

# Debunking Myths and Misconceptions About Artificial Intelligence, 2021

Saniye Alaybeyi, Senior Director Analyst  
Pieter den Hamer, Senior Director Analyst

# Debunking Myths and Misconceptions About Artificial Intelligence, 2021

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By Analysts [Saniye Alaybeyi](#), [Pieter den Hamer](#)

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The hype around artificial intelligence has led to many myths. Enterprise architecture and technology innovation leaders must separate reality from the myths to avoid pitfalls and devise future AI strategies, or enhance existing ones, that deliver business value outcomes.

## Overview

### Key Findings

- Throughout the COVID-19 crisis, the majority of organizations have been maintaining or even increasing their investments in artificial intelligence (AI), according to polling results from a Gartner webinar in May 2020.
- AI techniques are reaching deeper into the work environment, not only replacing and augmenting mundane jobs, but also changing or augmenting those that remain.
- Less than half of machine learning (ML) models make it to production; and if they do, it's often a lengthy process.

### Recommendations

Enterprise architecture and technology innovation leaders engaged in areas using AI should:

- Create real value with AI by applying it to the most practical scenarios and use cases such as cost reductions and operations improvements.
- Manage the impact of AI on existing tasks by working with HR to identify activities that will be augmented or automated by AI. Then redefine job profiles and adapt capacity planning to reflect increased productivity and initiate retraining programs for existing staff.
- Make AI part of existing automated decision-making systems by collaborating early with relevant business and IT stakeholders. Ensure that AI is focused on real business challenges and that IT application teams are prepared for integration.

### Strategic Planning Assumptions

By 2023, 85% of enterprise applications categorized as AI-enabled will, in fact, be based on traditional analytics techniques such as linear regression, decision trees and rule-based systems.

By 2024, 69% of what a manager currently does will be automated, requiring a complete overhaul of the role of the manager.

## Analysis

Business leaders are constantly inquiring about what AI can do for their enterprises. In this research, we dispel some of the AI myths (see Table 1), so that enterprise architecture and technology innovation leaders implementing AI projects in applications can devise sound strategies – or enhance existing ones – while still delivering business value.

**Table 1: Myths and Realities of Artificial Intelligence**

Myth	Reality
Artificial intelligence (AI) and machine learning (ML) are the same and interchangeable	AI comprises a series of mathematical or logic-based techniques to solve probabilistic problems. ML is one of AI techniques.
AI is all about deep learning	Many AI problems can be effectively solved using either rule-based systems or traditional machine learning.
All black-box AI needs to be explainable	Different applications of AI have different levels of requirements for explainability.
AI is all about the algorithms and the models	AI is all about the business. Operationalizing AI within the business is harder than building models using algorithms.
AI is an unnecessary luxury in times of COVID-19 crisis	Most organizations are maintaining or even increasing their investments in AI during times of crisis.
We do not need an AI strategy	Every organization must consider the potential impact of AI on its strategy.
AI can be free of bias	AI systems are intrinsically biased.
AI will only replace mundane and repetitive jobs	AI techniques are reaching deep into the work environment, not only replacing and augmenting mundane jobs, but also changing or augmenting those that remain.
Intelligent machines learn on their own	A machine learning model is the result of a mathematical parameter optimization step, which indeed runs mostly autonomously.

Source: Gartner (September 2020)

## Myth 1: AI and Machine Learning Are the Same and Interchangeable

Reality: Within AI, there is a large subfield called machine learning (ML), which is defined as the field of study that enables machines to learn without being explicitly programmed. Machines learn via a process called “training” and do not require custom programming to solve problems. ML can be “orchestrated” to recognize patterns from data without explicit programming, and is usually good at solving one specific task (that is, “narrow AI”). ML requires a well-thought-out training data acquisition strategy. AI, on the other hand, is an umbrella term for a broad set of computer engineering techniques, ranging from ML and rule-based systems to optimization techniques and natural language processing (NLP).

Recommendations:

- Use Gartner’s AI techniques and capabilities framework (see [What Is Artificial Intelligence? Seeing Through the Hype and Focusing on Business Value](#)) to break down into tangible pieces how AI can address problems.
- Remove the philosophical element from the AI discussion, and show how each of these techniques can solve real-world problems. Determine what AI can and cannot do for your organization.

## Myth 2: AI Is All About Deep Learning

Reality: Deep learning techniques (see [Innovation Tech Insight for Deep Learning](#)) or deep neural networks (DNNs) are a type of ML providing amazing breakthroughs. But this doesn’t mean that deep learning is the best technology for all problems falling under the AI umbrella – and it doesn’t mean that DNNs will always be the most successful AI technology for a specific challenge. As a matter of fact, many current AI problems can also be effectively solved for favorable cost-benefit-risk trade-offs using either rule-based systems or traditional ML. The [Kaggle](#) website is a good example of this, where most of the posted AI problems are still being solved using ensemble techniques that combine a variety of traditional ML algorithms, not just deep learning. Moreover, deep learning tends to be very hungry for data and compute power – the costs for data labeling and energy can be significant and should not be underestimated.

