AN EMPIRICAL MODEL INTEGRATING AI INTO GOVERNMENT

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ARTICLE INFO	ABSTRACT
	This study explores the evolution of global AI dynamics by discussing its role in government with a focus on aspects of development and governance of social and technological systems STS. This document reports three research questions, including the extent of the analysis: 1 theories regarding the concept of AI in the public sector; 2 expectations regarding the development of AI in the public sector; and, 3 the challenges and opportunities of AI in the public sector. This experimental study provides an experimental framework for a comprehensive approach to measuring the magnitude of AI policy that allows for the methods of evaluating different governance practices and policy priorities in different countries. The study sheds light onto areas of policy that have the potential to implement AI programs and strategies; administrative functions open to the acceptance of AI applications and strategies; and the challenges / risks that community managers may face in defining AI policies and projects in the public sector including how to deal with cyber-troops.

INTRODUCTION

Big data systems powered by AI technology are transforming governments and communities, challenging what were once considered values. Probably, the most common use of AI in government occurs in security, using face recognition. Gershgorn 2019 reported facial recognition by California police; Margetts and Dorbantu 2019 have reported the issue of the London Metropolitan Police in 2017. World governments have defined AI strategies and policies that address the uncertain future (Bratton, 2015). Therefore, the purpose of this paper, as well as other domains of online government-based technology (Agre, 1994; Allen, 2016; Bratton, 2015) is to understand the understanding, expectations, challenges / opportunities. of key public sector stakeholders. There is a growing concern that the widespread use of facial recognition will lead to the dramatic decline of privacy and civil liberties. Ubiquitous CCTV cameras and giant databases of facial images, ranging from public social network profiles to national ID card registers, make it alarmingly easy to identify individuals, as well as track their location and social interactions. Moreover, unlike many other biometric systems, facial recognition can be used without subjects' consent or knowledge.

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Pervasive surveillance is not the only risk brought about by facial recognition. Apart from identifying individuals, the algorithms can identify individuals' personal attributes, as some of them are linked with facial appearance. Like humans, facial recognition algorithms can accurately infer gender, age, ethnicity, or emotional state (Bucher, 2018; Castañeda, 2018; Decuypere, 2019a). Unfortunately, the list of personal attributes that can be inferred from the face extends well beyond those few obvious examples. A growing number of studies claim to demonstrate that people can make face-based judgments of honesty, personality, intelligence, political orientation , and violent tendencies. Moreover, the accuracy of the human judgment is relatively low. For example, when asked to distinguish between two faces—one conservative and one liberal—people are correct about 55% of the time (Gulson, 2019), only slightly above chance 50%. Yet, as human-beings may be missing or misinterpreting some of the cues, their low accuracy does not necessarily represent the limit of what algorithms could achieve. Algorithms excel at recognizing patterns in huge datasets that no human could ever process, and are increasingly outperforming us in visual tasks ranging from diagnosing skin cancer to facial recognition personality 64% vs. 57%; derived from Pearson's rs , and—as shown here—political orientation. National / state governments are actors in a variety of contexts in introducing new regulations on key issues, including data protection and security, citizen privacy, the future of public employment, the implementation of robots, automated decision-making, ethical principles, among others (Hartong, 2019; Lury, 2012; Martin, 2014).

Not to mention, not all countries will be controlling and designing AI in government with the same principles, democratic values, and objectives. Therefore, the purpose of this study is to understand the understanding, expectations, and challenges / opportunities regarding AI in the public sector. This article presents three research questions, including three dimensions of analysis:

- What is the view of those who handle AI in this sense? Ideas related to the concept of AI in the public sector;
- What are the expectations of those stakeholders managing AI in terms of its progress in public administration?
- What are the major challenges and opportunities for public administration to manage AI? Challenges and opportunities for AI in the public sector.

The framework of the proposed method in this study will provide a descriptive method for evaluating these research questions.

