Augmented Digital Government with in the AX Era: Opportunities and Challenges

M. Jae Moon

Underwood Distinguished Professor and Director of the Institute for Future Government

Yonsei University

미래정부연구센터

Institute for Future Government

YONSEI UNIVERSITY

M. Jae Moon, Yonsei University

- Underwood Distinguished Professor and former Dean, College of Social Sciences, Yonsei University, Korea
- Director of Institute for Future Government, Yonsei University
- Co-Chair of the Public Data Strategy Committee, RoK
- Chair of the AI Ethics Policy Forum, RoK
- Member of Presidential Committee on Digital Platform Government, RoK
- International Expert of the Global Partnership of Artificial Intelligence (GPAI)
- Selected as a 100 World Most Influential People in Digital Government in 2018 and 2019 by Apolitical
- Chair of Digital Government Document Innovation Forum
- Co-chair of Organizing Committee for Seoul Smart City Prize
- Member of Advisory Group of Digital Technology for Development, Asian Development Bank (ADB)

Evolution of E-government? Evolution of AI-government? Rhetoric or Reality?

M. Jae Moon
Texas A&M University

The Evolution of E-Government among Municipalities: Rhetoric or Reality?

Information technology has become one of the core elements of managerial reform, and electronic government (e-government) may figure prominently in future governance. This study is designed to examine the rhetoric and reality of e-government at the municipal level. Using data obtained from the 2000 E-government Survey conducted by International City/County Management Association and Public Technologies Inc., the article examines the current state of municipal e-government implementation and assesses its perceptual effectiveness. This study also explores two institutional factors (size and type of government) that contribute to the adoption of e-government among municipalities. Overall, this study concludes that e-government has been adopted by many municipal governments, but it is still at an early stage and has not obtained many of expected outcomes (cost savings, downsizing, etc.) that the rhetoric of e-government has promised. The study suggests there are some widely shared barriers (lack of financial, technical, and personnel capacities) and legal issues (such as privacy) to the progress of municipal e-government. This study also

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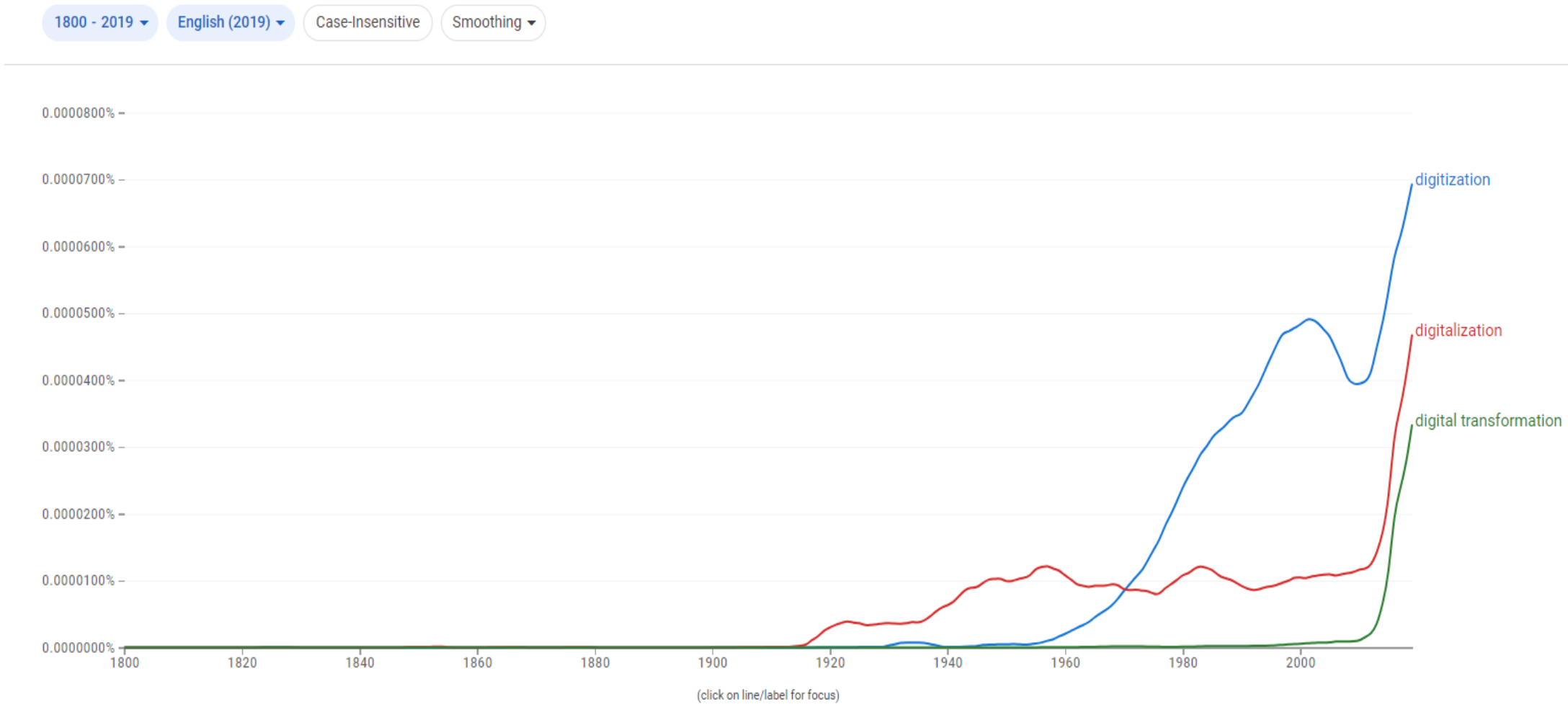


Why Should We Pay Attention to Digital Transformation?

FIGURE 3

Ranking of most common rationales for digital transformation cited by government and commercial respondents

Top rationale for digital transformation	Government (global)	US government	Corporate
We need to modernize/keep up with the times	#1	#1	#2
To enable us to innovate faster	#2	#2	#1
Meeting citizen demands/expectations	#3	#4	N/A
To become more resilient	#4	#3	#4
Delivering on agency's mission	#5	#4	N/A
To comply with regulations	#6	#6	#6
Changes in our industry require it	N/A	N/A	#3
Competitor moves require it	N/A	N/A	#5

Source: Deloitte analysis.

Deloitte Insights | deloitte.com/insights

https://www2.deloitte.com/content/dam/insights/articles/6974_CGI-Digital-2/figures/6974_figure3.jpg

FIGURE 4

The seven digital pivots to propel an organization's progress toward digital maturity

Data mastery	Aggregating, activating, and connecting siloed, underutilized data by embedding it into services and operations to increase efficiency and enhance service delivery
Flexible, secure infrastructure	Implementing technology infrastructure that balances security and privacy needs with the ability to flex capacity according to demand
Digitally savvy, open talent networks	Retooling training programs to focus on digital competencies, and staffing teams through flexible, contingent talent models to rapidly access in-demand skill sets and flex the organization's workforce based on the organization's need
Ecosystem engagement	Working with external business partners including R&D organizations, technology incubators, and startups to gain access to resources such as technology or people to increase the organization's ability to improve and innovate
Intelligent workflows	Implementing and continuously recalibrating processes that make the most of both human and technological capabilities to consistently produce positive outcomes and free up resources for higher-value actions
Unified customer experience	Delivering a seamless customer experience built around a 360-degree view of the customer that is shared companywide so that customers experience coordinated digital and human interactions that are useful, enjoyable, and efficient in immersive, engaging environments
Innovation and new business models	Innovating the organization's array of business models by adopting new business models to adapt to changing constituent needs and improving service delivery

Source: Deloitte analysis.

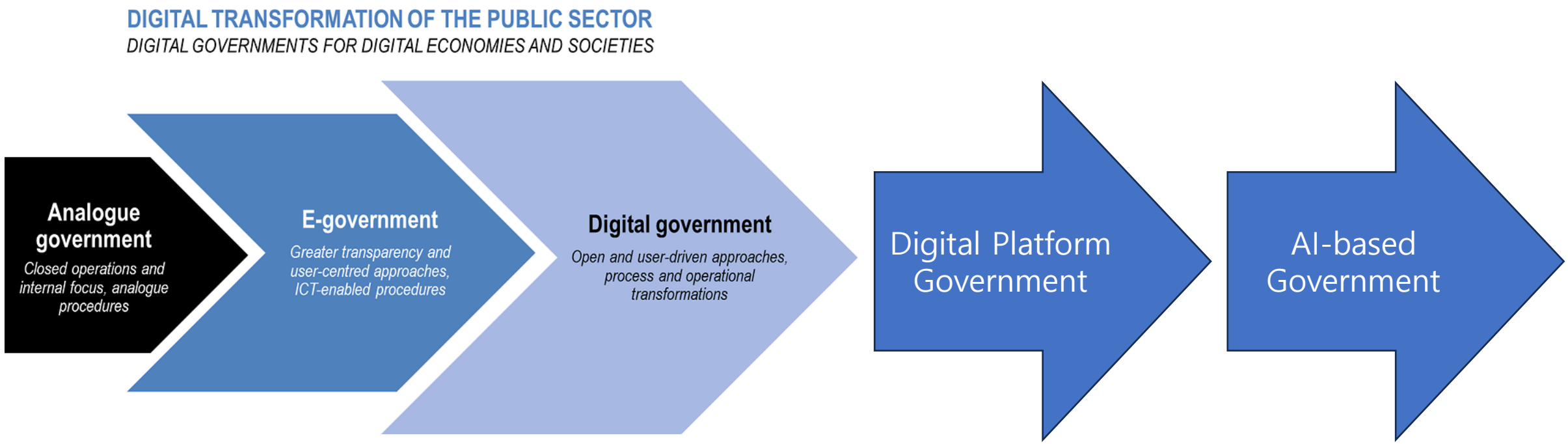
Deloitte Insights | deloitte.com/insights

https://www2.deloitte.com/content/dam/insights/articles/6974_CGI-Digital-2/figures/6974_figure4.jpg

Digital Transformation, Changing Rule of Game?

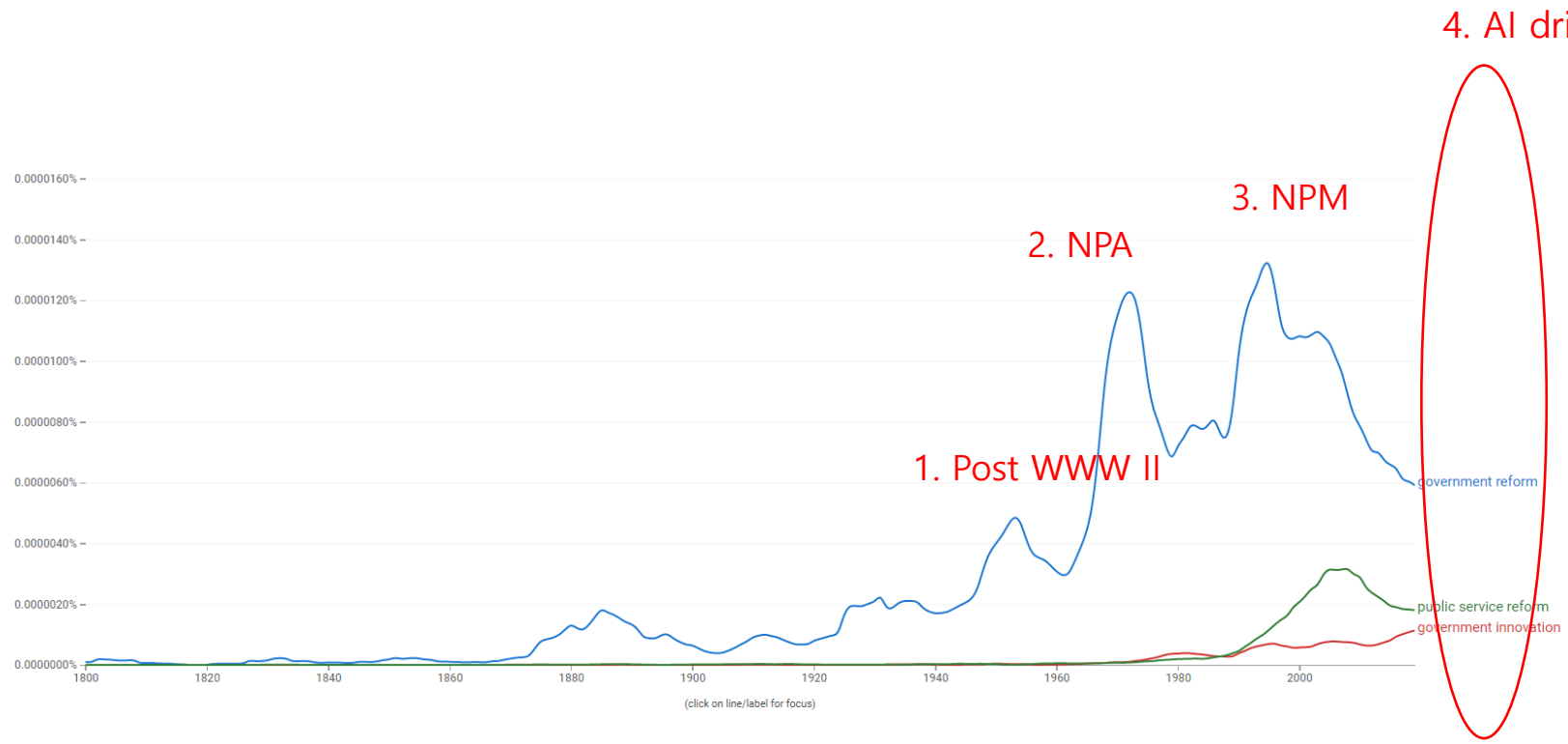
Changing Positions?

