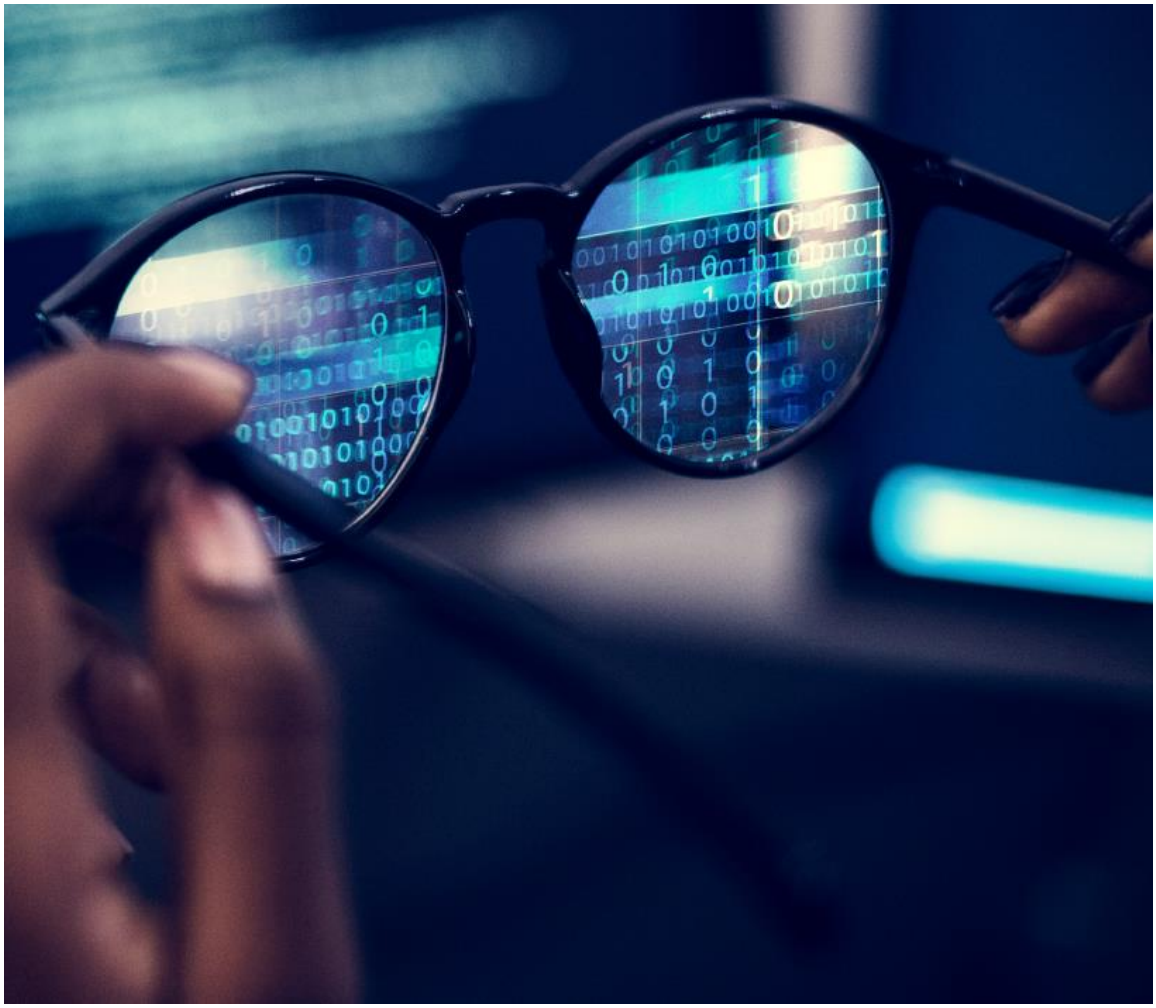
AI4PPP

Artificial Intelligence for People, Planet, and Profit

Project Result 2

DACUM Analysis

DACUM ANALYSIS



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Key challenges for AI adoption for non-tech C-level executives

Functioning through the Lens of Artificial Intelligence

If we were to rank one of the greatest achievements of all times, artificial intelligence, or AI, would be considered one of the top revolutionary developments in our history. The reason being is that AI is powering some of the most incredible answers to everyday problems that we have. It is found in capacities ranging from organizations, to governments and to everyday community groups, not only in the exclusive domain of the advanced digital world. It is also finding its way into our everyday lives and helping us answer some of the challenges that we have in human history.

What is Artificial Intelligence and why is it important?

The incredible capacity of AI as it currently stands is unlimited and defies description. The reason for this is that AI uses in some cases billions of lines of code to give the computer the independence to think and learn, both, in some cases, with the eventual capacity to do so fully on its own. The "artificial" part of the name is referring to the simulation of human intelligence allowing the machines to do engage in functions which humans would otherwise need to dictate. The capacity of AI functions is defined in 3 categories: weak AI, strong AI, and super AI. Namely, weak AI manages one task and does not exceed this realm (much like common human tasks); strong AI has the understanding and means to learn any human task (and is where researchers are currently working); whereas, the last category, still unattained, is super AI, which is intelligence that artificially exceeds human capacity for thought and the human ability to conduct any task.