The paper is structured as follows: Starting with a review of emerging AI management models in the public sector, the paper develops analytical strategy and research methods, including research questions. Section four presents the research framework in terms of three dimensions of analysis. Section five discusses the usefulness of the framework by looking at emerging AI documents in government. The final section concludes with a conclusion, developing ideas for the future development of this area of developing research and training content lead to user learning and understanding of how machines learn.

Related Work: Early in the history of computer science, one of the pioneers in computer science, James H. Moor, explained in his famous article "What is computer ethics?" policies open when policies conflict with technological advances that force us to "discover and make clear what our favorite values are"(Lewis, 2020). The history scholar Thomas P. Hughes described the general development stages of major technological development and expansion programs from the establishment, development, innovation, transfer and growth, competition and integration (Mathias, 2018; Piattoeva, 2020). Hughes refers to a "systemic war" in which the old and new systems exist simultaneously in a "linguistic tension" relationship. The stage of competition and integration is therefore also a time of conflict and resolution not only between engineers but also politically and legally. In these times of conflict, critical issues are identified, various interests are discussed and finally solutions are put together to guide the emergence of programs. The new system, or modification of the old system, then shifts to the very problems identified in this section.

Unlike Moror 1982 (Light, 2018; Ratner, 2019), Hughes (2019) does not consider these periods to be described as being influenced solely by the changing character of technology programs. He looks at their conversations in complex social contexts. In fact, he held that technology itself was linked to social, economic, and cultural problems.

This paper does not intend to enter into discussions on epistemological weights on the scale of social constructivism and relativism or technical determinism and environmental truth in science and technology e.g., as should be the case in some studies (Martin, 2014; Light, 2018; Ratner, 2019. Instead, it has to do with how we know the things and the skills and the skills and resources we use to create technology from an STS perspective. Harry M. Collins defines skills as goals and objectives and collections of technological principles. They are unexplained or "hidden" technological advances (Prince, 2017; Ratner, 2019).

Background: Government and AI

The use of artificial intelligence AI in government is nothing new. Since the 1980s, public AI adoption has evolved from an emperor-based system equipped with human expert knowledge to evolving systems and learned big data in digital environments through a decision-making body that continues to be independent and powerful (Ruppert, 2013). Aside from the growing importance of AI in the public sector, there are a few studies that address this emerging topic. Valle-Cruz, et al. (Bucher, 2018) expanded the literature review on AI in government, recognizing that practice and practice are much faster than scientific and theoretical manifestations. In general, AI-based publications in the public sector are based on experience, cases, opinions, and results from the private sector (Castañeda, 2018). From a public point of view, some argue that the massive use of social media, robots, big data, and more recently, AI in the public sector can be regarded as the fourth wave of information and communication technology ICTs from the public sector or the introduction of the fourth industrial revolution (Williamson, 2017). This new wave of technological dissemination in the public sector encompasses all aspects of operations i.e., strategic management, human resource management, performance appraisal, institutional communication and policy areas i.e., health, education, boundary control, customer service, emergencies, taxes, social benefitsand based on open and large data volumes and the ability to process new organizations (Ruppert, 2013). Therefore, this fact opens the door for public sector organizations to establish themselves in a different dimension.

Nowadays, very powerful computer processors, as well as the rapid emergence of the hardware and software industries have encouraged significant AI growth in various fields and countries. By 2010s, the social and technological data infrastructure developed by independent AI software systems, or autonomous, detecting and interpreting their locations worldwide increased significantly in the private and public sectors in health care, security, finance, emergency, defense, government, law, transport, and power. The US was the first to move towards global investment in AI and the creation of an AI biodiversity program, with China and the EU following suit (Thompson, 2018). Some authors suggest that AI will transform interactions with citizens and other social actors, using algorithms and other technological tools to enhance this experience from traditional web-based services. With the provision of AI environment and expertise in the public sector, many governments are accelerating expectations about their impacts. At the same time, they are working on understanding this new wave of technological emergence, their use, and impact. In addition, academics disagree on the effects of AI in the public sphere. This ambiguity is particularly important among government officials and senior executives in civil society organizations. Some scholars claim that AI will provide the benefits of efficiency in public organizations drawn from the creation of large data sources and analytics to improve all internal processes and functions (Lury, 2013; Piattoeva, 2020; Prince, 2017). Some think that AI will open up a different phase of public institution management including AI-related technological disruptions in policy making and decision-