Evolution of Digital Government



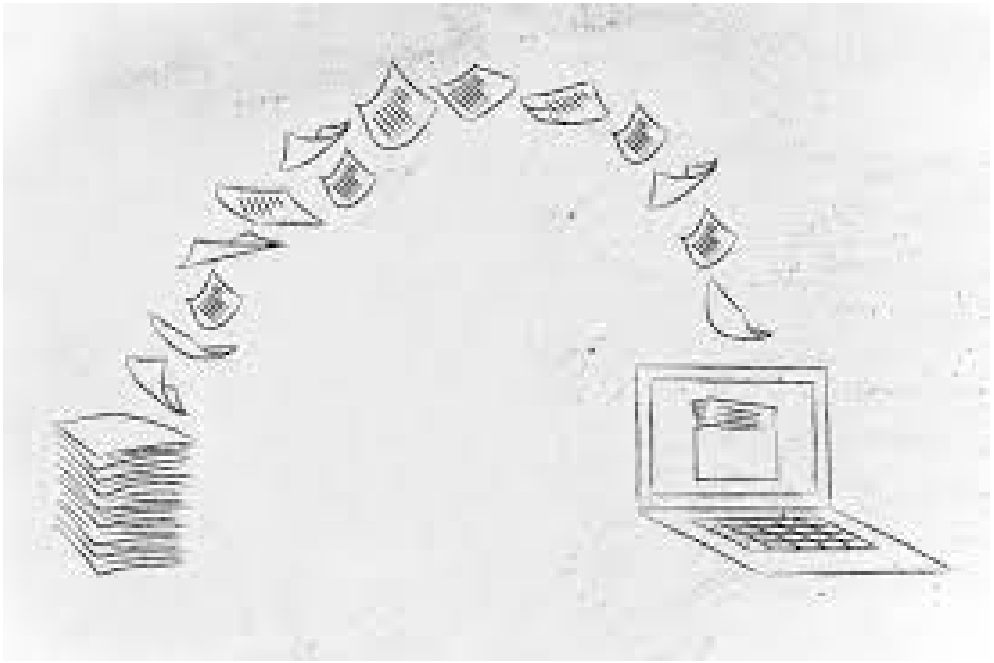
(Based on OECD (2019) and World Bank (2020)

Public Sector Innovations for last Two Centuries

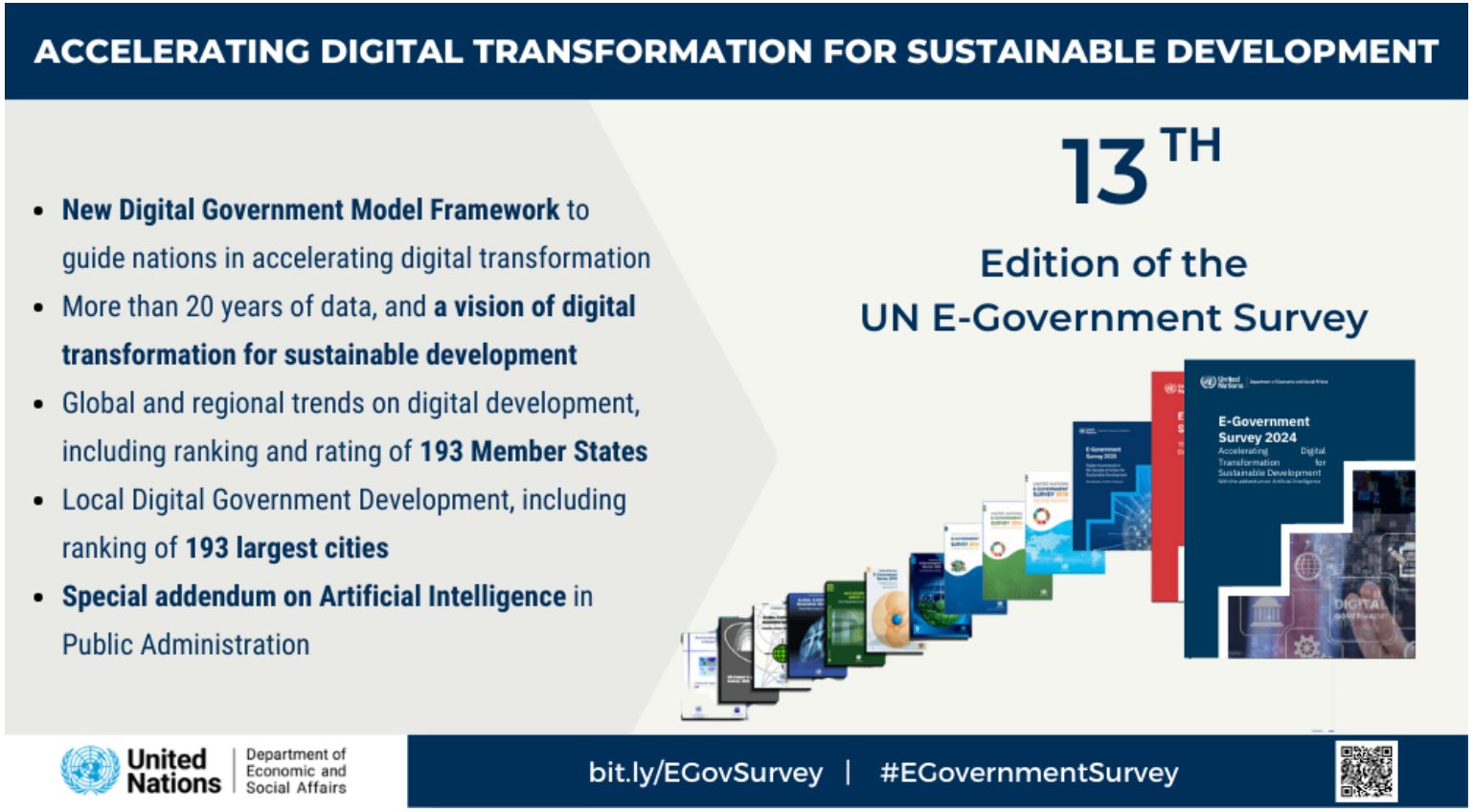


(Moon, 2022;2025)

Paperless Government? One-stop Service?

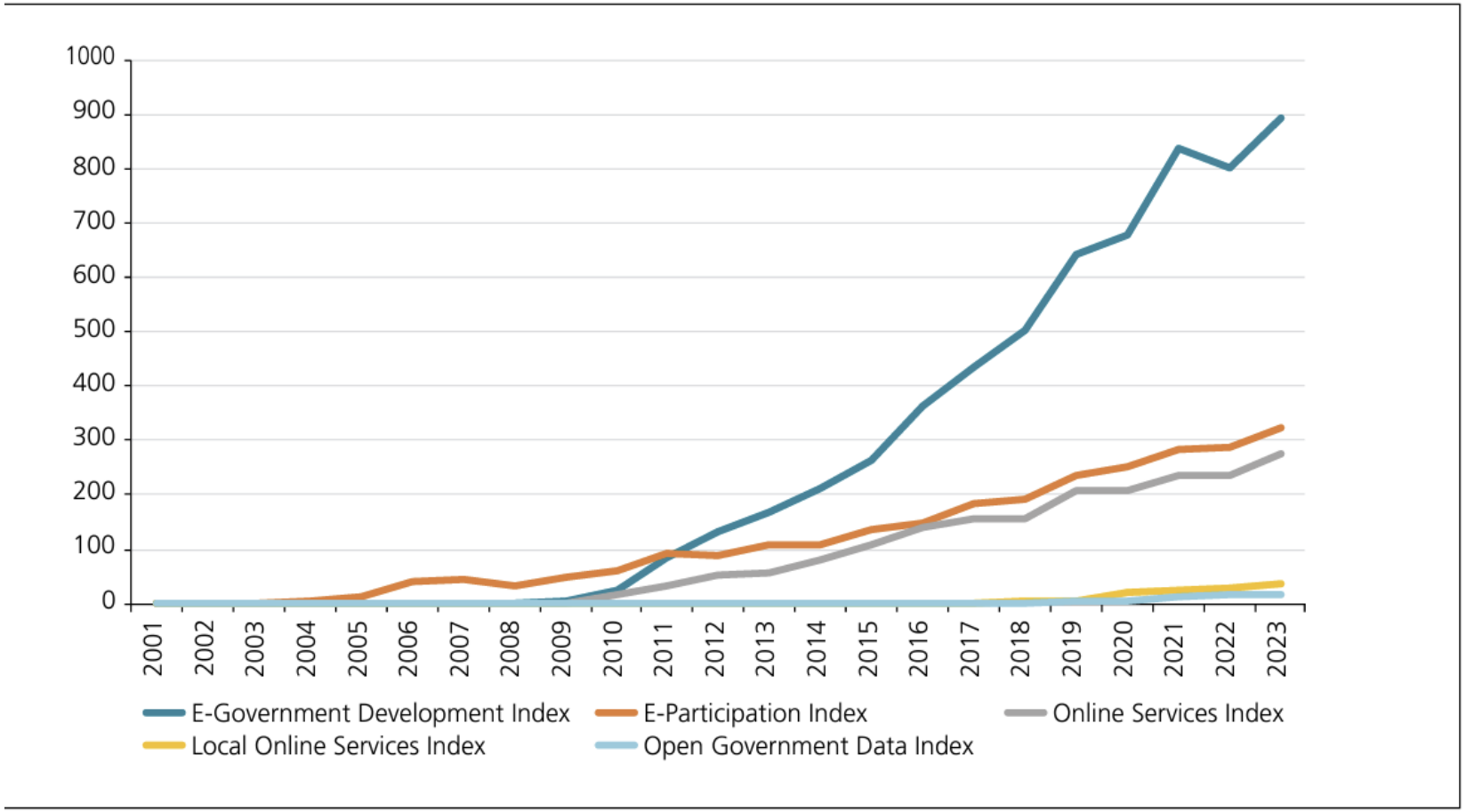


E-government in Focus….



