AI opportunities and challenges

Patrick Mikalef

Associate Professor, NTNU

Research Scientist, SINTEF

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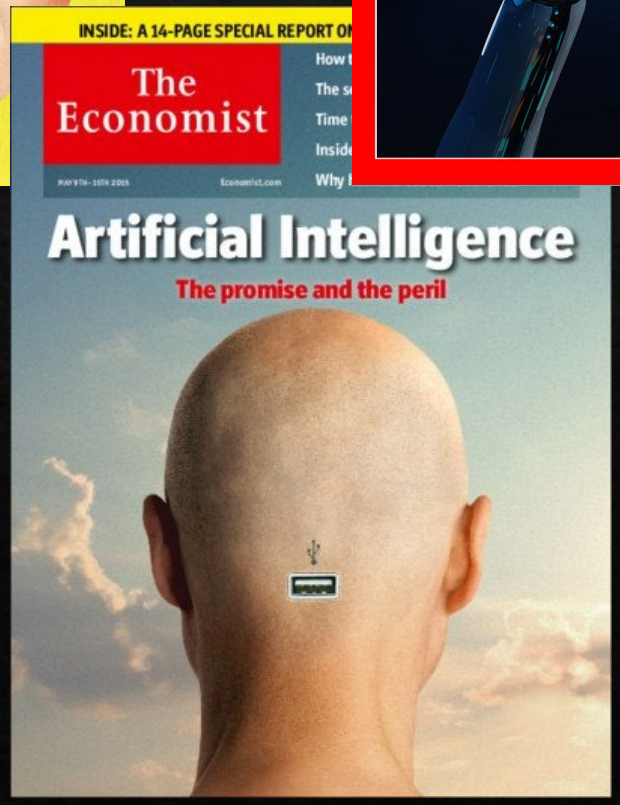
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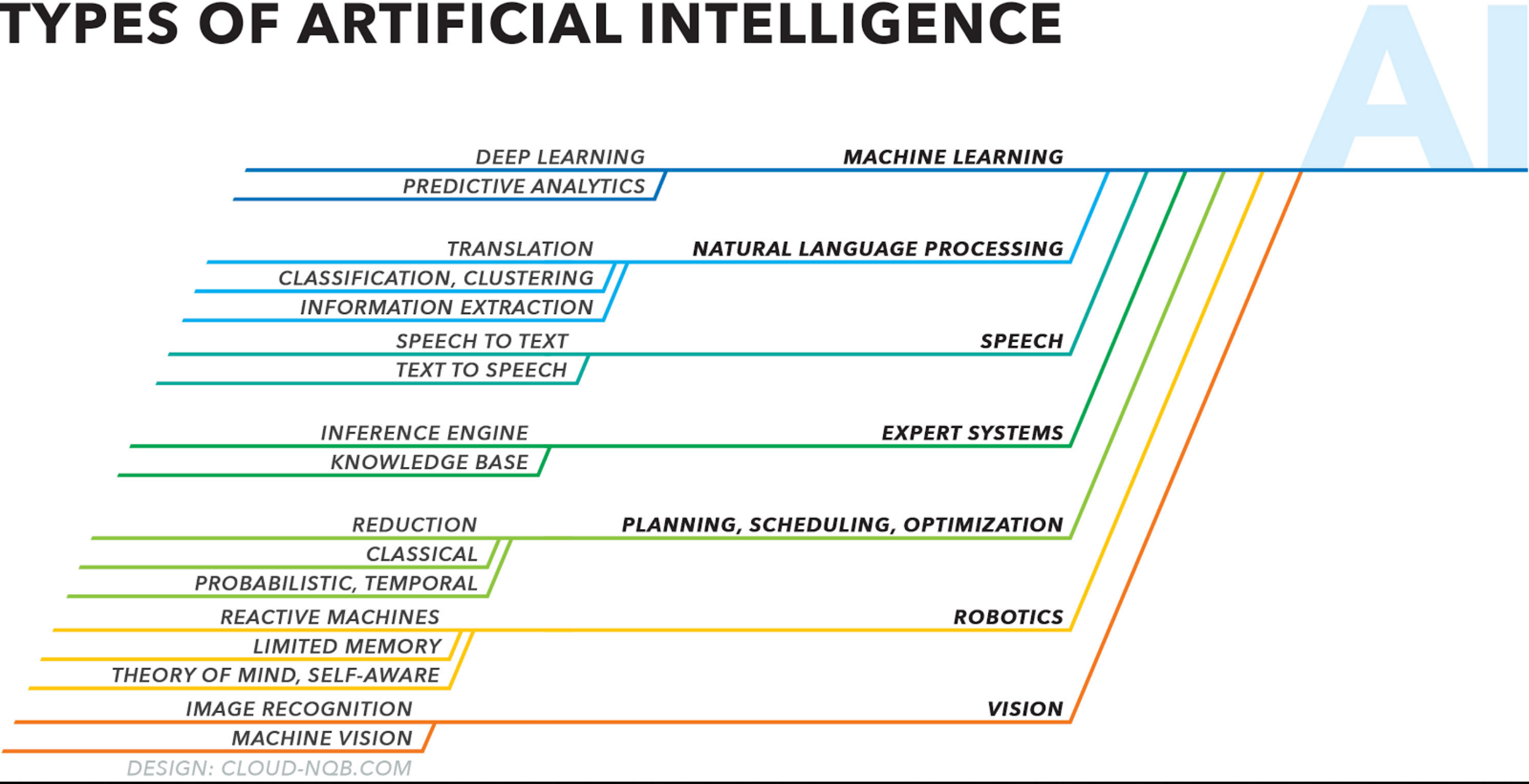
TYPES OF ARTIFICIAL INTELLIGENCE



