their work (Allen & Choudhury, 2022) and believing that humans, especially in their field, have superior capabilities to AI. Workers with low domain expertise are more likely to have aversion due to a lesser ability to assess and effectively use AI’s output. In contrast, workers with moderate domain experience, middle managers, are usually more inclined to use AI and can generate benefits from its use (Allen & Choudhury, 2022). Luo et al. (2021).

Emerging evidence regarding generative AI’s effects on workers supports this, with Brynjolfsson *et al.* (2023) showing that the introduction of a generative AI conversational assistant led to lower-skilled and novice customer support workers gaining a productivity advantage, but with little gain achieved by higher-skilled and more experienced workers. These adverse emotions can be attenuated by allowing workers to incorporate their knowledge into the system or by having greater human decision input overall, that is, increasing HITL (Human-In-The-Loop) approaches (Haesevoets *et al.,* 2021.)

Our concept (AI-A&I) has two sides: approval and influence. Let's consider the Apple iMessage strategy as an example. Apple decided to use iMessage for its ecosystem communications exclusively, not allowing messages from phones that were outside of the so-called Apple domain. This exclusivity fostered a sense of belonging and prestige among Apple users, reinforcing brand loyalty.

When Apple eventually introduced cross-platform messaging, they ingeniously differentiated the messages from Apple users and those from other platforms through color-coding: blue for messages sent between Apple devices and green for messages from non-Apple devices. It was a slight visual difference that told Apple's users exactly which ecosystem the sender of a message belonged to, thereby “influencing” (Higgins, T. 2022) their perception of the sender as a complement of the “approval” on the technology they use.

This strategy cleverly leverages the “human factor” to categorize and form in-groups and out-groups, essentially making the choice of messaging platform a statement of identity and belonging. As a result, the decision to purchase or stick with an Apple product, became less about the technological merits of the devices themselves and more about the “social influence” and perception they commanded among peers.

The decision-makers should consider three factors when assessing the opportunity of an AI solution: a) the user's level of domain expertise (expert, medium, and low), b) the role of technology and IT in judging the user to provide services or to act as facilitators and integrators, and c) the complexity of use as the third factor.

 

Figure 2 - Intensity of the AI rejection. *Source: authors.*

The figure above shows that the most significant benefits are achieved in use cases where the systems support tasks of medium complexity for workers with medium expertise in a solution integrated by IT. Equilibrium between the highest and the lowest level of complexity of the AI system will avoid the rejection from its users.

Organizations should prioritize professional judgment and cultivate a “collegial system,” giving primacy to AI as a tool to augment human workers’ judgment. Figure 2 illustrates that the “Approval & Influence” of an AI based system can be enhanced or impeded due to cultural factors. We can achieve the highest degree of Approval and Influence of AI (AI – A&I) where AI is perceived as a “colleague”. Tax and Customs Administrations should encourage the development of “collegial” AI systems within “comfort spheres,” promoting a culture that views AI as a supportive tool rather than a replacement, thereby enhancing decision-making processes with a focus on the human element (Vermas and Singh, 2022).

# USE CASES IN SPAIN

Spain's journey with AI, beginning with neural network adoption in 1998 for VAT control, provides valuable lessons. A decade ago, after experiencing its "AI winter," Spain revitalized its AI efforts, achieving scalability in 20% of the initiatives. Currently, Spain's Tax Agency (AEAT) employs 20 data scientists within a broader team of 600 software developers, highlighting the importance of specialized roles in developing AI solutions for Tax and Customs. This organizational model, distinguishing between Big Data developers and data scientists, offers a blueprint for effectively structuring AI initiatives.

There are two categories of tools used at scale in the Tax Administration of Spain, Machine Learning and AI tools.

## Machine Learning Use Cases

A series of ML applications, including classification, regression, nudges, and scanner automated imaging analysis have been effectively employed in risk analysis to enhance the selection process for taxpayer control and customs clearance. These applications harness advanced analytics to improve accuracy and efficiency in identifying and addressing potential risks. In all instances, these tools operate under the Human-In-The-Loop (HITL) paradigm, where inspectors make the final decision.

We observe a movement in the Spanish administration towards AI, advancing in the AlgorAI dimension. This evolution has not alleviated the concern for fairness. The use of advanced AI techniques to assist taxpayers is simplifying the organization of the administration. We believe this underscored our perception of a TCA following the path determined by the AI attractor.

