

# The impact of artificial intelligence on jobs: How to make it more human?

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## **Abstract:**

Artificial intelligence is not yet well known or understood; and this holds even more for its impact on jobs. It is now mostly used by firms to automate so-called routine tasks. AI is not intended to replace people but, instead, to appeal to their social and creative intelligence and boost the value of advice. In the coming years, firms will have to modify jobs to make them fit better with AI; they will have to support the learning of new aptitudes across the board to the detriment of the acquirement of “hard” skills alone. Pôle Emploi (the French Unemployment Office) is using AI to, for example, help its counselors concentrate on tasks with more human value. It has equipped them with an interface that recommends the services and training programs to be suggested to job-seekers.

This article analyzes the impact of artificial intelligence (AI) on jobs and occupational sectors. The intent is to identify the occupational possibilities related to AI and thus adapt jobs to it. The AI projects launched by Pôle Emploi (the French Unemployment Office) are then discussed.<sup>1</sup>

According to a report by the work groups France Artificial Intelligence, AI can be defined in terms of automating tasks, a use that relies on technological building blocks coming from a single thematic ecosystem. This thematic ecosystem is:

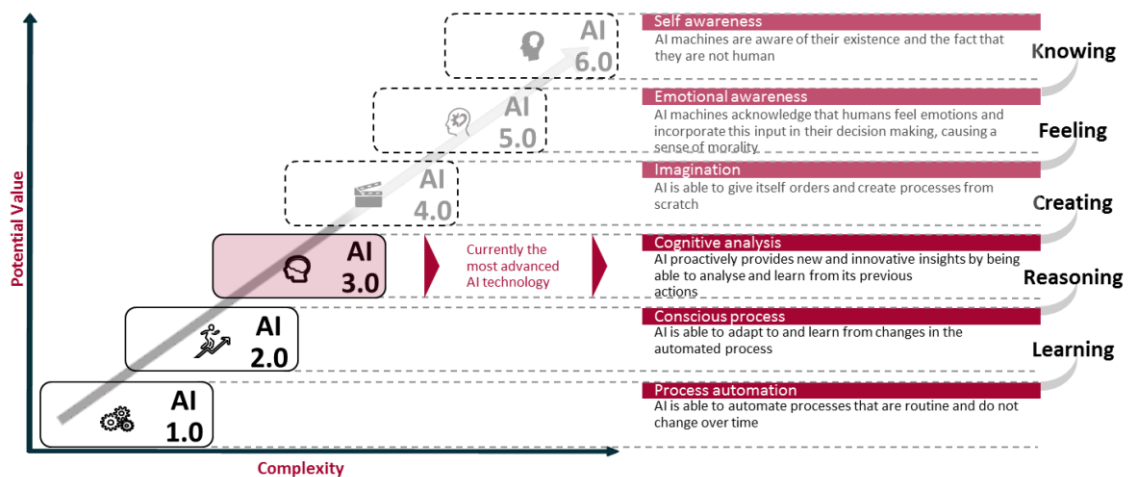
- INFORMATION: the digitized organization and management of data or expertise (procedures for collecting data, databases, etc.).
- HARDWARE: the material infrastructure (including sensors and computing technology).
- ALGORITHMS, in the strict sense of the word, but also the strategies for solving problems and performing calculations (expert systems, etc.).
- INTERACTIONS: robotics, user interfaces, ergonomics.
- ORGANIZATION: the know-how that, for controlling implementation, reaches across disciplines (law, philosophy, ethics and the social and human sciences), in general: the acceptance of AI and measurement of its individual and social impact).

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<sup>1</sup> This article has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor's approval, completed references.

## Different generations of AI technology, different needs

Bear in mind that the phrase “artificial intelligence” covers a large number of (more or less advanced) techniques. Various levels of AI have been classified in successive generations (See Figure 1).