(UN, 2024)

Steady Progress in Digital Government



(UN, 2024)

. Comparison of Global Digital Government Performance between 2003 and 2024

Region	2003(A)	2024(B)	Changes (B-A)	Change Ratio (B-A)/A*100
Europe	0.5580	**0.8493**	0.2913	52%
Americas	0.4154	**0.6701**	0.2547	61%
Asia	0.3533	**0.6990**	0.3457	98%
Oceania	0.3005	**0.5289**	0.2284	76%
Africa	0.2043	**0.4247**	0.2204	108%
World Average	0.3645	**0.6382**	0.2737	75%

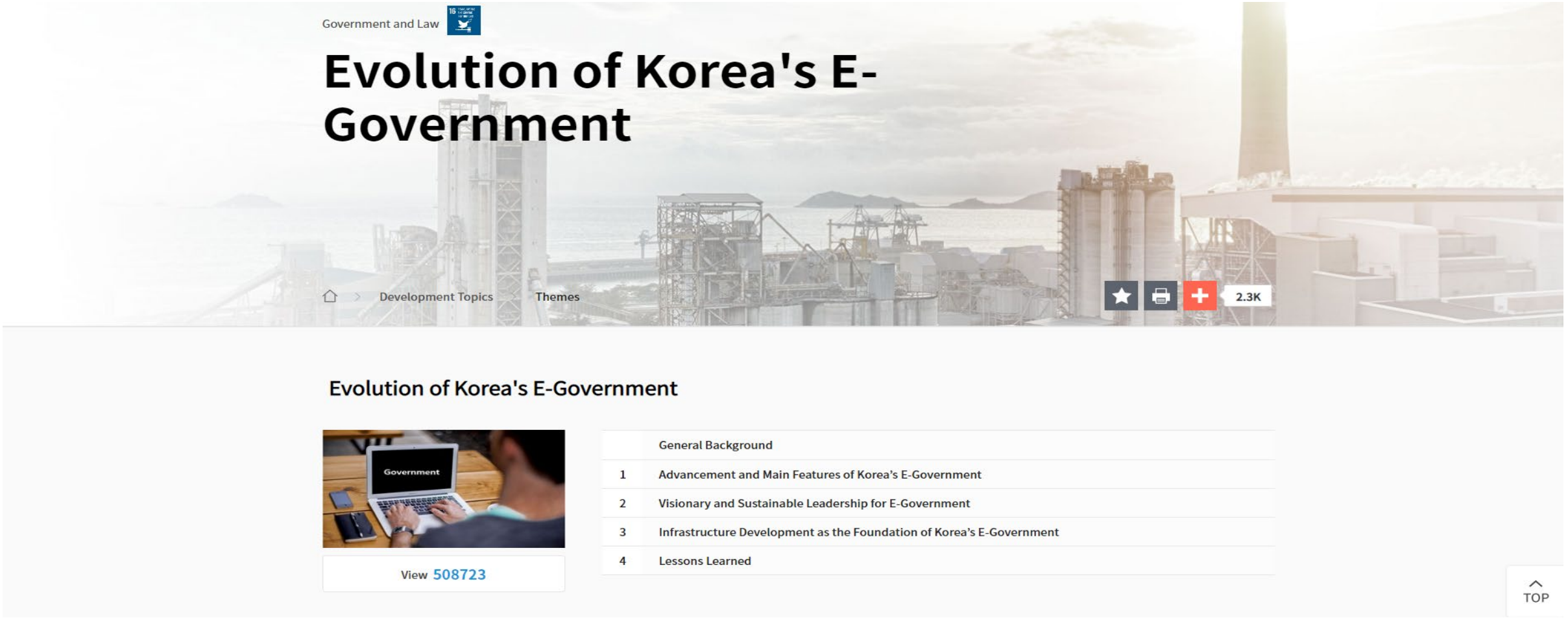
Source: Based on UN Global E-government Survey (2003; 2024)

Leaders of Digital Government

Top 20 E-Countries Ranked by E-Government Development				
Rank (2024)	Rank (2022)	E-Government Development Index	EGDI (2024)	EGDI (2022)
1	1	Denmark	0.9847	0.9717
2	8	Estonia	0.9727	0.9393
3	12	Singapore	0.9691	0.9133
4	3	Republic of Korea	0.9679	0.9529
5	5	Iceland	0.9671	0.9410
6	31	Saudi Arabia	0.9602	0.8539
7	11	United Kingdom of Great Britain and Northern Ireland	0.9577	0.9138
8	7	Austrailia	0.9577	0.9405
9	2	Finland	0.9575	0.9533
10	9	Netherlands (Kingdom of the)	0.9538	0.9384
11	13	United Arab Emirates	0.9533	0.9010
12	22	Germany	0.9382	0.8770
13	14	Japan	0.9351	0.9002
14	5	Sweden	0.9326	0.9410
15	17	Norway	0.9315	0.8879
16	4	New Zealand	0.9265	0.9432
17	18	Spain	0.9206	0.8842
18	54	Bahrain	0.9196	0.7707
19	10	United States of America	0.9194	0.9151
20	30	Ireland	0.9138	0.8567

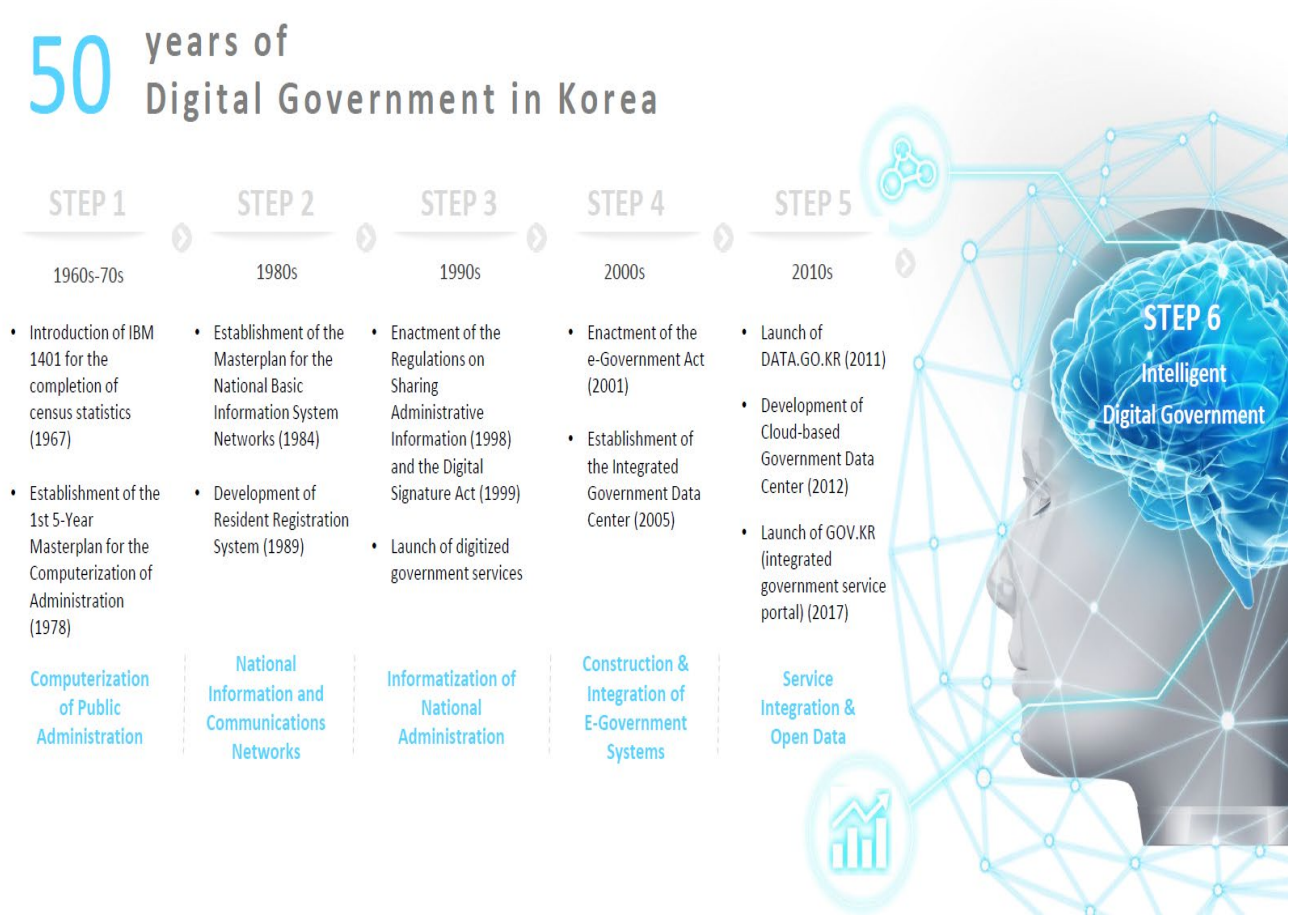
Source: 2024 United Nations E-Government Survey.

Evolution of Korea's E-government



https://www.kdevelopedia.org/Development-Topics/themes/--11

Evolution of Korea's E-government



IBM 1401 imported and operated in 1967

FOOD SAFETY INSPECTION

- Digital Health Epidemiology

- in Chicago, there were 5,880 inspections during the study, with 71 prompted by FINDER analysis. In Las Vegas, there were 5,038 inspections with 61 prompted by FINDER.

- Baseline Traditional Inspection: 25% Unsafe
- FINDER Flagged Inspection: 50% Unsafe

- About I30 Food Inspectors in Chicago
- About 15,000 Restaurants and Food-related Businesses (470 per inspector)

Denmark (Andersen, 2023)

The Danish Digital Journey

For more than 20 years, the Danish national government, municipalities, and regions have worked closely together to build a strong digital service infrastructure that serves as the public sector's foundation for delivering public services to residents and businesses in Denmark.

Read about the Danish Digital Journey

Latest news

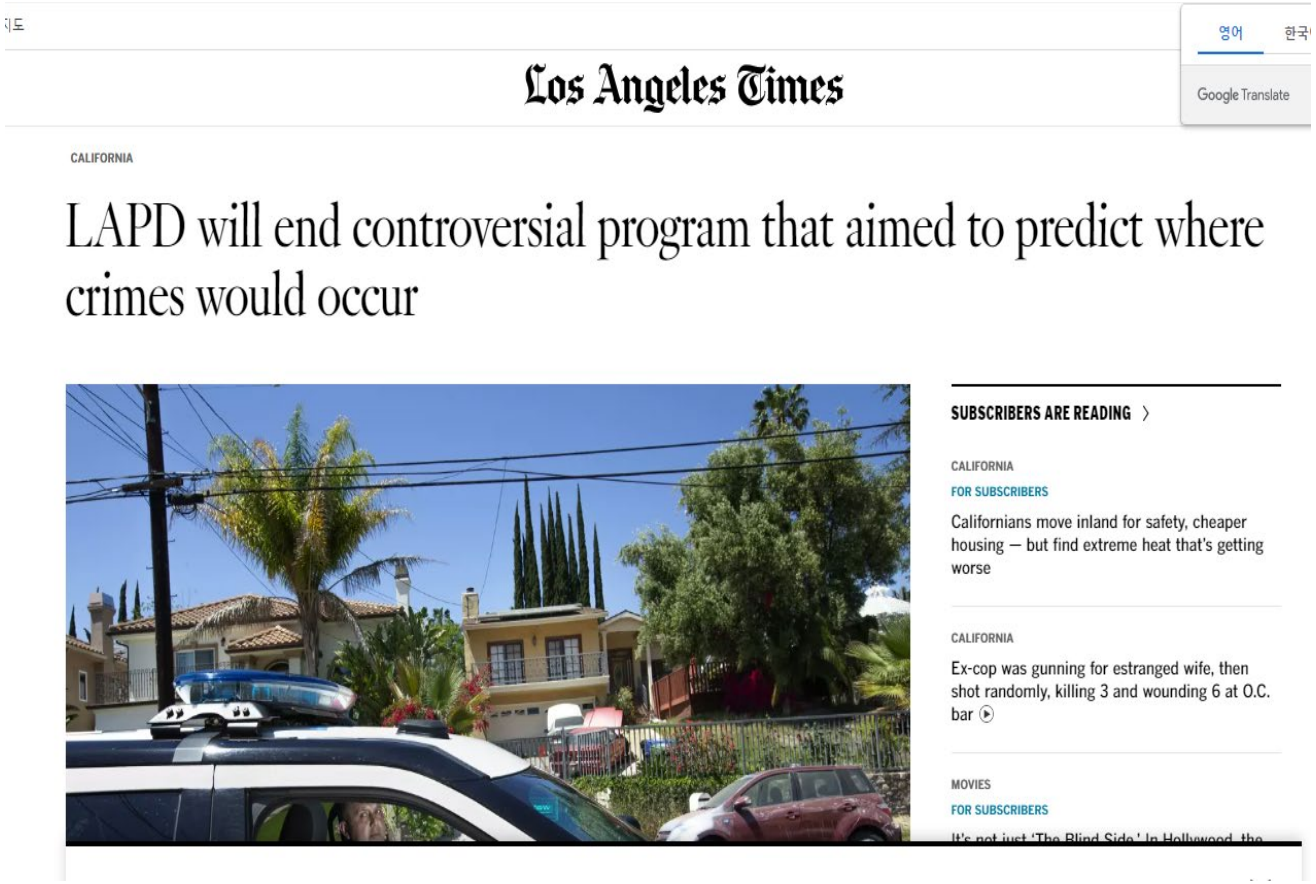
The Government Launches the New National Strategy for Digitalisation

- regulations apply to all levels and institutions of government. regulation also apply to government-to-government communication
- recognization of digital signature and e-mails as a legal document
- mandatory e-invoice from companies to the public sector
- all outgoing mail from public sector is stored and mailed through a shared digital post office
- all incoming mail from citizens to the public sector is stored and mailed through a shared digital post office
- digital mails can not be deleted
- mandatory electronic management systems
- the estimated monetary benefits from paper less government were cut in budget before full implementation
- business benefits calculated before implementation

Next Generation dBrain (KORAHS and KODAS)

- Realtime Data Analytics
- 14 Policy Areas and 71 Sectors
- 8,000 different domestic and global socioeconomic indices (2,475 government indices and 5,604 external indices)
- Data-based Prediction (Economic Digital Twin))
- Simulations

Prospects and Challenges in PrePol Systems?



