

Management and AI

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AGENDA

- Introduction
- Managerial implications of AI
- Policy Implications of AI

Introduction

- The role of the **technology management** function is to understand the value of certain technology and make its best use for the organization.
- Technology management involves integrated planning, design, implementation, and operation and control of technological products, processes and services.
- To make informed decision about appropriately deploying the technology a manager must understand,
 - how the technology works (not as an engineer but as an informed user) and
 - its potential uses in support of the organization's mission.
- The past experience shows that introducing and implementing new technology is one of the most important yet challenging responsibility faced by the management.

Artificial Intelligence: Managerial Implications

Artificial Intelligence: Managerial Implications

Managers need to use AI tools in at least three different ways:

- Creation and delivery of products and services as per the mission of the organization.
- Suitably adjusting the set of tasks being carried out by different jobs (i.e., job descriptions) and the associated training.
- Adjusting organizational decision-making processes -- Humans and AI-based systems need to work together to make better decisions.

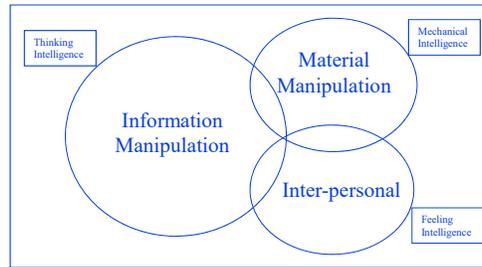
Using AI to Better Support DOD Organizational Mission

- The future warfare may not necessarily be a contact warfare. In the realm of non-contact warfare, we need to develop and integrate a number of technologies -- electronic warfare, robotics, unmanned systems, cyberspace, space, laser,... – all increasingly integrating AI.
- AI can be used to support combat operations, analyze data to support decision-making, engage-on-remote, and assist with weapons control and in battle management, thus making AI a function critical to the success of commanders at sea.
- AI used for personnel issues such as screening candidates, testing for skills, forecasting manpower needs, and even performance evaluation.

(Source: Artificial Intelligence: Addendum to NPS Strategic Plan 2018-2023.)

Nature of Work Performed in Jobs

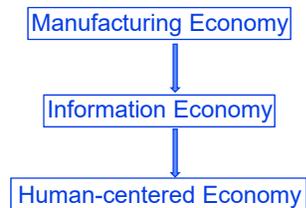
Three types of fundamental activities are performed in any job



Source: Apte and Mason (1995), "Global Disaggregation of Information Intensive Services," *Management Science*, 41(7), 1250-1262.

Changing Nature of Occupations

Economic Evolution



As AI performs many of the analytical and thinking activities, the human workers will gravitate towards interpersonal and empathetic tasks. Managers should adjust the job specs and training accordingly.

Decision Making with Artificial Intelligence

Decision-Making Conditions	AI-Based Decision Making	Human Decision Making
Specificity of the decision search space	Requires a well-specified decision search space with specific objective function/s.	Accommodates a loosely defined decision search space.
Interpretability of the decision-making process and outcomes	Effectively a black box: Difficult to interpret the decision process.	Decisions are explainable and interpretable, but vulnerable to retrospective sense-making
Size of the alternative set	Accommodates large alternative sets	Limited capacity to uniformly evaluate a large alternative set.
Decision-making speed	Comparatively fast with limited trade-off between speed and accuracy.	Comparatively slow with high trade-off between speed and accuracy.
Replicability of decision-making process and outcomes	Highly replicable due to standard computational procedure	Replicability is vulnerable to intra- and inter-individual factors such as experience.

Source: Shrestha et al. (2019), "Organizational Decision-Making Structures in the Age of Artificial Intelligence," *California Management Review*, 61(4), 66-83.

Combining Human and AI Decision-Making

- Full delegation of decision-making to AI
 - Examples: Recommender systems, online detection of fraud or fake news, dynamic pricing
- Hybrid sequential decision-making (Human intelligence augmented by AI)
 - Examples: Crowdsourced innovation contests, hiring, loan application assessment
- Hybrid sequential decision-making (AI augmented by human intelligence)
 - Examples: Sports analytics, health monitoring

Implementing AI

Experience of using AI in businesses (as of 2017)

- Mounting evidence of AI failures, gaps between AI ambition and execution, and a general post-AI-hype sobering.
- AI is typically implemented and used with other advanced digital technologies
- AI is used in the following areas: smart services, office automation, management support, smart products, manufacturing automation, and customer interface

Major Implementation Challenges

- Lack of skilled staff and knowledge in digital technologies
- Lack of organizational agility and internal resistance
- Cybersecurity risks
- Lack of leadership and sufficient funding

Source: Brock and Wangenheim (2019), "Demystifying AI," *California Management Review*, 61(4), 110-134.

Implementing AI

DIGITAL: Guidelines for Successful AI Applications:

- **D**ata: Relevant and suitable digital data
- **I**ntelligence: Managerial/technical skills and digital strategy
- **G**rounded: grounded approach – start small with projects in existing core businesses (and not pursue pie-in-the-sky projects)
- **I**ntegral: Integrated data repository and digitized business processes
- **T**eaming: Inter-disciplinary teams (involving external partners)
- **A**gile: Ability to quickly and frequently adapt processes and systems
- **L**eadership: Senior management comfortable and supportive

Artificial Intelligence: Policy Implications

Policy Implications of AI

- Concerns about the future of AI: (a) Human is replaced by AI, (b) Singularity is near, and (c) AI is abused.
- Impact of AI on occupations and the potential loss of jobs (various estimates --10-15% at low end to 40-50% at the high end).
- Alternate Policy Options
 - Regional Training Programs offered by universities teaming with companies.
 - Regulations with respect to employment
 - Firms spend a percentage of money saved through automation on training employees who have lost jobs.
 - Restrict the number of hours worked per day to distribute work.

Policy Implications of AI

- Regulations with respect to Algorithms
 - AI is objective but systems based on AI can be biased based on input data used. May need to regulate how AI algorithms are trained and tested.
 - AI Professional should adhere to moral codex (like doctors and lawyers).
 - Explainability - Deep learning is essentially like a black box. Output can be tested but the process remains opaque.
 - "Fragility" – Many black-box AI react unpredictably when presented with new data not in the training set
- Regulations to balance economic growth and personal privacy (e.g., General Data Protection Regulation (GDPR) in EU).

Source: Haenlein and Kaplan (2019), "A Brief History of AI," *California Management Review*, 61(4), 5-14.