At the end of the 20th century, Spain designed the SERENE system, a neural network aimed at improving VAT control. It utilized 371 boxes from different forms and was trained with data over a period of four years, achieving a precision rate of 98.76%. *It quickly became obsolete.* We learned several key lessons:

* The goal of an AI system is not merely to win academic contests and to achieve high accuracy on the probability of a taxpayer fraud. Instead, AI must address the concrete problems faced by an inspector, such as identifying how fraud was committed, uncovering the truth, and avoiding litigation with reliable and accurate data.
* AI cannot be a “black box” to inspectors. It must be a “colleague”, facilitating interaction and collaboration.
* AI must integrate with the tools that inspectors use daily, without adding unnecessary complexity.
* AI must comply with the Human-In-The-Loop (HITL) paradigm.

**Behavioral Economic and the use of nudges**

The Spanish Tax Agency focused its efforts on the improvement of taxpayer assistance, as this results in higher voluntary compliance and in a reduction in subsequent verifications. Every year, a significant number of taxpayers make changes to the pre-declaration, resulting in incorrect modifications and therefore data verification procedures that could have been avoided. The Spanish TCA has created a ML model that aims to predict which modifications are more likely to result in error and show a dissuasive message to prevent them from happening. This is in line with Nudge Theory (as coined by Nobel Prize winner Richard Taller). Data verification procedures that are a consequence of incorrect modifications made to the pre-declaration result in processing costs and revenue losses for the Tax Agency (and society in general).

The system has been trained based on the results of past control procedures and it prevents, through personalized messages, incorrect modifications in the pre-declaration, and it enhances the tax risk system by analyzing the results of the model. It has achieved a precision of 73% for the positive class (if the model predicts the taxpayer will make an incorrect modification, this is true 73 out of 100 times on average) and a recall of 68% for the positive class (amongst all incorrect modifications by the taxpayer, the model has identified 68%).

## Artificial Intelligence Use Case

The deployment of chatbots equipped with Natural Language Processing (NLP) technology has revolutionized taxpayer interaction. These chatbots provide immediate, accurate responses to inquiries, facilitating remote assistance and improving overall customer service and have been deployed for assistance in VAT, Customs, and other fields successfully.

In this case, AI has improved organizational simplification by creating new types of assistance units; it has shifted assistance tools in the AlgorAI dimension; and it has provided a new level in the quality of assistance to taxpayers that, we believe, enhances fairness.

From our point of view, this use case fits the Humans-Above-The-Loop (HATL) paradigm because the AI systems interact directly with the user. The quality control of these interactions - the degree of satisfaction of taxpayer - is *Above* the tool. It has been integrated within the middle levels of the organization, reducing the instances of real-time phone assistance to complex questions.

# CONCLUSION

This paper emphasizes the transformative potential and challenges of integrating Artificial Intelligence (AI) into Tax and Customs Administrations (TCAs). It highlights the necessity of a balanced approach that respects both the capabilities of advanced technologies and the indispensable value of human insight.

It is imperative to recognize the dual role of technology as both a catalyst for efficiency and a mirror reflecting our societal values, our fears, and our ethical values.

We strongly believe that TCAs will follow a common journey, as outlined in this document, which encourages the sharing of best practices and lessons learned. The existence of a known path should lead us to discover the footprints of the frontrunners and identify solid milestones.

TCAs should not select use cases solely based on performance. They should align technology with human expertise on a case-by-case basis. This approach fosters an environment where AI assists rather than replaces human expertise, creating "Comfort Spheres" where Tax and Customs professionals, with “artificial colleagues” can provide a better service.

In the short term it is imperative that TCAs not only leverage AI for efficiency and accuracy, but also maintain a keen awareness of the ethical and social implications of their technological choices. The pursuit of simplicity through AI, governed by principles of 'AlgorAI' and 'Ruled Fairness,' must also consider the preservation of human dignity and the equitable treatment of all stakeholders.

In conclusion, the journey towards integrating AI into TCAs is not just about technological adoption but also about fostering ‘Simplexity’, driving innovation and ensuring fairness, it is also about “approval and influence” (AI-A&I).

We strongly believe that in this journey, TCAs can achieve not only operational excellence but also contribute to a more just and equitable society placing themselves *above the technology and taming the loop*.

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1. The notion of ‘‘simplexity’’ was borrowed from Klugger (2007) [↑](#footnote-ref-1)
2. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_data/file/771123/OTS\_Technology\_paper\_Jan\_19.pdf [↑](#footnote-ref-2)
3. https://assets.kpmg.com/content/dam/kpmg/ch/pdf/ai-transforming-the-enterprise-broschure.pdf [↑](#footnote-ref-3)
4. Administrative powers. [↑](#footnote-ref-4)
5. By “tax AI system” (or “AI in tax,” “AI in taxation,” etc.), we understand any AI system that is used for delivering the decisions of TCAs, granting approvals, selecting taxpayers, invoices, or SADs for control, or other tax-related decisions. [↑](#footnote-ref-5)