Recommendations:

- Do not accept deep learning as the mantra – instead, apply pragmatic metrics to choosing the best solution approach for each challenge. For example:
  - Latency of the solution at runtime

- Whether it should run on-premises or in the cloud
  - Whether the solution is good enough in terms of false positives and false negatives
  - Whether AI is able to produce explanations of the outputs or confidence levels
- Focus on creating a flexible ML pipeline, regardless of the chosen approach, by leveraging traditional ML approaches first. Only if these approaches are not considered good enough should you proceed to deep learning approaches with all their known complexities.
- For complex problems, especially those requiring more common sense and human insights, combine deep learning with other AI techniques such as rule processing, heuristic or physical models, (knowledge) graphs and optimization. This is also known as “composite AI” (see [Hype Cycle for Artificial Intelligence, 2020](#)).

### Myth 3: All Black-Box AI Needs to Be Explainable

Reality: Different applications of AI have different levels of requirements for explainability, depending on the line-of-business (or customer/constituent, or regulatory) need for privacy, security, algorithmic transparency and digital ethics. AI that generates internal ideas and insights, which can then be further tested before deployment, doesn't necessarily need as much explainability. However, AI that makes decisions about people or citizens (such as criminal sentencing guidelines, eligibility for loans or credit, and nondiscriminatory hiring) requires explainability. AI that makes decisions in a closed loop with important consequences (such as autonomous driving) has a high requirement for explainability due to ethical and, possibly, legal reasons.

Recommendations:

- Determine the need for explainability by consulting with the relevant line of business, or legal department, for compliance. Put the AI models in context and define how AI fits within the overall design and operation of the business solution.
- Build trust with business users and stakeholders by:
  - Giving them visibility into training data by leveraging historical data, explaining model inputs, simplifying results or exposing underlying data in ways understandable to humans.
  - Ensuring they understand the trade-off between explainable versus more accurate AI models, so that they can decide an approach that best fits their business circumstances.

### Myth 4: AI Is All About the Algorithms and the Models

Reality: Building and applying ML algorithms to create a predictive model are often the easiest parts of an AI project. A predictive model is nothing more than a set of equations. Successful

predictive model building is about collaboration and communication.

The more challenging parts include making sure that the business problem that is being solved with AI is well-defined. Enough of the right data must be gathered and “curated” (that is, governed, managed, secured, and so on) to enable AI to drive business outcomes. The most difficult part of an AI project is deploying.

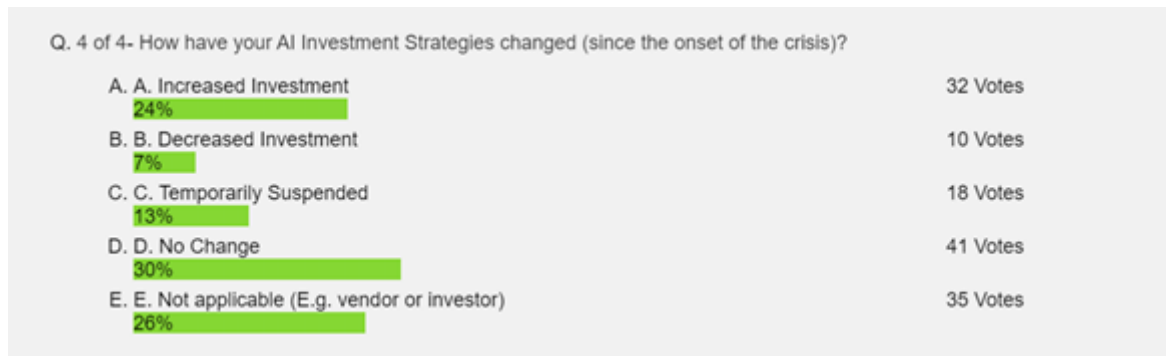
Recommendations:

- Define the business problem that AI will solve by first consulting with business stakeholders to help deliver a model that takes into account any issues and constraints that have been highlighted.
- Plan for model operationalization by getting budgets (or investments) approved in advance, and by shifting the organizational culture to increase the appetite for AI as a decision maker.
- Expand and adjust the data collection and curation strategy (that is, management, governance, security, privacy, sharing, orchestrating, and more) to master the art of AI.
- Explicitly organize and manage the people, processes and tools that are needed for testing, deploying, drift monitoring and other AI operationalization activities (see [Use Gartner’s 3-Stage MLOps Framework to Successfully Operationalize Machine Learning Projects](#)).
- Prevent AI experts from getting increasingly swamped from retraining and redeploying a growing number of models, by offering augmentation/automation through ModelOps tools (see [Innovation Insight for ModelOps](#)).
- Ensure domain experts work together with data engineers, ML engineers and other roles that make up a multidisciplinary AI team (see [How to Organize AI Talent](#) and [Staffing Data Science Teams: Mapping Capabilities to Key Roles](#)).