making processes (38). Most public administration experts think that the power and conclusions of private companies could be transferred more quickly to the public sector. This AI and public sector learning approach takes the need to define a particular focus on staff, jobs, citizens, and ultimately participates in public administration and policy. This study focuses on AI analysis from ambiguous ICT goals in government and public administration. AI in government involves the design, construction, implementation and testing of computer algorithms and techniques to improve the management of public organizations (Lindh, 2016; Martin, 2014). At this stage, governments around the world are beginning to adopt independent strategies for algorithmic management to transform decision-making and policy processes, service delivery, and citizen engagement (23, 27, 29). However, there are no consensus on the impact of AI on the public sector.

Existing Work of AI Research on Government: Existing work on AI and algorithms are limited directly related to public administration. In particular, automated technology is expected to have a direct impact on the state of the public sector. This could mean a shift from the passion for automation, computer policies, and digital management based on Web-based technology, to intelligent governance that requires continuous communication and learning with people based on inter-algorithm technology (Hartong, 2019; Lewis, 2020); Also, this new wave of technology in the public sector will be reflected in the emergence of dynamic forms of organization e.g., Holacracy, or open cultures of cooperation between individuals and government employees (Lury, 2012). Feed AI data is generated, collected, stored, and processed using information systems and technology algorithms that are perceived as neutral, or at least impartial by humans (30, 33, 27). These instruments of logical technology are the basis of descriptive, predictive, descriptive, and automated positivist analytics (11, 33). Therefore, AI thinking has been incorporated into the concept of big data analysis, as well as non-testing algorithms (11, 19, 28). This type of thinking make sit difficult for government organizations and public sector managers analyzing the risks of policy-making processes and public decisions based on biased sets of data or unethical algorithms (3, 5, 18). Under the guise of "political marketing", various political parties, trade unions and other civil society organizations and actors may be involved in deliberately spreading harmful information by following dissenters against anti-founders or homosexual lines and xenophobia. The growth or domination of a particular political ideology left or right can also contribute to the practice and toxic public discourse. In general, there are three types of main characters that can be involved in manipulating social media. They are the state, the media and the private sector:

- Firstly, the government can be a key source of false domestic information and false information through state news outlets, troll forces and the police to spread false information online. The government controls a number of news outlets (13)such as state-run newspapers or television companies

- Second, many untrue stories and untrue stories come from government-controlled media. By 2020, "all state institutions have shown evidence of propaganda and deception," said an independent media monitoring report (23).

- Third, most troll groups can be linked to the state. These trolls can create "dirt and lies" on social media (13, 17, 18)by linking their activities online.

Strategies, Tools, and Strategies: Social media, which now counts as part of AI, is often blamed for a lack of independence and often mixed with real and false news, is linked to political activists or people who spread false stories that pretend to come from trusted sources like CNN or the BBC's personal Facebook accounts, anonymous Facebook groups and WhatsApp. Sometimes the mainstream media can take those stories or politicians to discuss false information made by social groups or people who share it with their supporters. Trolls are very active on Facebook. The main sources of deceptive content on social media are human-based accounts. They include social networking sites, websites, and messaging apps. Unidentified information on social media can also come from the accounts of government-run stores and groups harassing political opponents with small words, and misleading the public into believing this is anonymous. Typical foreign-language narratives include presenting EU or US institutions as "weak" and promising the imminent collapse of the West (13, 19, 28). There are also other troll farm signs running on social media. However, they do not seem to serve as a major source of false information on social media. The platforms most affected by the ignorance are Facebook, Twitter and YouTube, in general.

