What does the human face of AI look like?

By Maria Jesus Saenz, Elena Revilla and Cristina Simon

When developing supply chain applications utilizing artificial intelligence (AI), it's vitally important to keep in mind that the working relationship between machine and humans is critical to the success of these projects.

Our extensive research shows that all too often projects are implemented without a clear understanding of how AI and people will work together as a team. A common pitfall is to underestimate the importance of pairing the predictive capabilities of algorithms with human expertise and intuition.

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As part of our research to examine how companies use digital capabilities, we have developed a framework for these working relationships. The framework is based on four configurations of machine/human relationships for different AI project types.

Map your decision-making

Before applying the framework, it is advisable to assess the decision-making context of the application along two dimensions: the openness of the decision-making process and the level of risk. This will help managers to decide which teaming options are the most appropriate.

Decision-making openness can vary from closed to open, and each extreme requires a different approach to AI.

Closed decision-making has predefined rules for framing decisions. Think of an automatic language translator that is programmed to follow preset rules of grammar and meaning. Conversely, in an open process the rules are not well-defined because decision-making has to be open to unpredictable changes. Think of an AI-driven assessment of the supplier base for a large contract negotiation where a company is making key sourcing decisions in preparation for the talks. The behavior of the participants is difficult to foresee and the final contract terms are unknown, so there has to be some flexibility in what decisions can be made.

The level of risk assessment encompasses all relevant types of threats associated with the AI-based decisions such as reputational and financial risk. Knowing the risk level helps you decide whether making decisions based entirely on algorithms is acceptable or whether you will need the support of human expertise in the decision-making process.

Decision mechanics

In addition to assessing the decision-making environment that shapes an AI project implementation, it is also necessary to get a sense of the teaming capabilities you can harness. There are four types of capabilities.

Interoperability. How will humans and machines exchange information when required to meet the goals of the process? The AI system should specify the role of the parties in these interactions.

Authority balance. Will humans or machines have final control and when is this right exercised? Much depends on the level of risk. For instance, in high-risk situations immediate responses might be required.

Transparency. Transparent decision-making is key to building trust where humans and algorithms interact. For example, humans need to know what rules the algorithm follows while the algorithm should have clear instructions on when humans make final decisions.

Mutual learning. Just as machines learn from humans, humans can acquire knowledge from machines. How will these two-way loops operate?

Different combinations of these capabilities will be embedded in the design of projects, depending on the type of environment in which the AI/human team will perform. It is now appropriate to consider these various scenarios.

Four scenarios

Having established the type of decision-making regime you are dealing with, you can look at which teaming configuration best suits your project. We have identified four ways in which humans and machines can work together to make decisions. These scenarios are depicted in Figure 1.

Machine-based AI systems. In this scenario the circumstances are predictable and AI plays a central role in decision-making. Machines operate independently; humans play a supervisory role and intervene only when necessary. Interoperability is for audit purposes only, while transparency is not required.

An example is a warehouse system based on AI-powered autonomous mobile robots (AMRs). The variables that govern these systems (location, speed and type of product handled) and how they interact, are well-defined. Machines adhere to precise sets of rules and key performance indicators. The warehouse operator functions as a supervisory foreman and engages only to fine-tune or adjust the system.

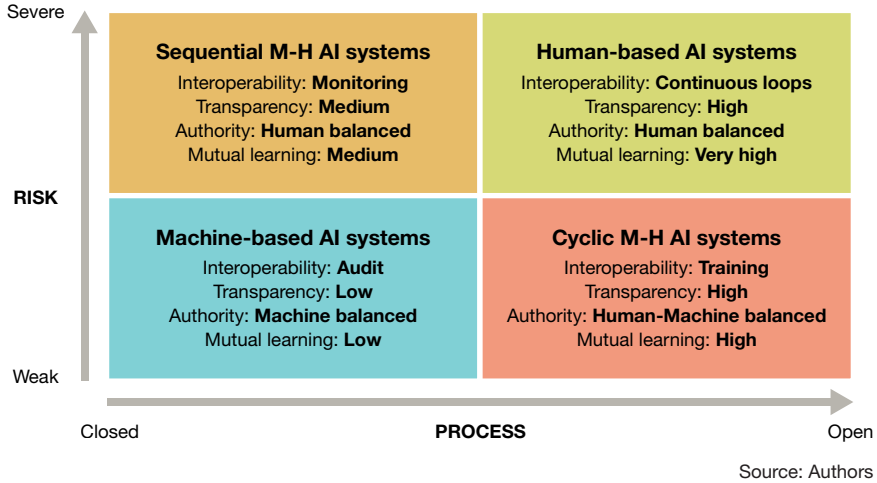
Sequential machine-human AI systems. Although machines operate independently in this scenario, humans need to do more than get involved only when needed—they must be ready to intercede to deal with unplanned contingencies.

The use of delivery drones is a case in point. In the future, AI-based systems that operate drones in densely populated areas will have some degree of autonomy, but human operators will probably be on standby for safety reasons. Even a hint of danger might require the support of a human. A level of transparency is needed in this scenario.

FIGURE 1

Human and machine teaming capabilities

Depending on the circumstances, humans and machines can work together in four different ways.



Source: Authors

Cyclic machine-human AI systems. Humans fulfill the role of coach in this scenario. In these low-risk, open settings, as long as the system is operating smoothly the human agent monitors outcomes without intervening in the activity. The human agent uses this knowledge to train the AI system. Given these interactions, a high degree of transparency is needed.

An example is the launch of a new product. Algorithms can be used to identify certain similar old products with enough historical data. The AI system is taught how to make better demand predictions for the new product.

Human-based AI systems. Open, high-risk decision processes where humans wield the final authority qualify for this configuration. In these scenarios, algorithms can make educated guesses but the high level of risk involved requires humans to have the final say. It is critical that the decision-making rationales are transparent.

Managing supply chain processes during extreme disruptions such as the COVID-19 pandemic is an example of this type of configuration. While AI-based systems can propose certain decisions, they are limited by the lack of historical data on these rare disruptions. Because the rules and behaviors are relatively unknown, it is difficult for the AI system to make predictions. The humans in charge make the decisions and interact with the AI system to assess future scenarios. This is an example of how algorithms and humans can collaborate.

Flexible approach

AI projects that achieve the right balance between machine and human involvement in decision-making are more likely to succeed. By using the framework we have developed to focus on this balance at an early stage in a project, teams can avoid a lot of wasted effort and sub-optimal results. However, the scenarios are not set in stone; project teams should apply them flexibly and be prepared to shift from one configuration to another as necessary.

A more detailed article based on this research was published in the MIT Sloan Management Review. It can be viewed at sloanreview.mit.edu/article/designing-ai-systems-with-human-machine-teams.