AI for Business

Process Automation	Cognitive Insight	Cognitive Engagement
Automated decision making	**Clarifying a messy picture**	**Value to your costumers**
Back-office administrative	Costumer segment	Customer service
Financial activities	Credit / insurance fraud Detection in real time	Service recommendation

Source: Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. Harvard business review, 96(1), 108-116.

Table 2. Potential AI applications for the public sector.

AI Application	AI Value Creation and Functional Proposition	Public Sector Use Cases
AI-Based Knowledge Management (KM) Software	• Generation and systematization of knowledge – gather, sort, transform, record and share knowledge • Expert systems can support the codification of the knowledge of KM • Use of neural networks enables to analyze, distribute and share knowledge with others	• Clinical documentation powered by AI (Lin et al. 2018) • …
AI Process Automation Systems	• Automation of standard tasks; perform formal logical tasks with unpredictable conditions in consistent quality • Complex human action processes (formal logical or dangerous tasks) can be transferred to automation systems, which can support humans in performing tasks • May include rule-based assessment, workflow processing, schema-based suggestions, data mining, case-based reasoning, intelligent sensor technology • Robotic process automation has emerged as a sub-area through further technology innovations. This leverages the ability of software robots or AI-driven workers to mimic human interaction with user interfaces of software systems	• Faster and higher quality request processing for immigration application forms (Chun 2007) • Automated image diagnoses (Collier et al. 2017) • Human-computer interaction for repetitive tasks like data entry etc. (Jefferies 2016) • …
Virtual Agents	• Computer-based system that interacts with the user by means of speech analytics, computer vision, written data input but may also include real-time universal translation and natural language processing systems and affective computing • Software that can perform tasks for humans • Sub-areas are chatbots and avatars	• Task allocation according to the respective area of responsibility of a specific agency (smart HR services) (Zheng et al. 2018) • Virtual nursing assistant (Collier et al. 2017) • A chatbot for helping refugees that seek asylum to fill out and search documents (Mehr 2017) • …
Predictive Analytics & Data Visualization	• These analytics are based on quantitative and statistical analysis of data. • Processing of big data for reporting, prescriptive analysis and predictive analysis • Machine learning as a technical sub-area based on algorithms that can learn from data	• Control and performance monitoring in public areas for police departments to determine terror threats and crime hotspots for preventive action (Power 2016) • Determine high crime-risk situations to secure public transport (Kouziokas 2017) • Forecast model to predict water levels (Kouziokas et al. 2017) • …
Identity Analytics	• Software combined with big data, advanced analytics and identity access management to control the access to IT systems and automate risk-based identity checks • May include deep learning and machine learning, affective computing and artificial immune systems	• Facial recognition software to verify or identify criminals in public areas (Power 2016) • AI fraud detection to secure governmental data (Hemken and Gray 2016) • …
Cognitive Robotics & Autonomous Systems	• Systems with higher-level cognitive functions that involve knowledge representation and are able to learn and respond • Sometimes in connection with affective computing to determine and adapt human behavior as well as respond to respective emotions	• Electric-powered autonomous vehicles for public transport (Christchurch International Airport Limited 2016, Jefferies 2016) • Robot-assisted surgery (Collier et al. 2017) • …
Recommendation Systems	• An information filtering system • Software-based systems that screen personalized information to predict preferences of individuals	• E-service for government offices to provide personalized information for employees (Cortés-Cediel et al. 2017) • …
Intelligent Digital Assistants (IDA)	• Software based on speech analytics • Providing an intuitive interface between a user and a system/device to search for information or complete simple tasks	• Connecting federal programs to IDA's to make public service information available for customers (Herman 2017) • IDA-Amelia to help residents locate information and complete applications forms using speech analytics and affective computing (Jefferies 2016) • …
Speech Analytics	• Software for intelligent recognition and processing of language • Understand or respond to natural language • Translate from spoken to written language or from one to another natural language • May include real-time universal translation and natural language processing systems (Pannu 2015)	• Real-time universal translation (Microsoft 2018) to translate speech and text in face-to-face communications in public service settings • Administrative workflow assistance with voice to text transcription (Collier et al. 2017) • …

Source: Wirtz, B. W., Weyerer, J. C., & Geyer, C. (2019). Artificial intelligence and the public sector—applications and challenges. International Journal of Public Administration, 42(7), 596-615.

Survey respondents report that strategic, leadership, and organizational hurdles often determine the degree to which they can use data and analytics effectively

Which of these have been among the TOP 3 most significant challenges to your organization's pursuit of its data and analytics objectives?

● High ● Moderate ● Low

	Barriers	Overall %	High tech and telecom	Retail	Manu-factur-ing	Public sector	Health care
	Constructing a strategy	30	●	●	●	○	●
Strategy, leadership, and talent	Ensuring senior management involvement	42	○	●	●	●	●
	Securing internal leadership for data and analytics projects	33	●	●	○	○	○
	Attracting and/or retaining appropriate talent (both functional and technical)	21	●	●	●	○	○
Organi-zational structure and processes	Tracking the business impact of data and analytics activities	23	○	○	●	●	●
	Designing an appropriate organizational structure to support data and analytics activities	45	●	○	●	●	●
	Creating flexibility in existing processes to take advantage of data-driven insights	13	○	○	●	○	○
	Providing business functions with access to support	14	○	●	○	○	○
IT infra-structure	Investing at scale	17	●	●	○	○	●
	Designing effective data architecture and technology infrastructure	36	○	●	●	●	●