Facebook is the forerunner of all social media for any cyber troop activity. Research since the 2014 elections has shown that 70% of voters use Facebook to access news and information (11, 14, 17). As of May 2020, active use of Facebook was almost 68%, compared to 18% for Pinterest and 10% for YouTube Global Statistics, 2020. Twitter and Instagram are lagging behind by less than 2% Global Stats, 2020. Although the general public uses Facebook rather than Twitter, politicians and political activists also have Twitter accounts. Political activists rely on Twitter to move their issues consistently forward, so that politicians do not see them as meaningless arguments but as real social problems. In addition to the low use of Twitter, repetition pays to influence politicians' view of social status. Given the fact that WhatsApp is a private messaging system, rather than a social media platform, WhatsApp's fake news situation is a threat that can only be started with more digital learning. Table 1 summarizes the strategies, tools and techniques seen to exploit social media in general.

Table 1. Observed Strategies, Tools and Techniques of Social Media Manipulation

Account Types	Messaging and Valence	Content and Communication Strategies	Platforms
Human	Polarization strategies including attacks on government reforms, immigration, diversity and inclusion, and religious values/human rights/social issues, Trolling and Harassment, Defamation attempts/accusations of corruption	Facebook pages, disinfo/misinfo websites, including news websites linked to political parties, memes, misleading photos or images from elsewhere	Facebook, WhatsApp, Twitter

Propaganda efforts may be centered and distributed:

- Central co-ordination is possible through government agencies that control all key statistics in the police and state affairs.

- Some troll groups operate in a very reduced way. However, their origins and interactions are uncertain. There is little information available about the source used to fund fraud attempts. Government-controlled media will certainly need essential resources to share deceptive political content.

If there is any attempt to use bots for political propaganda, they can also be done in a negative way. For example, many accounts can share the same text, so these are easily recognizable. However, any such efforts can be combined. Theoretically, bots can have a huge impact, but when it comes to spreading false information in small countries, misinformation can go further and faster than tools like WhatsApp without the use of bots. Similarly, high-level "deep fakes", in which a person in a photo or video is inserted by another to use the content, are possible. For political purposes. In some cases, political activists may use images that have come from elsewhere, making them easier to identify as false. Finally, the systematic use of media prosecutors paid or unpaid by political parties or other political actors to amplify their messages, could also be one of the government's options.

Government and private responses: Government actors are very concerned about information from a foreign country. The most important method used by the government to respond to this false information sponsored by the government is the media network. To date, the government may use the "Information Security Concept" based on the purposes of "information ownership." The concept can prioritize state-of-the-art information management. This concept is likely to involve a greater response to misinformation and the propaganda of foreign powers. Therefore, it should be aimed at ensuring the security of the information of the authorities "rather than the people". Various public and private sector projects can be implemented to curb the spread of online information. This includes public sector initiatives such as protecting the integrity of the electoral process, as well as projects investigating the truth by the government, or other media. Each is briefly described below.

Social sector programs: Some non-profits may choose to fight against disinformation campaigns through education and communication rather than following a punitive approach. Such a strategy is based on three main pillars:

- Advanced digital literacy;
- Improved communication; and
- Immediate response to anonymous information campaigns.

Other workshops can be conducted with the target audience, including local politicians, municipal leaders and youth political leaders. Some may be open to the public. Similarly, social media companies can offer conferences to public officials, political parties, and the media on how to identify false information and propaganda. The second pillar is based on the development of interactive communication and dialogue and videos to dispel common myths about elections, and to explain electoral processes to journalists, especially municipal elections. The purpose is to prevent untrue stories from getting into the bloodstream. Building relationships with an open channel of communication with the media is important to ensure that when suspicious items are found, they are skeptical, ask critical questions, and call on the relevant

organization to confirm before contributing to the leading false news. A third pillar of public response to inappropriate information campaigns involves the immediate implementation of responses by including in its agreement an open channel with social media such as Facebook that contains censorship content that may threaten the integrity of the electoral process. To achieve this, election judges will be compelled in the first phase to issue a decision to provide evidence to support their decision. Once approved, the related non-profit organization will be allowed to call the number on Facebook to request that the content be reduced. The provision will only be used in extreme cases, for example when public order or the basic right to vote is threatened by false news or organized media fraud. In addition to these processes, a fact-finding alliance between all major issues can also be established at the national level with the help of telecommunications companies. The idea is that each media company can assign two of its journalists to the fact-finding team during the election process and will publish the unit's findings in all participating news outlets. This unit will maintain the ownership of the editing process and the social media platform may be able to inform its users of false information.