Los Angeles Times

CALIFORNIA

LAPD will end controversial program that aimed to predict where crimes would occur

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Californians move inland for safety, cheaper housing — but find extreme heat that's getting worse

CALIFORNIA

Ex-cop was gunning for estranged wife, then shot randomly, killing 3 and wounding 6 at O.C. bar

MOVIES

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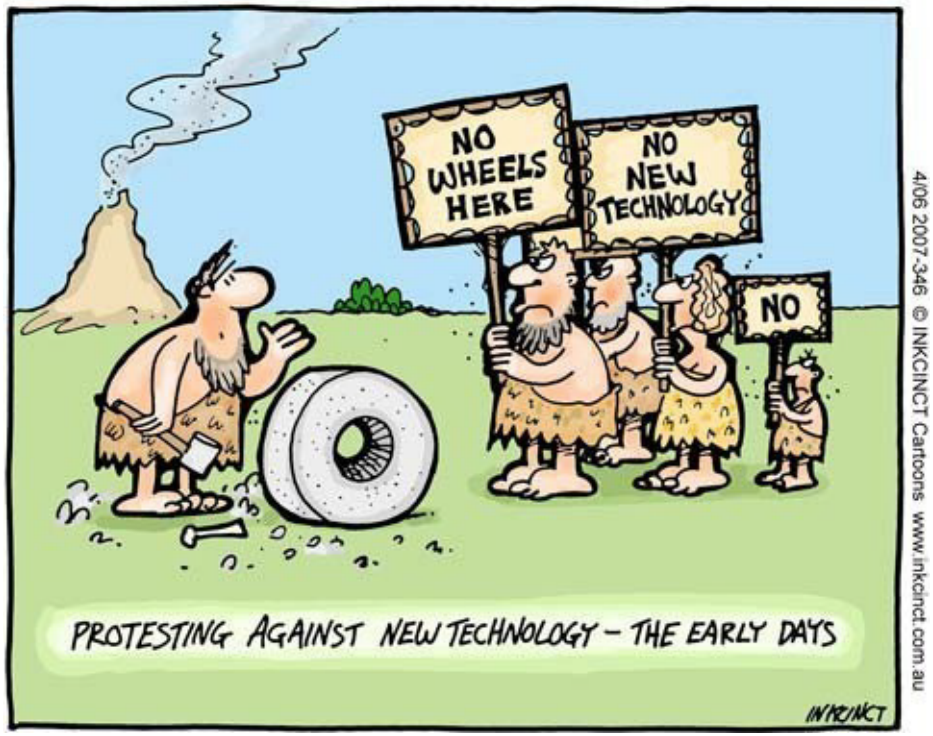
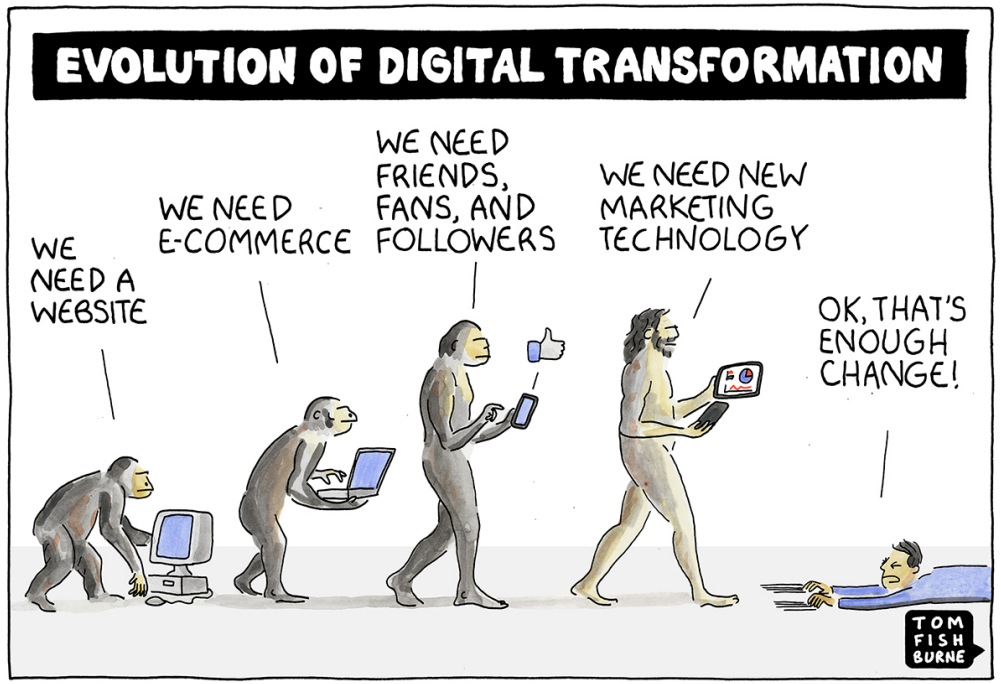
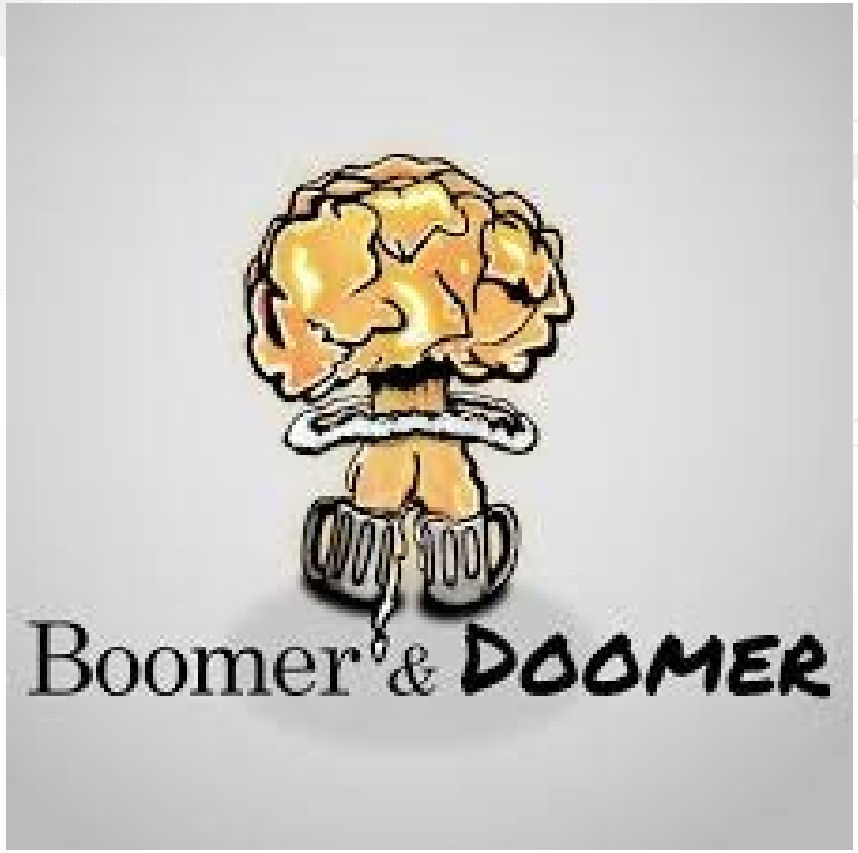
Technological Changes and Resistance?



https://1reddrop.com/2019/01/13/is-artificial-intelligence-about-taking-human-jobs-or-creating-them-what-is-the-future-of-work/resistance-to-change-cartoon/