**Figure 1:** Generations of artificial intelligence.  
**Source:** Capgemini Consulting.

AI 1.0 responded to the need for automation (for example, to increase a factory’s productivity) or for surveillance and the recording of data (video surveillance, closed-circuit television). Thereafter, AI 2.0 has been used to analyze huge databases (big data), interact with users (chatbots) or stock information (cloud computing). Finally, AI 3.0, the most advanced generation now present, can, in addition to the preceding activities, recognize recurrent behaviors for predictive purposes (video games) or for learning from previous actions (machine learning). These activities open toward a cognitive analysis of the situation and thus toward reasoning. Some firms are now using AI 3. An example is self-driving vehicles that can learn from information on actual accidents and improve the detection of obstacles.

The French public sector, the country’s first employer, mainly uses AI 1.0 and 2.0 for the following tasks: preparing, applying and analyzing. Recently, Shark Robotics equipped firefighters in Paris with a nonautonomous drone that takes the place of human beings to explore risky areas (AI 1.0). During the presidential election, the city of Marseille experimented with a chatbot that informed users of the schedule and location of polls for voting and of the documents needed to vote (AI 2.0). More simply, the public sector is using AI to automate processes and analyze big databases for the purposes of decongesting services, improving working conditions for employees and ameliorating the user’s experience.

Future generations of AI will, we imagine, be more autonomous, capable of feeling, moralizing and creating. Contrary to a widespread belief however, the next generation is yet far away. Meanwhile, many jobs are still not highly exposed to the risk of automation. The belief that new generations of AI will be coming soon is evidence of how much effort must be devoted to educational campaigns on AI.

## How to assess whether a job or task will be automated?

A pioneering article in 2003 was the first to have conceptualized a theoretical model of how automation threatened employment.<sup>2</sup> Matrices were made of workplace tasks ranked as routine/nonroutine and as manual/cognitive (analytic/interactive). According to this study, people can be replaced in routine tasks, whether manual or cognitive; but the number of such tasks is limited, and can be established using the explicit rules of computer programs.

In contrast, nonroutine tasks, whether manual or cognitive, are more complex; and the input from computer science is a complement rather than a substitute for workers. For instance, there is less probability that the tasks of presenting, influencing, writing articles, organizing a schedule or training others will undergo automation even though, according to Frey and Osborne (2013), that is not impossible given the new advances in machine learning, artificial intelligence, big data, etc. After applying their model to more than 700 occupations in the United States, Frey and Osborne found, in effect, that nearly 47% of them were possible candidates for automation.<sup>3</sup> The more exposed occupations were in transportation, logistics and support functions in offices.

This study also shed light on the human aptitudes required by AI:

- SOCIAL INTELLIGENCE: the skills used for tasks involving bargaining, persuading or providing care.
- PERCEPTION AND MANIPULATION: the skills required to perform tasks in an unstructured work environment, where irregular “objects” have to be recognized or where the lack of space imposes movement.
- CREATIVE INTELLIGENCE: these skills are hard to automate. The major obstacle to automating creativity is to clearly define creative values so as to encode them in an algorithm.

A travel agency could, for example, use AI for routine tasks such as flight reservations; but more complicated requests, such as a customized travel plan, are still reserved for human beings.

In the same vein, Laurent Alexandre, an AI specialist, has defended the idea that, to be complementary to AI, it does not suffice to reason like a highly qualified expert. It is the capacity to be intelligent, innovative and creative (whether in manual or cognitive tasks) that will shelter individuals from having their places taken by AI.

## Tracking changes in jobs to adapt them to AI

Three parameters are important to make occupations complementary to AI.

THE FIRST IS THE ADAPTATION OF EDUCATION AND TRAINING to a fully changing ecosystem of employment. To be complementary to AI, as much (or even more) importance must be given to “soft skills” as to the “hard skills” acquired from formal education. This is the opposite of what now happens.

A report has situated AI in relation to occupational training with the goal of changing current ideas about education and training.<sup>4</sup> Nowadays, the ratio of the time spent working to the time spent on training and education is out of balance; and occupational training programs are seldom used. Public institutions and firms have to play a part in this change by fostering the improvement of the skills and qualifications of their employees on highly technical subjects and by emphasizing creative and artistic aptitudes (whether or not manual). By adapting to new

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<sup>2</sup> AUTOR D., LEVY F. & MURNANE R.J. (2003) “The skill content of recent technological change: An empirical exploration”, *Quarterly Journal of Economics*, November, pp. 1279-1333.