Proposed Model: The study provides a framework for conducting online research for government / national officials leading governmental policies. The research process for data collection contains research see the Appendix to review the analysis strategy and research questions. The questionnaire consists of 19 questions targeting public officials who control ICT in various international departments. Research has been developed and constructed based on a review of various books focusing on art and theoretical studies(20, 25, 24, 17, 19). This research identifies various typologies and concepts that are very helpful in formulating final questions. To assess the magnitude of this study, research results can be analyzed using descriptive statistics. These simple but effective methods are useful to achieve the purpose of exploratory research.

RESULTS AND DISCUSSION

This section provides a framework for three key elements as it will be explored by public officials: ideas, expectations, and AI opportunities / challenges in government. The study provides key information from senior public officials leading technical policies in national / state governments.

Ideas on the concept of AI in the public sector: In the first case, this study examines the perceptions of government officials about AI in the public sector, as emerging technologies can be unanimously understood, accepted and applied. In particular, the views of senior management will help to realize the magnitude and power of AI in the public sector as this community management team "plans" IT policies. Therefore, this part of the study sheds light on the concepts, and strategies commonly associated with, AI by national / national stakeholders such as CIOs Chief Information Officers or IT managers. The survey question asks, "how much do you agree with the following ideas about artificial intelligence". The answers to the study question are Likert's seven-point scale, ranging from "I totally agree" 7 to "strongly disagree" 1. Table 2 shows the overall sample view for general deviations.

Table 2. General AI-related ideas in the public sector

	Average	Standard deviation
I am open-minded in terms of adoption of AI.		
AI in the public sector is similar AI in the private sector.		
It is likely that robots and humans will share jobs.		
Given complex interactions between robots and human-beings replacement process will have huge impacts.		
Other "intelligences" might be necessary for public sector.		
Emerging professions in the public sector relating to AI need to be evaluated in detail.		
Average		

Ultimately, size will include a section set to identify the skills and behaviors of senior executives who link them to changes based on the use of AI in the public sector. The research question on power / morality says, "in terms of this level of power and morality of the people, how much do you agree with their transformation by artificial intelligence in the public sector?" . Table 3 shows a summary of the officials' responses as they report common experiences on AI-based power and behavior change in the public sector.

Table 3. Human capacity and behavior based on AI

	Average	Standard deviation
Monitor		
Monitor		
Analyze		
Act		
Interact		
Remember		
Anticipate		
Feel		
Moralize		
Create		
Decide		
Average		

Expectations for AI in the public sector: Social and political expectations about AI are high in terms of achievement and benefits, but also in terms of potential problems. This part of the study examines the expected impact of AI on various management functions in the public sector. To understand this magnitude, the survey question was, "in your view, what about the following activities that will be most affected by artificial intelligence in the short term?". Figure 1 shows the sample answers in the study in the multiple-choice question minimum of three response options in the full list. The final section of this rating examines the expected impact of AI on various areas of high-level public policy. To understand this magnitude, the survey question I am asking is, "In your opinion, when will public policy domains be adopted artificial intelligence from the outset?" Figure 2 shows the sample answers in the study in the multiple-choice question minimum of three answer options in the full list.

Challenges and opportunities for AI in the public sector: This final aspect of the study described the challenges and opportunities based on the realities in the use of AI in the public sector.
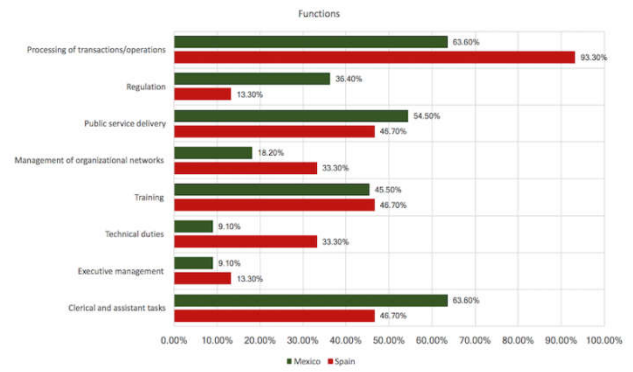