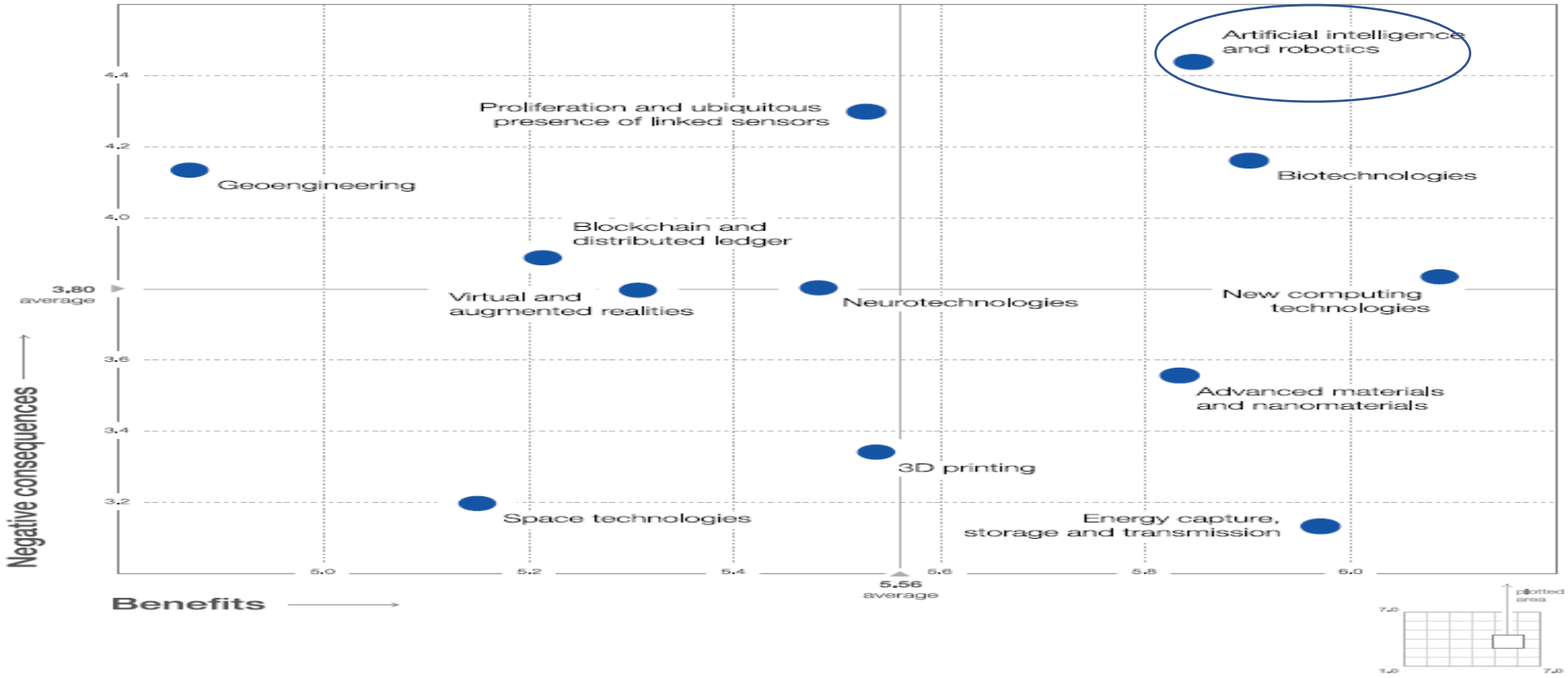


https://marketoonist.com/2020/08/evolution-of-digital-transformation.html

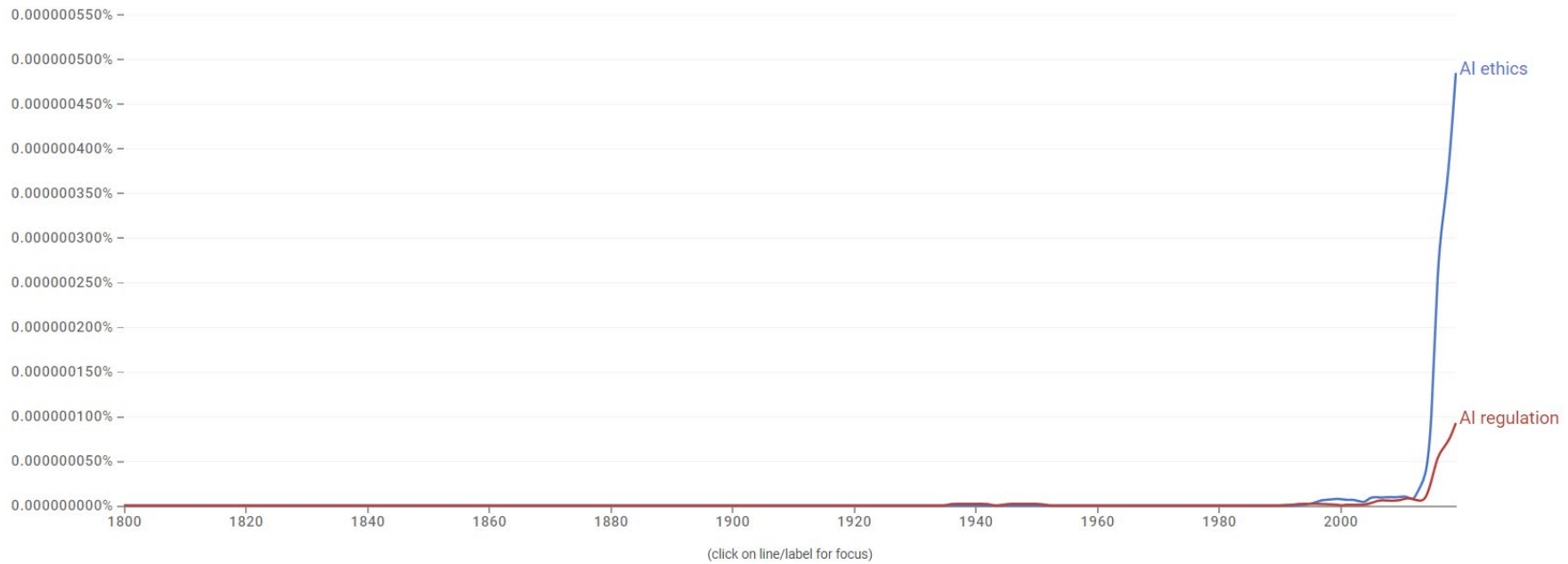

Boomer & DOOMER


AI

Perceived Benefits and Negative Consequences of Different Technologies



Source: World Economic Forum Global Risks Perception Survey 2016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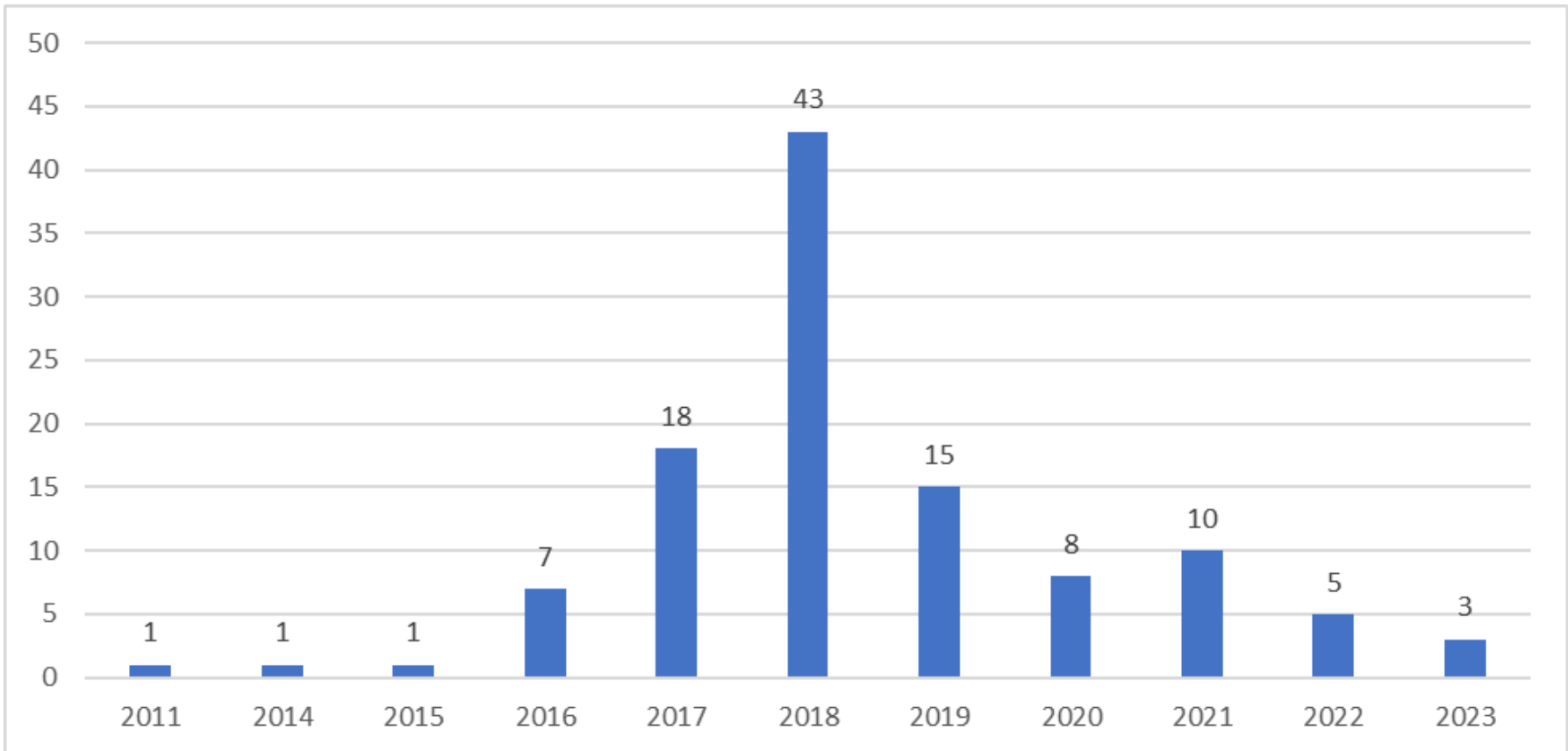
AI ethics
AI regulation
(click on line/label for focus)

Two Approaches to AI Policies: Ethical Approach and Legal Approach

	Ethical Approach (Moralizing)	Legal Approach (Regulating)
Mechanism	Ethical standards	Regulatory laws
Actor(s)	Various stakeholders	Government(s)
Nature	Voluntary	Mandatory
Consequences	Moral Blaming	Punishment or Penalty

(Moon and Park, 2000)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2014
2015
2016
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2019
2020
2021
2022
2023

Ethical Principles by Government vs. Non-Government

	관찰값*	F-value	Prob>F
Privacy	107	0.75	0.607
Accountability	**107**	**2.10**	**0.050***
Safety/Security	107	1.05	0.378
Transparency/Explainability	107	1.75	0.105
Fairness/Indiscrimination	**107**	**2.01**	**0.083***
Controllability	**107**	**3.22**	**0.025****
Responsible design/ human rights	107	0.49	0.78
Human values	107	1.38	0.239
Sustainability	107	0.01	0.989
Prohibition of Military Use	**107**	**3.38**	**0.068***

(Moon , 2023)

Diversity in AI Ethics Discussions

Diversity

윤리 원칙	참여자 배경 다양성의 상관계수	p-value
개인정보보호	-0.078	0.523
책무성	0.459	0.000***
안전 및 안보	0.252	0.038**
투명성과 설명가능성	0.414	0.000***
공정성과 차별금지	0.315	0.009***
인간의 기술통제	0.428	0.000***
전문적 책임	0.233	0.056*
인간 가치 증진	0.382	0.001***
지속가능성	0.293	0.015**
군사적 사용금지	0.078	0.523

*p<0.1, **p<0.05, ***p<0.01

Privacy
Accountability
Safety
Transparency/EX
Fairness/Nondiscrimination
Human Control
Professional Responsibility
Human Right
Sustainability
Prohibition of Military Use

(Moon , 2023)

PUBLIC ADMINISTRATION REVIEW

VIEWPOINT

Searching for inclusive artificial intelligence for social good: Participatory governance and policy recommendations for making AI more inclusive and benign for society

M. Jae Moon

First published: 24 April 2023 | https://doi.org/10.1111/puar.13648 | Citations: 3

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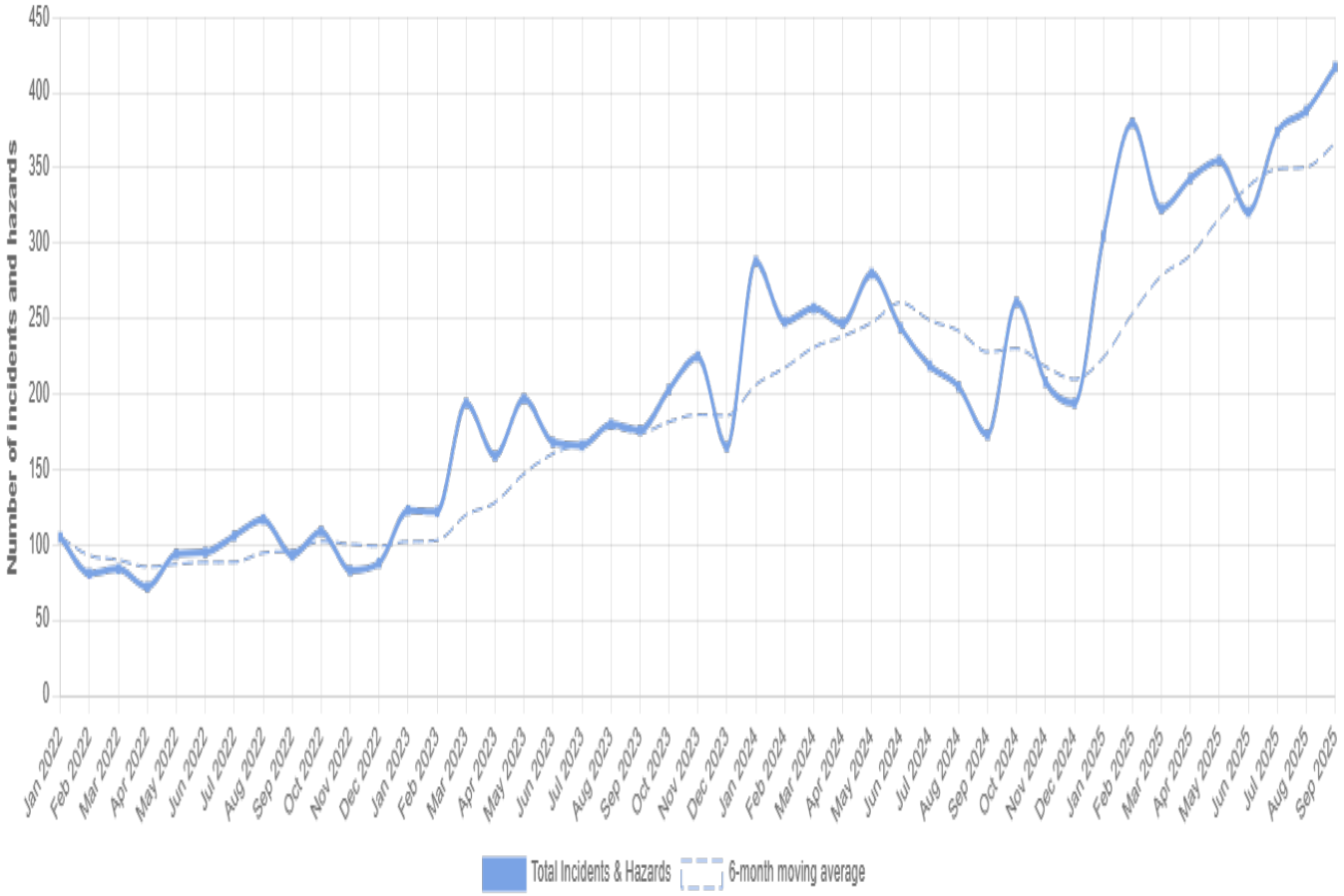
Abstract

While artificial intelligence (AI) has begun to transform individual lives, business operations, and public services, there has been a lack of discussion concerning its role in contributing to social good. Both academic research and practical evidence have often compellingly predicted and suggested AI's potential impact on the labor market, industry, and services, as well as the risks and benefits of disruptive technologies. With an emphasis on understanding the complex and uncertain nature of AI as well as the disparities in its benefits, in this article, the logic of participatory governance is examined, and it is posited that this governance is an appropriate governing mechanism for an inclusive AI that contributes to social good. This study also offers a set of policy recommendations by reviewing selected cases and the challenges that policy-makers face at the national and global levels.

Change and Trend in AI Incidents and Hazards



(a) injury or harm to the health of a person or groups of people;
(b) disruption of the management and operation of critical infrastructure;
(c) violations of human rights or a breach of obligations under the applicable law intended to protect fundamental, labour and intellectual property rights;
(d) harm to property, communities or the environment.

https://oecd.ai/en/incidents?search_terms=%5B%5D&and_condition=false&from_

Drivers Behind the Law

- Global Regulatory Momentum: EU AI Act, OECD/UNESCO guidelines.
- Domestic Gaps and Interest in AI global leadership: undefined AI legal framework, transparency and fairness issues.
- Public Trust: Variations in trust in autonomous AI, demand for human oversight and accountability.

Legislative Process and Political Impetus

- Ministry of Science and ICT led multi-stakeholder consultations.
- Unified draft law proposed in 2023 from multiple earlier bills.
- Bipartisan consensus on competitiveness, rights protection, and innovation governance.

Structure of Basic Law on AI

- Chapter 1 General Rules
  - Clause 1: Objective: to contribute to the protection of the rights and dignity of the people, the improvement of quality of life, and the enhancement of national competitiveness by stipulating the fundamental matters necessary for the sound development of artificial intelligence and the establishment of a trust-based foundation
  - Clause 2: Definition

Chapter 1 General Rules

- Clause 3: Principles and State's Responsibility

  ① Artificial intelligence technology and the AI industry must develop in a way that enhances safety and reliability, thereby improving the quality of life for the people.