<sup>3</sup> FREY C.B. & OSBORNE M.A. (2013) “The future of employment: How susceptible are jobs to computerisation?”, working paper of 17 September (Oxford Martin Programme on Technology and Employment), 72p. Available via: <https://www.oxfordmartin.ox.ac.uk/publications/view/1314>.

<sup>4</sup> FRANCE STRATÉGIE (March 2017) “Anticiper les impacts économiques et sociaux de l’intelligence artificielle”, report of Work Group 3.2, 48p. Available via <http://www.strategie.gouv.fr/publications/anticiper-impacts-economiques-sociaux-de-lintelligence-artificielle>.

needs, possibilities will open for acquiring new aptitudes and preparing wage-earners (both public and private) for changes in their occupations.

According to Martin Ford, an entrepreneur and the author of a book that received the Financial Times Business Book of the Year Award in 2015,<sup>5</sup> AI, unlike previous technological revolutions, affects all sectors of the economy. This means that a person will not be able to switch from one routine job to another in a different sector. The individual should, accordingly, hold a nonroutine job that requires specific skills.

To boost this transformation, institutions will have to listen to their environment. Although AI might destroy jobs, all studies agree that there will also be a concomitant phase of jobs being transformed and created. In other words, thousands of new occupations might emerge within organizations or as freelance work. To take up the challenge of advising the people caught up in this transformation of their careers, we must target the occupations that automation is most likely to affect.

THE SECOND PARAMETER IS THE FLEXIBILITY OF THE RHYTHM OF WORK, as described in an article by David Autor.<sup>6</sup> This American scholar has emphasized that people still have a competitive edge over machines owing to the soft skills of social interactions, adaptability, flexibility and problem-solving. According to him, the automation of a task makes its execution faster and more profitable; and this frees demand for tasks that have not yet been automated and are performed by humans.

For France Stratégie,<sup>4</sup> two questions in surveys on working conditions can shed light on whether or not wage-earners have skills that will keep their jobs from being automated: *a)* Do wage-earners have to respond immediately to an outside demand (customers, the public)? and *b)* Do they have to strictly apply instructions to do their job properly? Roughly speaking, the fact of having a pace of work imposed by an outside demand for immediate responses highlights the soft skills of social interactions, adaptability and flexibility. The fact of not having to strictly apply instructions in order to do one's job correctly tells us something about the wage-earner's adaptability and problem-solving ability. These hard-to-replace jobs have increased by 1.14 million in fewer than ten years: from 7.9 million in 2005 to 9.1 million in 2013.

THE THIRD PARAMETER IS THE SOCIAL ACCEPTANCE of automation. Although all technological breakthroughs lead to job creations, it is very hard to foresee tomorrow's occupations. It was hardly possible fifty years ago to imagine jobs in cybersecurity or video games. At stake for firms and governments is to facilitate the acquirement of new skills and orient careers.

## Pôle Emploi's initiatives

Pôle Emploi is conducting several experiments with AI that mainly use smart algorithms and machine-learning techniques.

- The Unemployment Office is proposing to job-seekers, upon enrollment, an overview of their occupational prospects that offers the possibility of verifying the match between their skills and actual job offers. This is to be done using an algorithm that endows the job-seeker with a visibility on the labor market by comparing job offers for which other job-seekers with the same profile are postulating (clustering). It suggests to the job-seeker other job offers that might correspond to his/her skills and are classified by the rate of return to employment.
- Fake job offers are regularly published on Pôle Emploi's website. These offers are deemed fraudulent when they do not comply with the Labor Code or when they come from dishonest persons who fake being recruiters and are trying to make a profit at the expense

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<sup>5</sup> FORD M. (2015) *The Rise of the Robots: Technology and the Threat of Mass Unemployment* (New York: Basic Books).