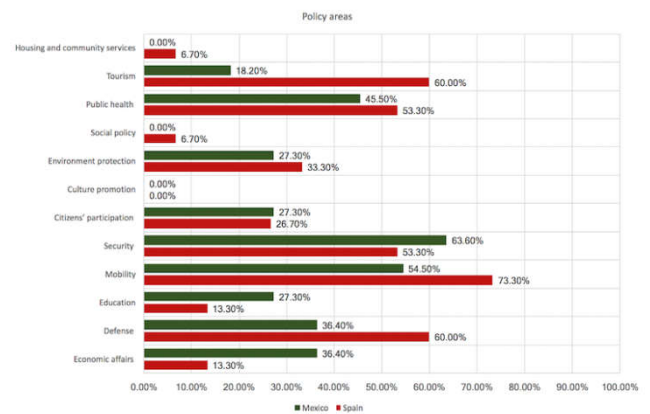**Figure 1. Sample expected tasks that are most affected by AI performance**

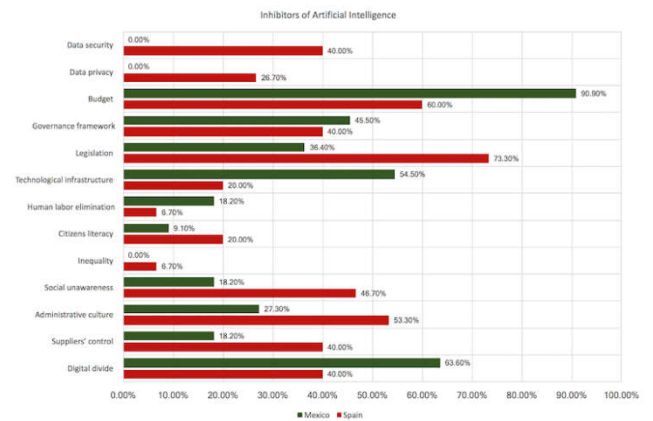**Figure 2. A sample of the expected policy areas using artificial intelligence is still young**

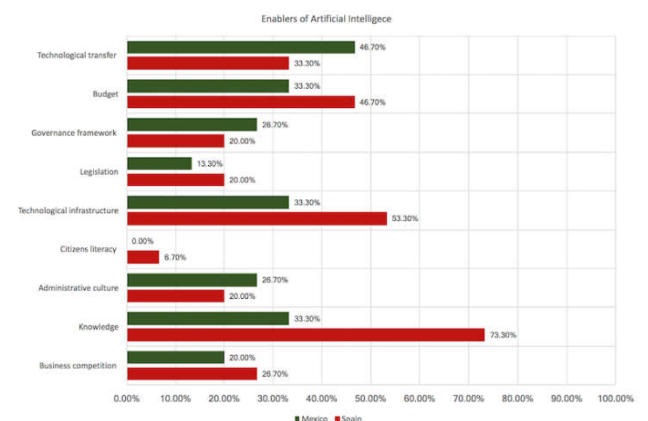**Figure 3. Inhibition of implants in public organizations**

Figure 4. AI power makers in community organizations

Here, attention is paid to IT leaders in departments that promote or organize, at least in part, applications, cases, and strategies, based on algorithms, big data analytics, and AI technology, programs, or applications, dealing with inhibitors different and providers. First, analyzing inhibitors explained how CIOs understand the real challenges in AI implementation in their organizations. To understand this magnitude, the survey question states, "what are the major barriers to the use of artificial intelligence in the public sector?" Answers to the survey are multiple choice questions minimum of three response options in full list. Figure 3 outlines three key constraints, including digital budget diversification, technical and legal infrastructure. This section reports real differences in the experience of implementation based on each country. At the same time, the barriers address different issues in the public sector, developing, in a way, the same ideas in different AI governance systems. Learning developers provided insight into how CIOs understand the real possibilities in the use of AI in their organizations. As for the promoters, the question for the survey is, "What are the most important factors in the application of artificial intelligence in the public sector?" Figure 4 shows the sample answers in the study in question multiple answers minimum of three response options in the full list.