SOURCE: McKinsey Global Institute analysis

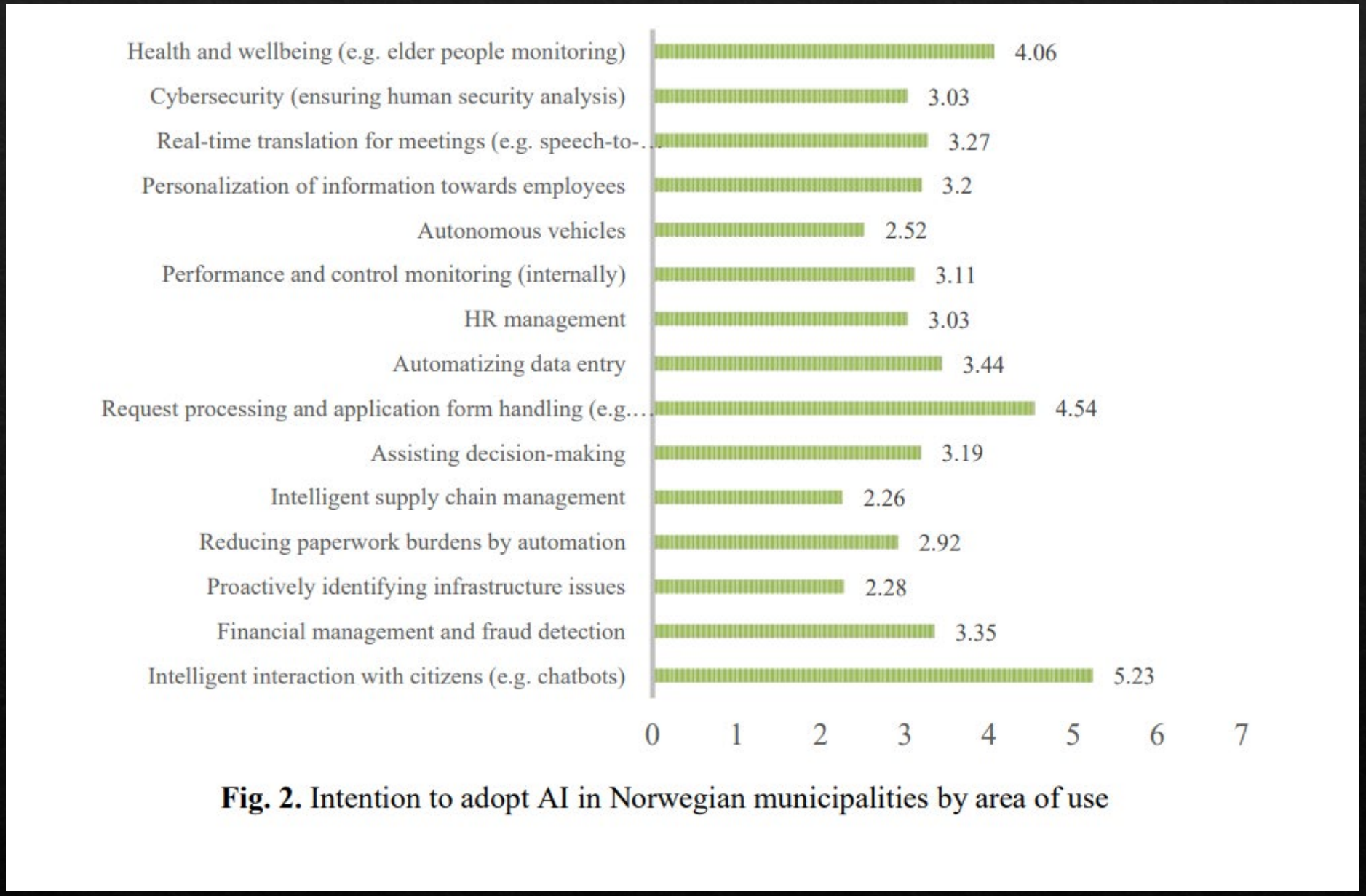
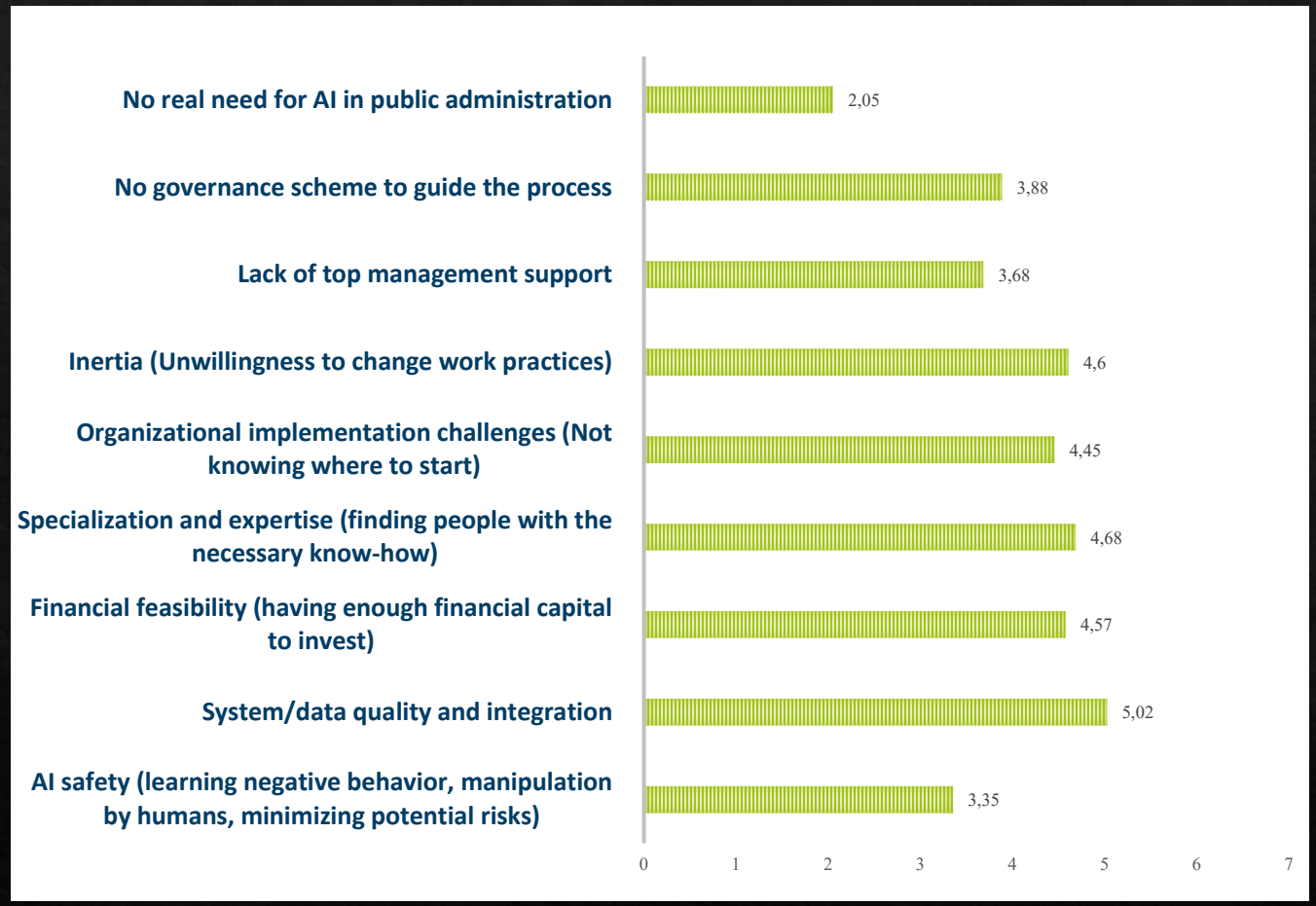