<sup>6</sup> AUTOR D. (2015) "Why are there still so many jobs?", *Journal of Economic Perspectives*, 29(3), pp. 3-30. Available at: <https://dspace.mit.edu/openaccess-disseminate/1721.1/109476>

of job-seekers. To fight against these fake offers, the Unemployment Office has adopted an algorithm that, by analyzing semantically the contents of previously detected fake offers, determines whether or not a given job offer is a potential fake and should not be posted on the website. This algorithm, which adapts to changes, is capable of a detection rate of more than 90%.

- Emploi Store is a platform with nearly 300 services in employment and training that have been developed by Pôle Emploi or other parties active in the field of employment. On this platform, the Unemployment Office proposes a self-learning engine that makes recommendations on the basis of a questionnaire by analyzing respondents' behavior patterns, and that changes the assignment score of services. It has recently started using a clustering technique to make peer-to-peer recommendations.



**Figure 2:** Applications used at Pôle Emploi.  
Source: Pôle Emploi.

Following a demonstration of “collective intelligence”, the decision was made to generalize a mutual aid support service and counseling tools on public (Internet) platforms. This arrangement (the pop-up in the bottom right corner of the screen capture in Figure 2) can be used to ask questions directly to other cybernauts in order to profit from the power of the “crowd”. It also:

- completes Pôle Emploi’s actions by dealing with problems related to opening/closing hours and providing, unlike a bot, a human response to a wide range of questions.
- contextualizes questions in order to detect problems related to uses or information, and improve the user’s experience.
- feeds directly a knowledge base that is continually improved for later use as input into a bot. This will better equip the bot to reply to questions from users.
- makes the knowledge base grow “naturally” with contents not produced by the Unemployment Office.

Collective intelligence is a key resource for artificial intelligence. It does not claim to take the place of interpersonal exchanges, the very basis of Pôle Emploi as a public service.

A new digital work environment (MAP: My Personal Assistant) is also offered to Pôle Emploi’s employees. Thanks to it, each counselor, regardless of his/her specialty, will have a fully digital interface (service and data APIs) that will use artificial intelligence to:

- instantly compare a job-seeker’s profile and plans with labor market data;
- suggest the right services to job-seekers (assisted decision-making);

- make printouts of data to save time; and
- suggest actions or job offers.

MAP does not, of course, replace human decision-making. The counselor ultimately makes the decision whether or not to propose services or job offers. This useful tool saves time for everyone, thus enabling counselors to concentrate on actions with more human value.

## Conclusion

As seen, AI is complementary to other forms of intelligence, above all to interpersonal intelligence — the irreplaceable human dialog, both verbal and nonverbal (pheromones, skin color, gestures, cultural traits, etc.), articulated with thought processes.

Collective intelligence introduces a horizontal approach that boosts exchanges, both inside and outside the organization, helps detect needs and annoyances, and improves the capacity for delivering immediate, sophisticated responses. Pôle Emploi is launching a social media project to better follow up on and monitor job-seekers and recruiters. It will fully control the data as well as the general conditions for using them. These social media communities, open to our partners, will help us reconsider our actions for the sake of the common good.

Above all, this human and humanizing approach can help Pôle Emploi define a clear position for AI.

Public services have a responsibility for protecting citizens, in particular the use of their data and their privacy, and fighting against discrimination. For this reason, AI systems have shortcomings and even commit faults. AI reproduces human cognitive representations and their biases (stereotypes, discrimination, etc.). Every decision made when providing a public service must be opposable; and the algorithmic processing of data must be notified to beneficiaries (under the Lemaire Act in France). Since AI is self-learning, it is impossible, even for those who design it, to explain the results obtained. This makes it legally impossible, at present, to fulfill our obligations of accountability for the decisions made.

Our social (and societal) responsibility is to not refuse technology but, instead, to understand its contributions and find a place for people in an increasingly digitized world that is changing ever faster. Our conviction is that artificial intelligence is inevitable for enabling Pôle Emploi to invest in human aptitudes and skills in a controlled way.