Conclusions

Politics is in large part a conversation about how we define those ground rules in a way that enjoys the widest possible legitimacy, and the challenge that social media now faces is, for better or worse, inherently political. The framework provided in this study is an attempt to understand the first steps of government artificial intelligence AI. In the light of public opinion, it will be clear how much the country advertises AI, at least in some way, not only to the government itself, but also to the government to the public promoting business or citizen ideas, providing little or no prominence in data protection, privacy, and security. certain and other areas of policy, and designed different forms of governance. Should a private company be intervening to shape the ideas that flow across its systems, above and beyond the prevention of serious harms like incitement to violence and harassment? If so, who should make that decision? Essentially, this research sheds light onto areas of policy that have the potential to implement AI programs and strategies; administrative functions open to the acceptance of AI applications and strategies; and the challenges / risks that community managers may face in defining AI policies and projects in the public sector including how to deal with cyber-troops. The future of AI in government and public administration is not predetermined. Various voices seek appropriate AI policies and strategies, anti-discrimination, and equality. The results would also assist senior officials to evaluate their nationally submitted AI policies in practice during the construction and implementation of various national / state, regional / state, and local / municipal environments. Last, but not least, agreeing on what constitutes the collective good is very hard indeed. A better understanding of the relationship between the user and the algorithm is in everyone's interest. People need to have confidence in the systems that are so integral to modern life. The internet needs new rules for the road that can command broad public consent. And tech companies need to know the parameters within which society is comfortable for them to operate, so that they have permission to continue to innovate. That starts with openness and transparency, and with giving you more control.

REFERENCES

Agre, P. E. 1994. Surveillance and capture: Two models of privacy. The Information Society, 102, 101–127.

Allen, J. 2016. Topologies of power. Beyond territory and networks. Routledge.

Bratton, B. 2015. The Stack: On software and sovereignty. MIT Press.

Bucher, T. 2018. If...then: Algorithmic power and politics. Oxford University Press.

Castañeda, L. and Selwyn, N. 2018. More than tools? Making sense of the ongoing digitizations of higher education. International Journal of Educational Technology in Higher Education, 151.

Decuypere, M. 2019a. Open Education platforms: Theoretical ideas, digital operations and the figure of the open learner. European Educational Research Journal, 184, 439–460.

Dieter, M., Gerlitz, C., Helmond, A., Tkacz, N., Vlist, F., Der, V., & Weltevrede, E. 2018. Store, interface, package, connection : Methods and propositions for multi-situated app studies. CRC Media of Cooperation Working Paper Series No 4.

Drucker, J. 2020. Visualization and Interpretation: Humanistic Approaches to Display. MIT Press. Journal of New Approaches in Educational Research, 101

Mathias, Decuypere The Topologies of Data Practices: A Methodological Introduction Fedorova, K. 2020. Tactics of Interfacing. Encoding Affect in Art and Technology. MIT Press. Goriunova, O. 2019. The Digital Subject: People as Data as Persons. Theory, Culture & Society, 366, 125–145.

Gulson, K. N., Lewis, S., Lingard, B., Lubienski, C., Takayama, K. and Webb, P. T. 2017. Policy mobilities and methodology: a proposition for inventive methods in education policy studies. Critical Studies in Education, 582, 224–241.

Gulson, K. N., & Sellar, S. 2019. Emerging data infrastructures and the new topologies of education policy. Environment and Planning D: Society and Space, 37, 350–366.

Hartong, S. 2020. The power of relation-making: insights into the production and operation of digital school performance platforms in the US. Critical Studies in Education, 0000, 1–16.

Hartong, S., & Förschler, A. 2019. Opening the black box of data-based school monitoring: Data infrastructures, flows and practices in state education agencies. Big Data & Society, 61,

Lash, S. 2012. Deforming the Figure: Topology and the Social Imaginary. Theory, Culture & Society, 294-5, 261–287.