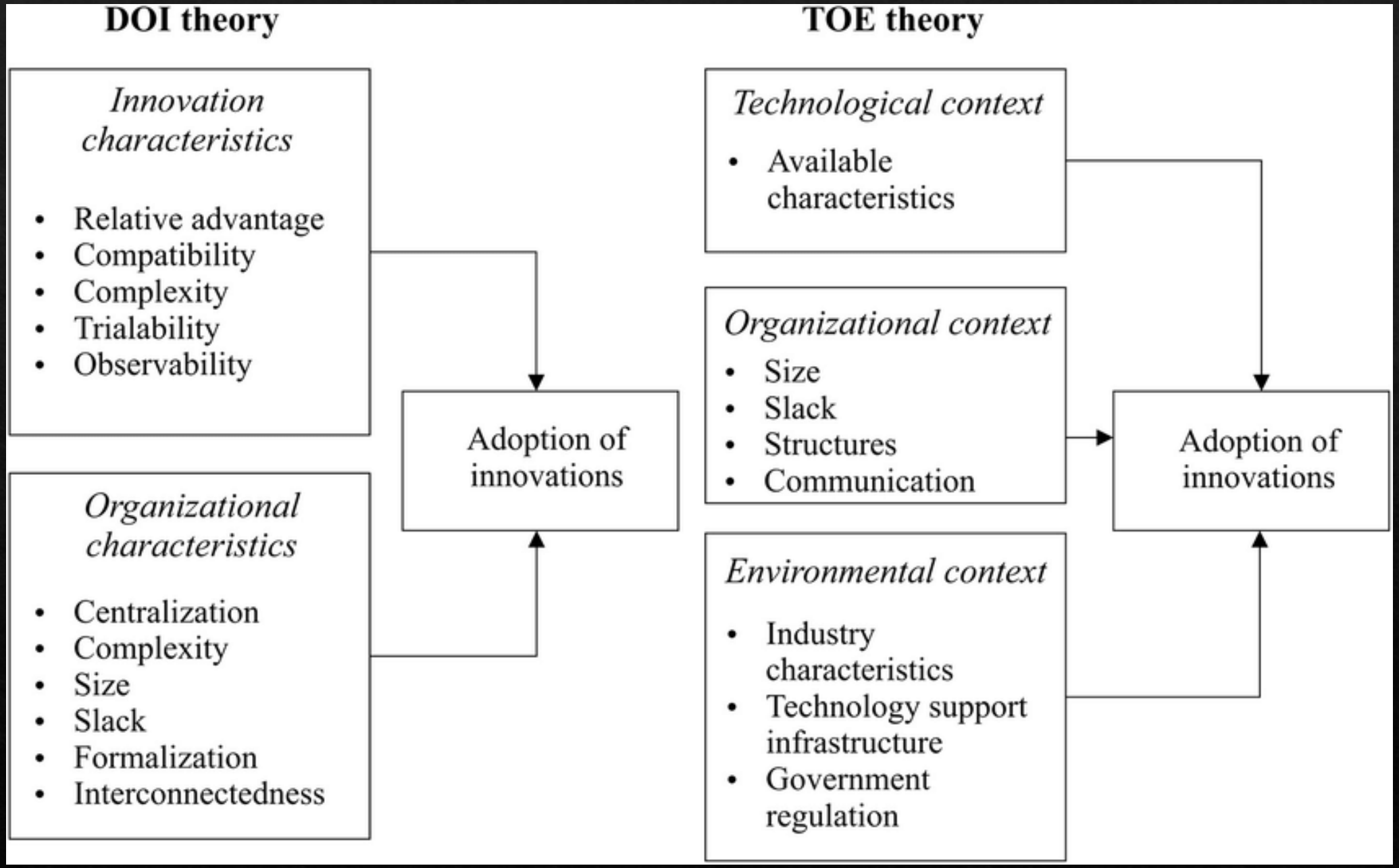
Fig. 2. Intention to adopt AI in Norwegian municipalities by area of use