## Myth 5: AI Is an Unnecessary Luxury in Times of COVID-19 Crisis

**Reality.** Most organizations are maintaining or even increasing their investments in AI throughout the COVID-19 crisis, as illustrated by polling results from a May 2020 webinar (Figure 1). AI is seen by many as an important enabler of cost optimization and business continuity, but also of revenue growth and improved customer interaction. Improved situational awareness by analyzing more data more quickly, generating early warnings and predictions about disruptions, and automating or augmenting decision making — all are essential to most organizations today.

**Figure 1. Change in AI Investment Strategies Since the Onset of the COVID-19 Crisis**



Source: Gartner screenshot of polling from Gartner webinar, “Panel Discussion: Use AI to Fight Through COVID-19 and to Recover,” 30 June 2020.

Recommendations:

- Use AI in pragmatic scenarios and use cases. In times of crisis, it is even more important than usual to focus AI on practical applications to speed recovery (see [Tool: Use Cases to Seize AI Investment Opportunities](#)).
- Make sure that AI initiatives move from prototyping and piloting to real production (see [Accelerating AI Deployments – Paths of Least Resistance](#) and [Use Gartner’s 3-Stage MLOps Framework to Successfully Operationalize Machine Learning Projects](#)).
- Proactively promote the application of AI as a powerful set of technologies. Although not a “silver bullet,” most organizations cannot afford to ignore the use of AI to fight both the immediate and also longer-term impact of the COVID-19 crisis (see [How to Use AI to Fight COVID-19 and Beyond](#)).

### Myth 6: We Do Not Need an AI Strategy – AI Does Not Apply to My Business Yet

Reality: Every organization must consider the potential impact of AI on its strategy (often based on three- to five-year projections of market and competitor evolution) and investigate how this promising technology can be applied to a wide variety of business problems. There is a rich goldmine of real-world AI experience to investigate, which enables the prioritization of use cases and sources of transformative business value.

Recommendations:

- Maximize business value by pairing business priorities with near-term opportunities, especially those that leverage AI’s power to augment human work, decisions and interactions, as well as other functional innovation opportunities. Investigate existing or potential competitors’ disruptive actions to customer/constituent value propositions.
- Identify the most promising AI use cases by closely collaborating with stakeholders regarding strategic initiatives and critical business functions (see [Tool: Use Cases to Seize AI Investment](#)

Opportunities).

- Enterprises should have an AI strategy, even if the C-level executives decide that it is not yet necessary. In many ways, eschewing AI exploitation is analogous to forgoing the next phase of automation; it could, therefore, place enterprises at a competitive disadvantage. In some cases, the current approach might be “no AI” for now, but this should be a conscious decision after research and deliberation. Any AI strategy, including “no AI,” should be periodically revisited.

## Myth 7: AI Can Be Free of Bias

Reality: AI systems are intrinsically biased. This is true for the collection of (which and how) data, the development and selection of datasets, their weighting, and even for analytical frameworks and models and which outputs to consider. In addition, data scientists and software developers involved in developing AI systems may inadvertently create a bias or project their own biases onto their model creation/data cleansing activity. For instance, data scientists introduce bias by selecting a model or algorithm that is subtly different from others in terms of resulting predictions or automated decisions. AI deployment is currently done by humans, and utilizes data that humans generate knowingly or unknowingly; bias is thus impossible to avoid, similar to human decision making. AI systems that are adaptive and frequently retrained – using new data from social media – are even more vulnerable to unwanted bias or intentional malevolent influences, as misinformation and biases infect social media, both intentionally and accidentally.

Recommendations:

- Minimize bias by actively and frequently evaluating datasets that are used for training/retraining and validation in ML. Highlight potential biases and determine whether they are significant or require redress. Apply statistics and data exploration to check for outliers and skewed distributions by comparing and validating different samples for representativeness, and by using separate test and validation datasets.
- Limit the occurrence of bias or blatant mistakes in automated decision making, predictions or other AI output by:
  - Applying “guardrails” in a separate system, or involving humans in a workflow system to detect AI results that are outside of common sense or business rule boundaries.
  - Applying ensemble learning in which multiple models and algorithms are compared to produce an outcome, and involving a human in the loop if differences are too large or confidence levels too low.
- Reduce selection/confirmation bias by creating a team of AI experts and other stakeholders of sufficient diversity – representing different categories of expertise, business domain, demographics, gender, ethnicity and other backgrounds – and with mandatory reviews of each other’s work.