  ② Individuals affected by AI must be provided with clear and meaningful explanations—within technically and reasonably feasible limits—regarding the key criteria and principles used in deriving the final results of the AI system.

  ③ The national and local governments must respect the creativity of AI businesses and make efforts to create a safe environment for the use of artificial intelligence.

  ④ The national and local governments must devise policies to ensure that all citizens can adapt stably to the changes brought about by artificial intelligence in all areas, including society, the economy, culture, and everyday life.

- Clause 4: Scope

  ① This law applies even to actions conducted outside the country if they have an impact on the domestic market or users.

  ② This law does not apply to artificial intelligence developed or used solely for national defense or national security purposes, as specified by presidential decree.

- Clause 5: Relationship with other Laws

Chapter 2 Implementation System for Sound Development of AI and Establishment of Trust-based Foundation

- Clause 6: Preparing Basic Plan on AI
  - Matters regarding the basic direction and strategy of policies related to artificial intelligence, etc.
  - Matters regarding the training of specialized personnel and the creation of a foundation for promoting the development and utilization of artificial intelligence, aimed at the systematic nurturing of the AI industry.
  - Matters regarding laws, systems, and culture for the realization of a healthy AI society, including the spread of AI ethics.
  - Matters regarding the securing of resources and the direction of investments for the development of AI technology and the promotion of the AI industry.
  - Matters regarding the establishment of a trust-based foundation, including ensuring fairness, transparency, accountability, and safety in artificial intelligence.
  - Matters regarding the development direction of AI technology and the corresponding changes and responses in various societal areas, such as education, labor, economy, and culture.
  - Other matters recognized by the Minister of Science, ICT, and Future Planning as necessary for enhancing national competitiveness, including the promotion of AI technology, AI industry, and international cooperation.
- Clause 7-10: Presidential AI National Committee, Functions, Committee Members, and Sub-committees
- Clause 11: AI Policy Center
- Clause 12: AI Safety Institute

Chapter 3 Development of AI and Promotion of AI Industry

- Clause 13: Supporting AI Technological Development and Safe Usages
- Clause 14: Standardization of AI Technologies
  - Establishment, revision, and abolition of standards related to artificial intelligence technology, and their dissemination.
  - Investigation and research & development of domestic and international standards related to artificial intelligence technology.
- Clause 15: Policy on Machine Learning Data for AI Development
- Clause 16: Supporting AI technology Adoption and Usage
- Clause 17: Special Support for SMEs
- Clause 18: Promoting Venters
- Clause 19: Promoting AI Convergence
- Clause 20 (Policy and Financial Support), 21 (AI Human Resource), 22 (International collaboration and Supporting and Promoting Oversea Marketing
- Clause 23 (AI Cluster), 23(Local Foundation), 24 (AI Data Center) 25(AI Promotion Organization),

Chapter 4 Assurance of AI Ethics and Trust

- Clause 27 AI Ethical Principles (Safety, Trust, Quality of Life and Co-Prosperity)
- Clause 28 (Non-government Committee on AI Ethics, 29 (Policy for Trustworthy AI), 30 (Examination and Certification of AI Safety and Trust), 31 (AI Transparency), 32 (Safety), 33 (Identifying High Impact AI), 34 (Responsibilities of High Impact AI Businesses), 35 (High Impact AI Assessment), 36 (Designation of Domestic Agent)

Chapter 5 and 6

- Chapter 5
  - Clause 37 (Financial Resources for Promotion of AI Industry), 38 (Analysis, Statistics, and Index), 39 (Delegation of Authority and Outsourcing), 40 (Investigations)
- Chapter 6 Penalties
  - Clause 42 (Penalties), 43 (Charges)

What Should We Worry about?
AI in the Public Sector: Prospects and Challenges

- Digital Health Epidemiology

npj | Digital Medicine

Article | OPEN | Published: 06 November 2018

Machine-learned epidemiology: real-time detection of foodborne illness at scale

Adam Sadilek, Stephanie Caty, Lauren DiPrete, Raed Mansour, Tom Schenk Jr, Mark Bergtholdt, Ashish Jha, Prem Ramaswami & Evgeniy Gabrilovich

npj Digital Medicine **1**, Article number: 36 (2018) | Download Citation

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- Baseline Traditional Inspection: 25% Unsafe
- FINDER Flagged Inspection: 50% Unsafe

- About I30 Food Inspectors in Chicago
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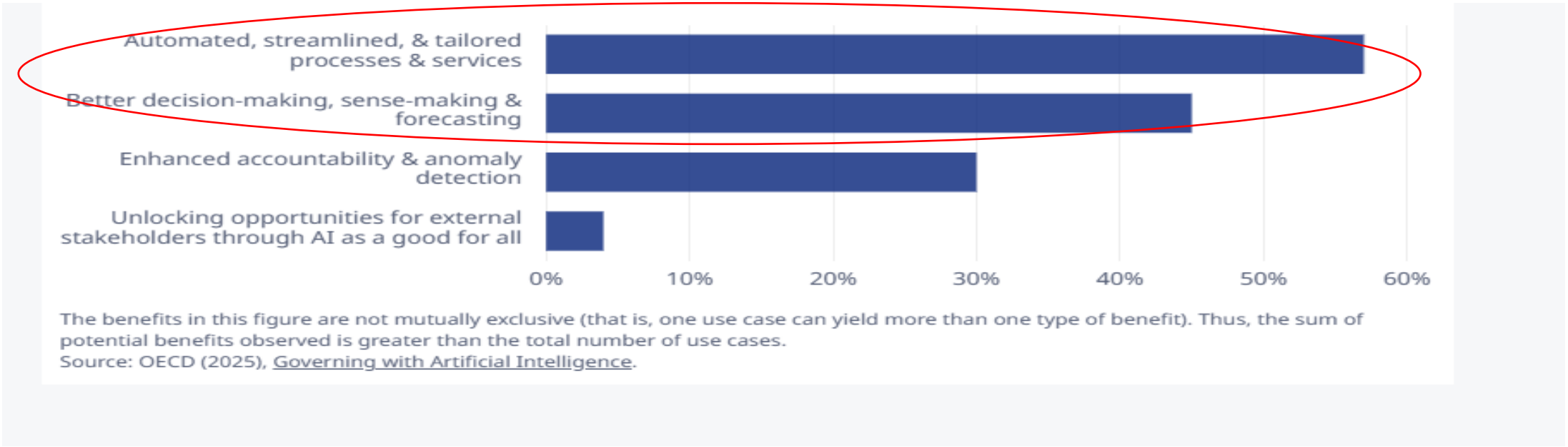
Governing with AI (OECD, 2025)

AI tasks	Government activity	Opportunity area
- Recognition - Event detection - Forecasting - Personalisation - Interaction support - Goal-driven optimisation - Content generation - Reasoning with knowledge structures	Internal operations	Productivity (efficiency and effectiveness)
	Policymaking	
	Service delivery	Responsiveness
	Internal and external oversight	Accountability

https://www.oecd.org/en/publications/governing-with-artificial-intelligence_795de142-en.html

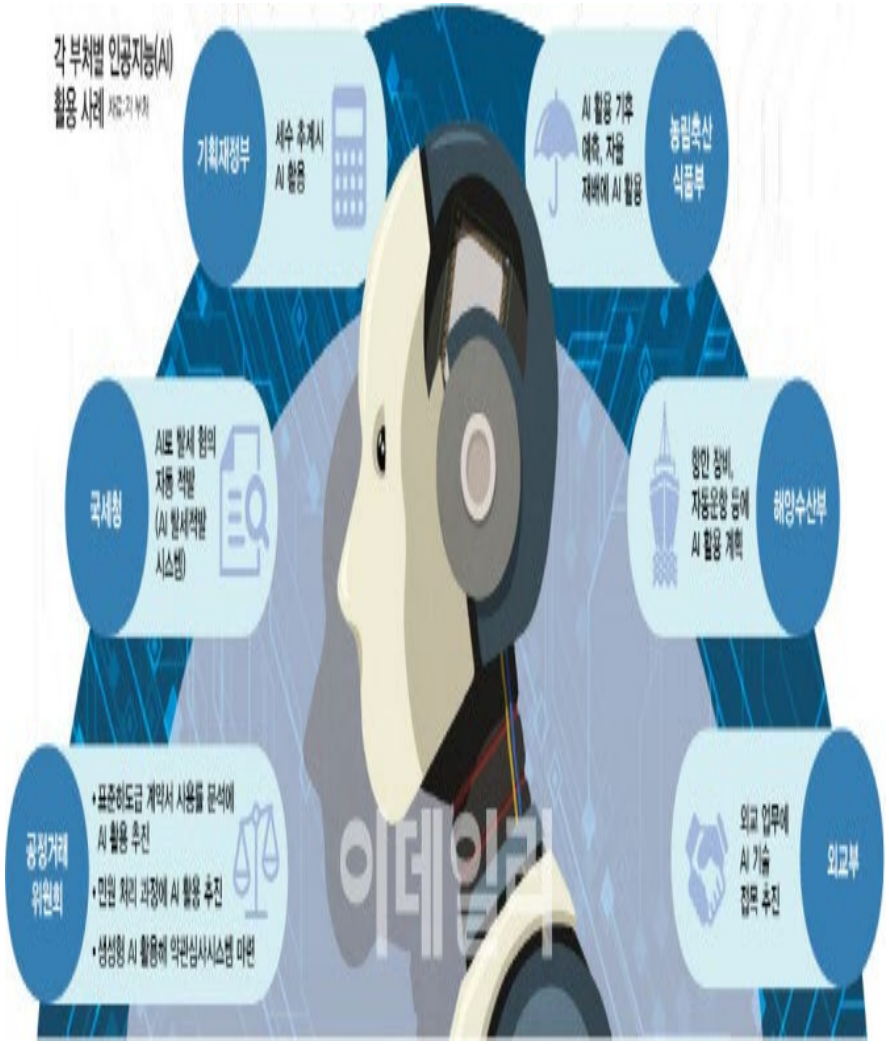
Benefits of AI Use Cases



The benefits in this figure are not mutually exclusive (that is, one use case can yield more than one type of benefit). Thus, the sum of potential benefits observed is greater than the total number of use cases.
Source: OECD (2025), Governing with Artificial Intelligence.

https://www.oecd.org/en/publications/governing-with-artificial-intelligence_795de142-en.html

AI in Government?



Detecting Tas Evasion or Tax Filing Assistance, National Tax Service

AI-based Job Matching System, Ministry of Labor and Employment

……

AI for Job Matching?

- **AI Found the Perfect Job for Me …**
- **87,000 Job Seekers Employed**
- In the first half of 2025, *AI job matching* led to the employment of **87,212 people**, an **84% increase** compared to the same period last year.

고용노동부 보도자료

보도시점 2025. 7. 23.(수) 12:00 (2025. 7. 24.(목) 조간)

내게 딱 맞는 일자리, AI가 찾아줬다 … 취업자 8.7만 명

- '25년 상반기 'AI 일자리 매칭' 취업자 87,212명, 전년 동기 대비 84% 증가

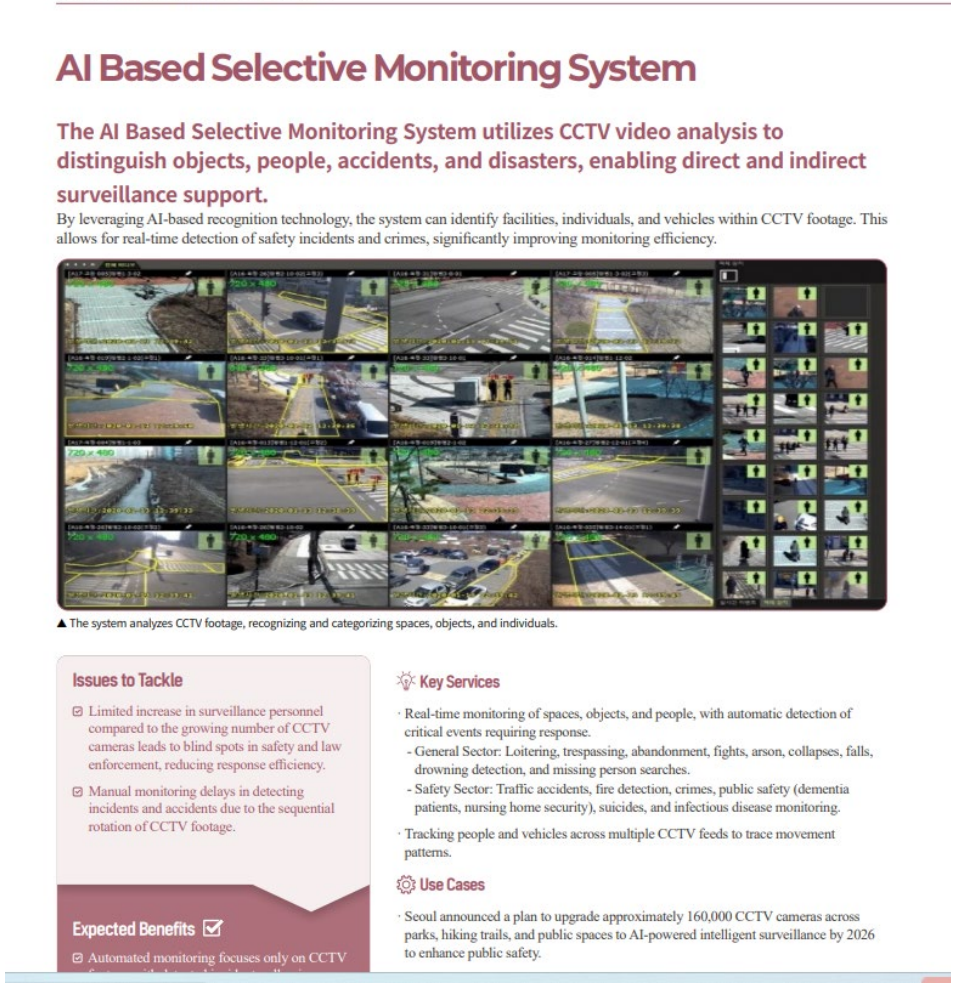
고용노동부(장관 김영훈)는 올해 상반기 **인공지능**(이하, 'AI') 기술을 활용한 **디지털 고용서비스 이용 실적이 크게 증가**했으며, 이를 통한 실제 **취업 성과도 두드러졌다**고 밝혔다.