Latour, B. 1986. Visualization and cognition: Thinking with eyes and hands. Knowledge & Society, 6, 1–40. Retrieved from http://hci.ucsd.edu/10/readings/Latour1986.pdf

Law, J. 2004. After Method: Mess in Social Science Research. Psychology Press.

Lewis, S. 2020. Providing a platform for "what works": Platform-based governance and the reshaping of teacher learning through the OECD's PISA4U. Comparative Education, 564.

Lewis, S. and Hardy, I. 2017. Tracking the Topological: The Effects of Standardised Data Upon Teachers' Practice. British Journal of Educational Studies, 652, 219–238.

Light, B., Burgess, J. and Duguay, S. 2018. The walkthrough method: An approach to the study of apps. New Media and Society, 203, 881–900.

Lindh, M. and Nolin, J. 2016. Information We Collect: Surveillance and Privacy in the Implementation of Google Apps for Education. European Educational Research Journal, 156,

Lury, C. and Day, S. 2019. Algorithmic Personalization as a Mode of Individuation. Theory, Culture & Society, 362, 17–37.

Mathias, Decuypere The Topologies of Data Practices: A Methodological Introduction Lury, C., Fensham, R., Heller-Nicholas, A., & Lammes, S. 2018. Routledge Handbook of Interdisciplinary Research Methods. Routledge.

Lury, C., Parisi, L. and Terranova, T. 2012. Introduction: The Becoming Topological of Culture. Theory, Culture & Society, 294-5, 3–35.

Lury, C., Tironi, M., & Bernasconi, R. 2020. The Social Life of Methods as Epistemic Objects: Interview with Celia Lury. Diseña, 16, 32–55.

Lury, C. and Wakeford, N. 2012. Introduction: A perpetual inventory. Inventive Methods pp. 15–38. Routledge.

Martin, L. and Secor, A. J. 2014. Towards a post-mathematical topology. Progress in Human Geography, 383, 420–438.

Piattoeva, N. and Saari, A. 2020. Rubbing against data infrastructures: methodological explorations on working within the impossibility of exteriority. Journal of Education Policy, 0000, 1–21.

Plantin, J. C., Lagoze, C., Edwards, P. N., & Sandvig, C. 2018. Infrastructure studies meet platform studies in the age of Google and Facebook. New Media and Society, 201, 293–310.

Prince, R. 2017. Local or global policy? Thinking about policy mobility with assemblage and topology. Area, 493, 335–341.

Ratner, H. 2019. Topologies of Organization: Space in Continuous Deformation. Organization Studies, 1–18.

Ratner, H. and Gad, C. 2019. Data warehousing organization: Infrastructural experimentation with educational governance. Organization, 264, 537–552.

Ratner, H. and Ruppert, E. 2019. Producing and projecting data: Aesthetic practices of government data portals. Big Data & Society, 62, 1–16.

Ruppert, E., Law, J. and Savage, M. 2013. Reassembling Social Science Methods: The Challenge of Digital Devices. Theory, Culture & Society, 304, 22–46.

Suchman, L. 2012. Configuration. In C. Lury& N. Wakeford Eds., Inventive Methods: The Happening of the Social pp. 48–60. Taylor and Francis.

Thompson, G. and Cook, I. 2015. Becoming-topologies of education: deformations, networks and the database effect. Discourse: Studies in the Cultural Politics of Education, 365, 732–748.

Thompson, G., & Sellar, S. 2018. Datafication, testing events and the outside of thought. Learning, Media and Technology, 432, 139–151.

van de Oudeweetering, K., & Decuypere, M. 2019. Understanding openness through invisible platform boundaries: a topological study on MOOCs as multiplexes of spaces and times. International Journal of Educational Technology in Higher Education, 161.

van de Oudeweetering, K., & Decuypere, M. 2020. In between hyperboles: forms and formations in Open Education. Learning, Media and Technology, Advance online publication, 1–18.

Williamson, B. 2017. Learning in the "platform society": Disassembling an educational data assemblage. Research in Education, 981, 59–82.

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