- Manage risks that may result from biased AI – including safety, security, privacy, financial, legal, compliance and PR risks – by proactively identifying such risks and initiating mitigation measures. These measures include the management of expectations and the involvement of relevant stakeholders for each risk.

## Myth 8: AI Will Only Replace Mundane and Repetitive Jobs

Reality: AI techniques are reaching deep into the work environment, not only replacing and augmenting mundane jobs, but also changing or augmenting those that remain (see [Predicts 2020: AI and the Future of Work](#)).

AI enables businesses to make more accurate decisions via predictions, classifications and clustering. AI accomplishes these tasks by finding patterns within complex unstructured data such as images, audio and documents, or within structured historical data. Therefore, AI can not only accomplish repetitive, tedious and low-skilled tasks, but also read thousands of legal contracts (see [How to Recognize and Select the Best AI Solutions for Your Corporate Legal Practice](#)) in minutes and extract all the useful information out of them faster and with fewer errors than lawyers (see [Debunking Myths and Misconceptions About Artificial Intelligence](#)).

AI for imaging is an especially promising area, because computers and deep learning algorithms are better and faster than humans at perceptual tasks, especially regarding images. For example, current chest X-ray applications of AI can detect disease faster than radiologists (see [Debunking Myths and Misconceptions About Artificial Intelligence](#)).

AI and algorithms are also being used to:

- Write articles about sporting events
- Determine the price of hotel rooms and airline seats
- Provide wealth management advice for some financial services companies (“roboadvisors”)
- Determine when, and for how much, insurance claims should be paid
- Ascertain which advertisements to place before web surfers (such as Google, Facebook and Baidu ad placements)
- Execute foreign exchange transactions

Recommendations:

- Ascertain the impact of AI on existing tasks by working with stakeholders to identify activities that will be augmented or automated by AI. Advocate AI for retraining programs for existing staff.

- Anticipate concerns about AI, and lower resistance to AI-infused change by communicating frequently and transparently with employees and other stakeholders. This will decrease unnecessary negative sentiments and allow preparation for change that is coming.

## Myth 9: Intelligent Machines Learn on Their Own

Reality: ML approaches can, typically, automatically determine the necessary parameters. The resulting ML program or model is the outcome of a mathematical parameter optimization step, which runs mostly autonomously. However, before this happens, many other steps have been taken by the humans who created the mechanisms to enable the following:

- Framing the problem within the ML context
- Cleaning and preparing the data
- Determining appropriate datasets, and splitting up input and output parts
- Feature engineering, to determine the best codification of inputs and outputs
- Removing potential bias in the training data (for example, appropriate stratification)

Currently, most of these tasks cannot be automated. Here, experienced data scientists are needed to set up the environment, guide the numerical optimization, and then help in operationalizing the whole process into business capabilities. Once a model is built, it is not automatically updated. The whole loop must be executed manually (again) to enable the integration of new knowledge and data into the next model iteration.

Recommendations:

- Use data engineers for data cleanup and preparation, and data scientists for feature engineering and model building, in order to frame a business problem into an ML setup. Once this setup is available, transfer the predictive model to the lines of business where it will be operationalized.
- Review regularly to assess how well the model is predicting results, and to ensure that the right cutoffs and decision rules continue to be applied. Produce a set of reports showing how accurate the predictions made by the model have proved to be.

## Evidence

The analysis and advice provided in this document are built from constant scanning of the market, as well as the aggregation of analyst experience and ongoing interactions with end users and technology and service providers. We have used a range of sources, including:

- Gartner customer inquiries and conversations with end users and vendors

- Discussions between Gartner analysts with expertise in AI and ML
- Polling results from a Gartner webinar conducted in May 2020

## Document Revision History

[Debunking Myths and Misconceptions About Artificial Intelligence - 18 January 2019](#)

## Recommended by the Authors

[What Is Artificial Intelligence? Seeing Through the Hype and Focusing on Business Value](#)

[Artificial Intelligence Maturity Model](#)

[Artificial Intelligence Primer for 2020](#)

[How to Determine the Best AI Organizational Design](#)

[An Artificial Intelligence Reality Check for CIOs](#)

## Recommended For You

[Artificial Intelligence Primer for 2020](#)

[Predicts 2020: Artificial Intelligence – the Road to Production](#)

[Hype Cycle for Artificial Intelligence, 2020](#)

[Predicts 2020: Artificial Intelligence Core Technologies](#)

[The Present and Future of Artificial Intelligence \(Presentation Deck\)](#)

## Supporting Initiatives



Artificial Intelligence



Application Leaders



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