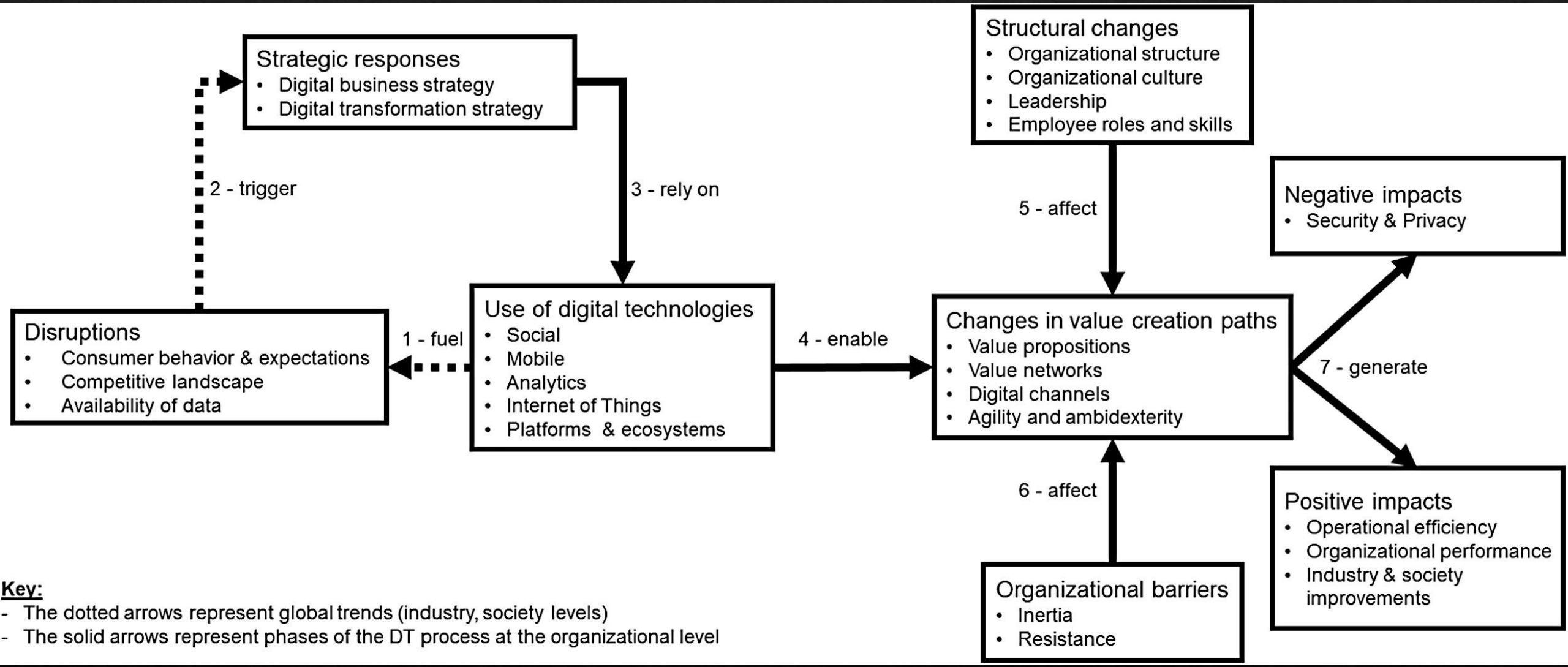
Source: Mikalef, P., Fjørtoft, S. O., & Torvatn, H. Y. (2019, September). Artificial Intelligence in the public sector: a study of challenges and opportunities for Norwegian municipalities. In Conference on e-Business, e-Services and e-Society (pp. 267-277). Springer, Cham.



- System/data quality ranks highest (5.02)
- Specialization and expertise is an important concern (4.68)
- Inertia – Organizational "Stickiness"(4.60)
- Financial feasibility (4.57)

Source: Mikalef, P., Fjørtoft, S. O., & Torvatn, H. Y. (2019, September). Artificial Intelligence in the public sector: a study of challenges and opportunities for Norwegian municipalities. In Conference on e-Business, e-Services and e-Society (pp. 267-277). Springer, Cham.


DOI theory
Innovation characteristics
Relative advantage
Compatibility
Complexity
Trialability
Observability
Organizational characteristics
Centralization
Complexity
Size
Slack
Formalization
Interconnectedness
Adoption of innovations
TOE theory
Technological context
Available characteristics
Organizational context
Size
Slack
Structures
Communication
Environmental context
Industry characteristics
Technology support infrastructure
Government regulation
Adoption of innovations



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