◇ AI가 나에게 맞는 '일자리'를 찾아준다?

'AI 일자리 매칭' 서비스는 구직자의 이력서, 경력, 입사지원서 등을 분석해 **적합한 일자리를 자동으로 추천**해 주는 서비스이다.

Korea's AI-powered CCTV to protect against crime and emergencies

- These systems use existing CCTV infrastructure and advanced deep learning algorithms to automatically detect and classify objects, people and events, including accidents, fires and unusual pedestrian behaviour (e.g. loitering, fighting unauthorised access).



AI Based Selective Monitoring System

The AI Based Selective Monitoring System utilizes CCTV video analysis to distinguish objects, people, accidents, and disasters, enabling direct and indirect surveillance support.

By leveraging AI-based recognition technology, the system can identify facilities, individuals, and vehicles within CCTV footage. This allows for real-time detection of safety incidents and crimes, significantly improving monitoring efficiency.

▲ The system analyzes CCTV footage, recognizing and categorizing spaces, objects, and individuals.

Issues to Tackle

- Limited increase in surveillance personnel compared to the growing number of CCTV cameras leads to blind spots in safety and law enforcement, reducing response efficiency.
- Manual monitoring delays in detecting incidents and accidents due to the sequential rotation of CCTV footage.

Expected Benefits

- Automated monitoring focuses only on CCTV

Key Services

- Real-time monitoring of spaces, objects, and people, with automatic detection of critical events requiring response.
  - General Sector: Loitering, trespassing, abandonment, fights, arson, collapses, falls, drowning detection, and missing person searches.
  - Safety Sector: Traffic accidents, fire detection, crimes, public safety (dementia patients, nursing home security), suicides, and infectious disease monitoring.
- Tracking people and vehicles across multiple CCTV feeds to trace movement patterns.

Use Cases

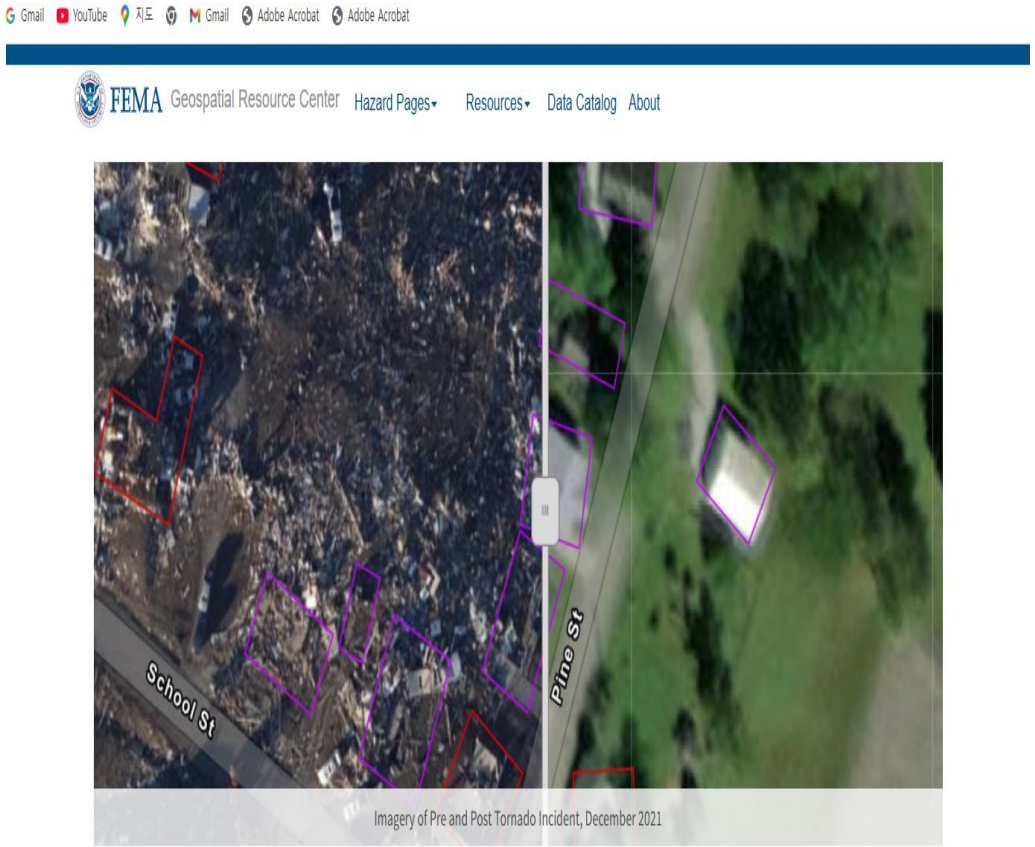
- Seoul announced a plan to upgrade approximately 160,000 CCTV cameras across parks, hiking trails, and public spaces to AI-powered intelligent surveillance by 2026 to enhance public safety.

https://smartcity.go.kr/wp-content/uploads/2024/09/EN02.AI-Based-Selective-Monitoring-System.pdf

Accelerating post-hurricane recovery with AI in the United States

- AI tool known as the Geospatial Damage Assessments (GDA) mode

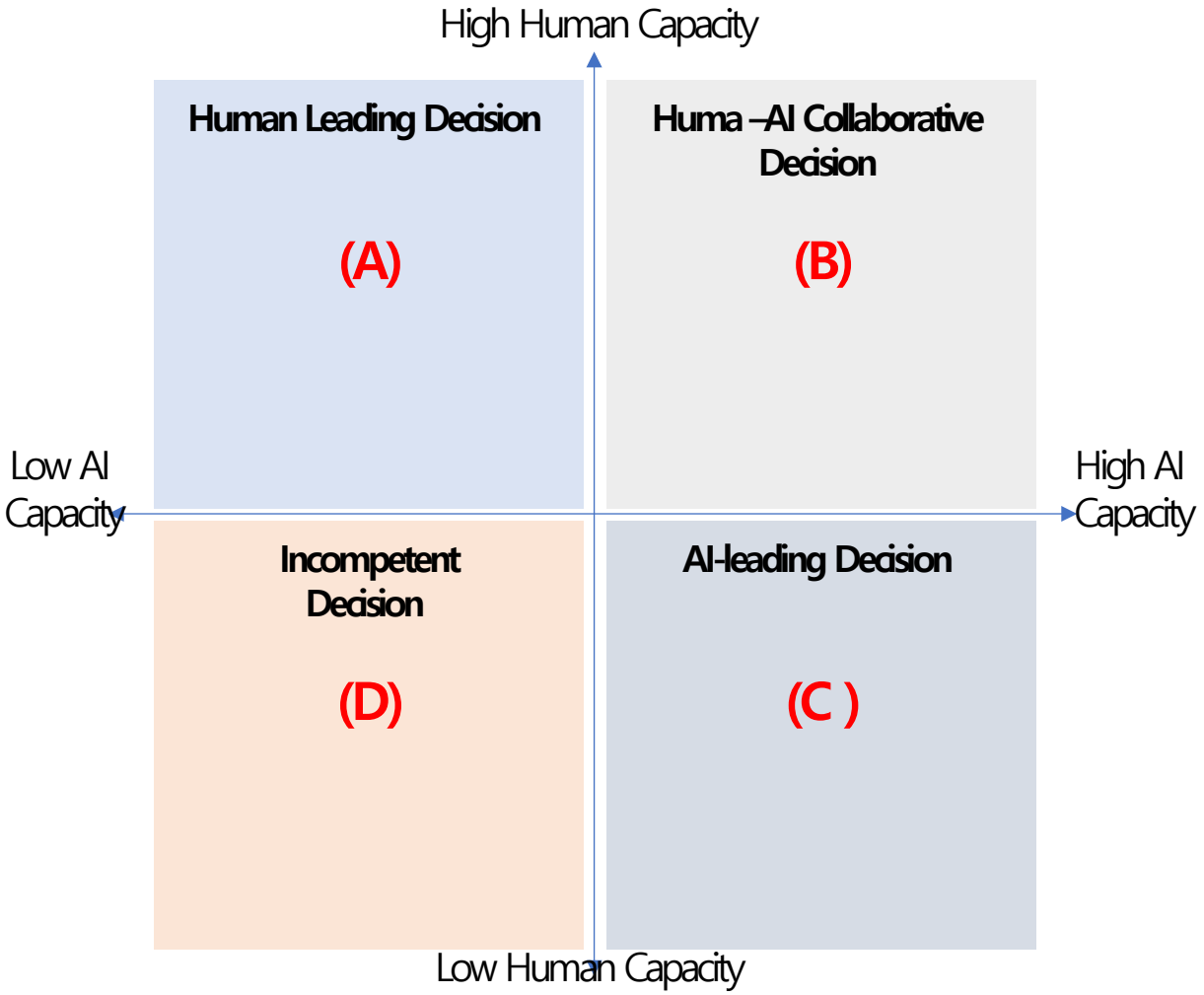
- Reducing the number of structures requiring human review from over 1 million to just 77 000, cutting assessment times from weeks to days

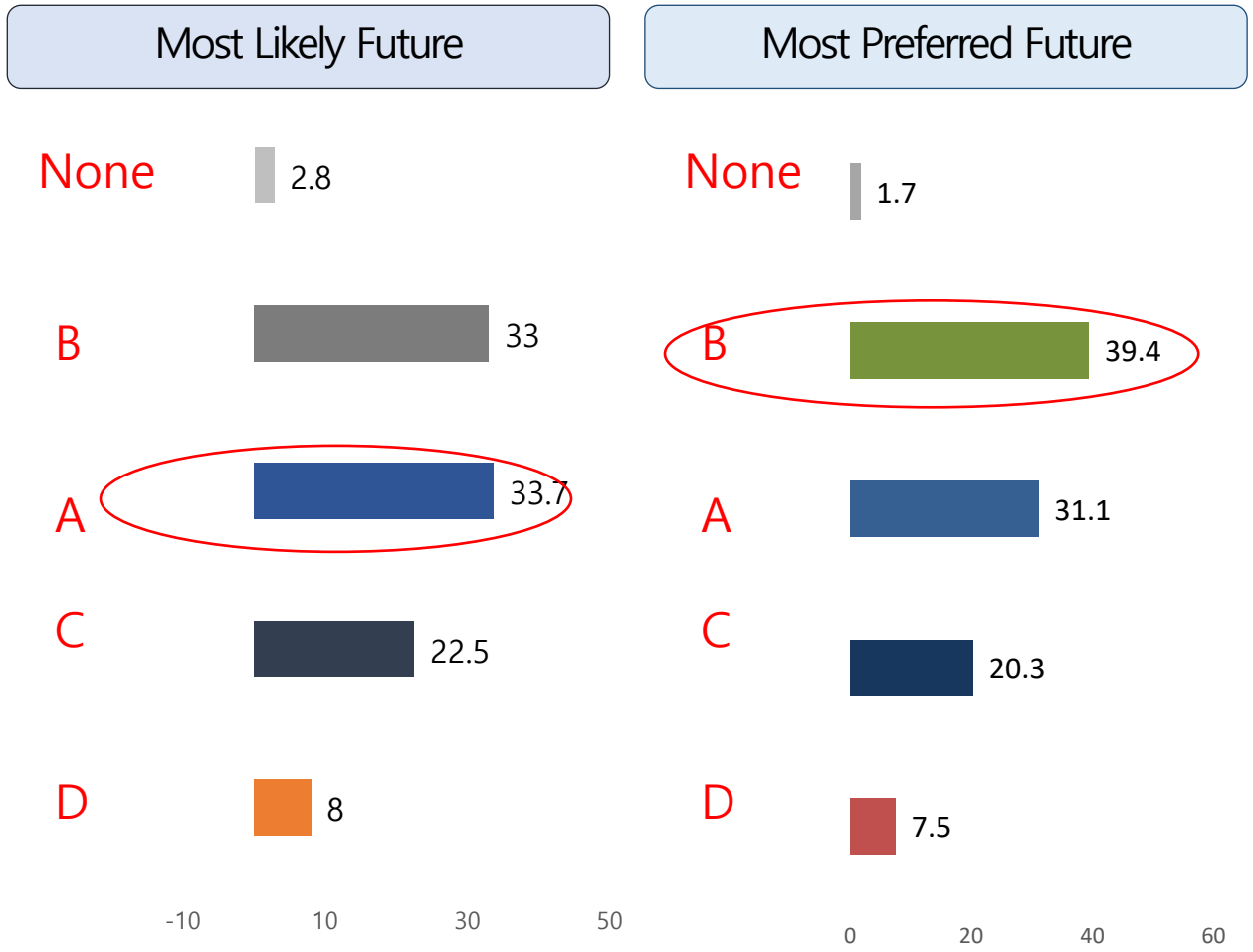


Geospatial Damage Assessments

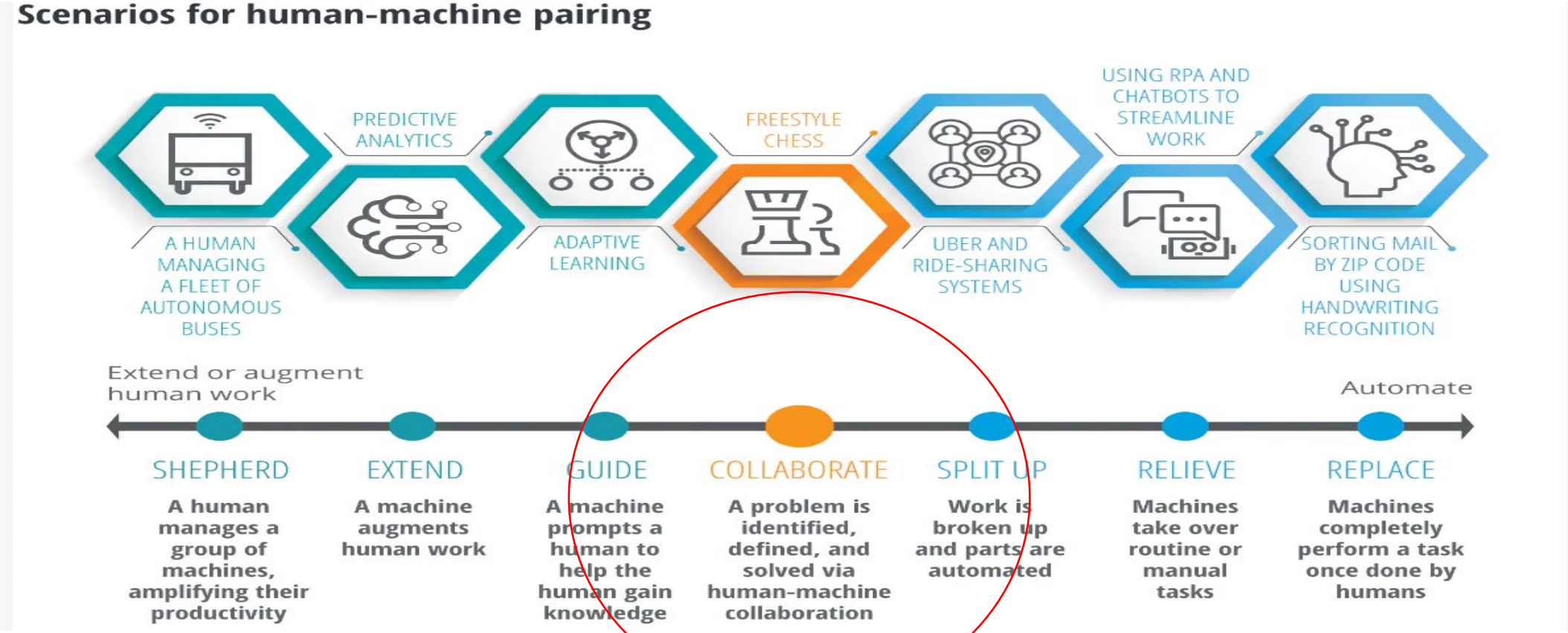
Human-AI in Public Services

Human-AI Types





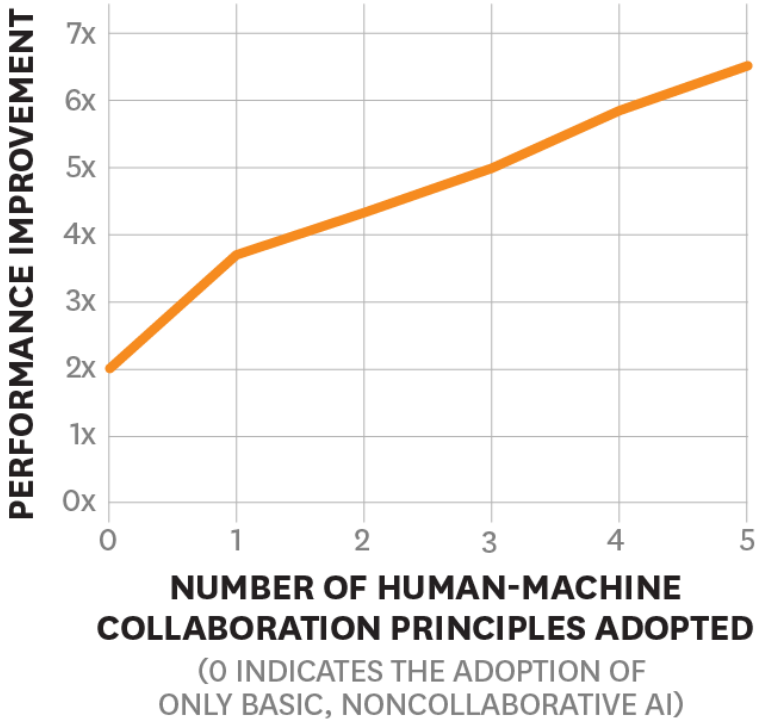
Human-AI Collaboration

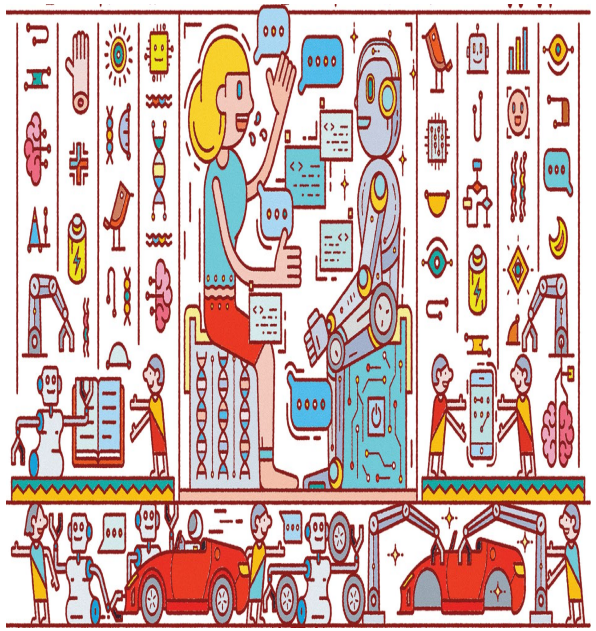


Source: The Deloitte Center for Government Insights (2020; 3)

Human-AI Collaboration

- Collaborative Intelligence (Wilson and Daugherty, 2018)





- Human-AI Collaboration and Performance
- Human-AI Collaboration is a must not an optional

- Wilson & Daugherty (2018)

  : Adoption of Human-AI Collaboration Principles will lead to Performance Improvement

  :

- Wang & Siau (2019)

  : Misdiagnosis Rate

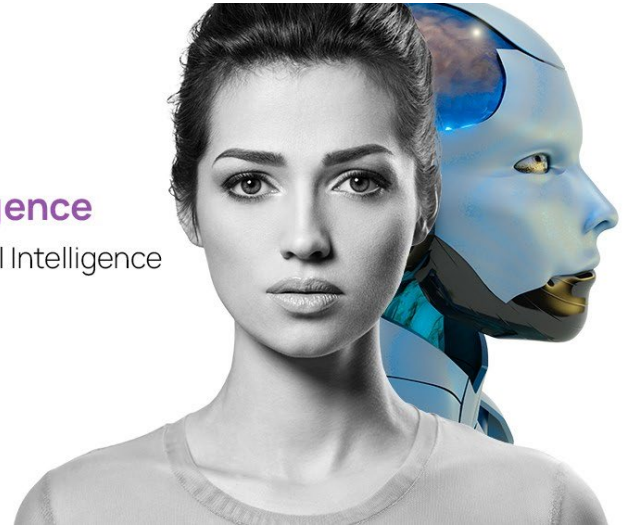
Doctor only: 3.5% vs. AI only: 7.5% vs. Doctor-AI Collaboration: 0.5%

Trust in Human and AI Decisions in Different Scenarios

Scenarios	Subjects	Trust in AI Decision	Trust in Human Decision	No Trust in Both
Scenario 1 Pandemic	Citizens	30.8	45.9	23.3
	Public Servants	35.0	52.7	12.3
Scenario 2 Judiciary Sentencing	Citizens	36.9	41.6	21.5
	Public Servants	41.3	48.7	10.0
Scenario 3 Response to Climate Change	Citizens	46.3	33.4	20.3
	Public Servants	52.2	39.3	8.5

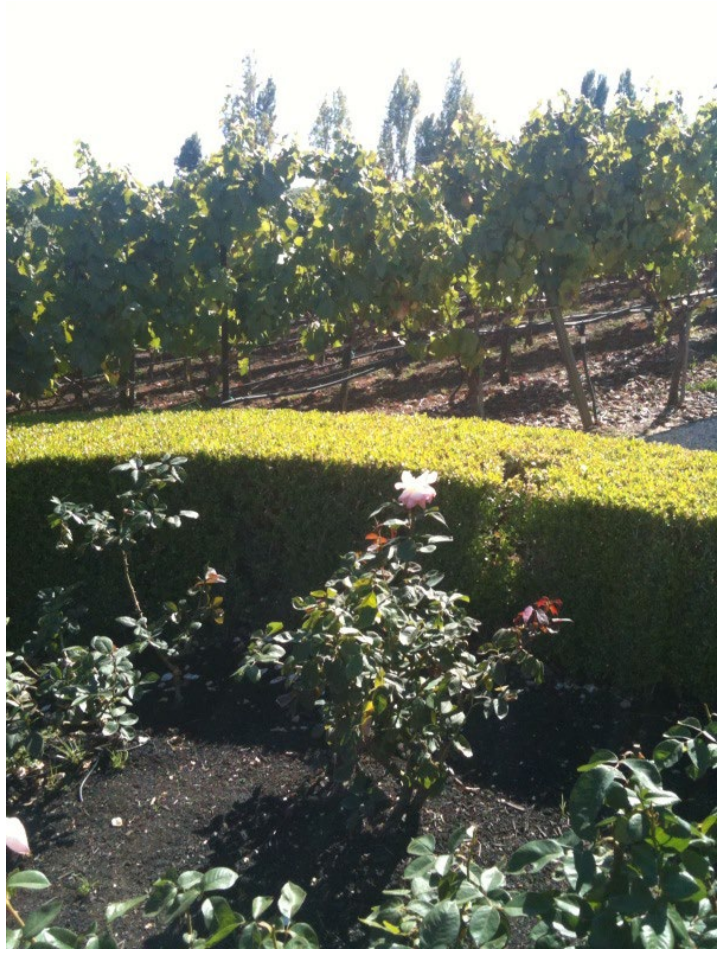
Source: Moon et al. (2024)

HAI CQ?



Human-AI Collaborative Intelligence

Why Should We Have Rose in Winery?



The Width of Railway?

Horse Wagon?

Roman Chariot?

Rocket Engine?

Rocket Engine and Horse Wagon?

From Good to Great!