What are the 4 types of AI?

Reactive machines, limited memory, theory of mind, and self-aware AI are the four types of artificial intelligence. The first two are widespread, while the other two are in development.

Reactive machines are most commonly used; they contain no prior knowledge, nor do they store anything in their memory. They, as their name suggests, react to the current state presented to them.

Limited memory AI is used in self-driving cars, employing a range of data and machine learning to perform calculations in real-time. Researchers are now trying to reach the point of producing a theory of mind machines, which are capable of understanding the intent behind data instead of just processing it, as limited memory currently is limited to.

The theory of mind AI has the ability to interact with the thoughts and emotions of humans. Just like the AI portrayed in the movie "HER", this type of AI is a figment of the future, currently still under research and development, and will be entirely different from the current types of AI. The theory of mind AI will better understand the entities it interacts with, focusing on elements such as predicting and understanding the humans it interacts with.

Self-aware AI is still a science-fiction dream (or in some views, a nightmare). It requires humans to fully understand what consciousness really is and then replicate it and put it into a machine. This final stage of AI development, if it ever happens, will allow machines to be completely autonomous, synthetic humans – or androids, in other words. This is the stage where many who warn about the problems with AI are referring to, and which we will explore later.

Which is the smartest AI system in the world?

While there is no universal way to measure how smart any AI system is, we can compare the speed at which data is processed. Statistics regarding the speed of data processing indicates that the current world record holder is Oak Ridge National Laboratory's Summit, which is also the largest supercomputer in the world. This computer is the first to reach a speed of a quintillion operations per second, using more than 27,000 graphical processing units to run its calculations and is powered by IBM, with the aim to use large-scale AI to solve climate issues that the world currently is currently facing.

Where is AI currently being used?

The contributions of AI span many fields. Statistical AI is driven purely by numbers and data. It relies heavily on machine learning and algorithms that, technically, feed into themselves to reiterate data. This kind of AI is often used in finance and for running hedge funds, but can also be used for discovering and measuring trends among customers. One of the common uses for this kind of AI is in self-driving cars, where predictive analytics are needed for a safer ride.

In the realm of detective work, AI is used as an internal communications monitor, which can overlook communications between workers and corporate environments, viewing emails and chat and documents that are created, to view inappropriate content which might be hiding suggestions of violence or sexual abuse. There have also been AI applications where victims share stories of their

own harassment and abuse and can also share location and other details to proper policing bodies. AI also establishes algorithms to scope images from websites used by traffickers and uses data from advertisements and websites that might be identifying victims that are trapped in human trafficking situations.

In the health world, the development of the new drugs has been hugely assisted by artificial intelligence, which can identify potential molecules by crunching enormous repositories of data and uses predictive analytics to find molecular combinations which may be profoundly useful for a new drug. In assisted health services, artificial intelligence is extremely useful for people with disabilities enabling them to live independently, particularly those that are seeing impaired. Voice assisted AI enables those with disabilities to communicate with smart devices and to describe their surroundings.

Another great benefit is the use of AI in collaboration with other technologies known as the Internet of Things (IoT), which includes cloud computing and big data analytics. AI assisted programs can utilize weather data and other information from sensors that will allow for information to be dictated regarding energy consumption, and can predict how to dispatch the energy and how to optimize the reserves that are used and those that will potentially be needed.

As can be seen with this overview, the benefits of AI are extremely promising, and there is a great need to optimize the benefits without over analyzing all the risk factors, as that may stunt creativity. For that reason, it is important to include tools which will regulate any associated ethical issues and put in place proper regulatory and security controls. The way to overcome risk factors are obviously through careful and thorough research, and the building of a digital ecosystem that is highly sophisticated and establishes a common intelligence literacy in society.

When given the option, many people **would still prefer** to interact with a **human** being rather than an automated customer service system

43% of respondents in the survey reported that they were **not sure** what AI was or how it is currently being used

Only **26%** of respondents reported feeling **"great"** with Artificial Intelligence

60% had a **warm** acceptance of AI, allowing for its ultimate future potential but also realizing that **we need to be mindful of how it is used**

How truly popular is AI globally?

Global statistics change on an almost daily basis. According to a study by Gartner, 37% of businesses used AI in some shape or form in 2019. It remains to be seen how the COVID-19 pandemic affected

these trends. However, numerous large hardware and software companies worldwide continue to invest heavily in AI. As such, the expectation is that this percentage will keep growing steadily.

Here are some of the global statistics as gathered from research and the fact-finding corporations in parentheses are listed below:

- The global AI market value is expected to reach $267 billion by 2027. (Fortune Business Insights)
- The total contribution of AI to the global economy is expected to hit $15.7 trillion by 2030. (Price Waterhouse Cooper -PwC)
- AI will help boost the GDP of local economies, with China expected to record the greatest gains of 26% by 2030. (PwC)
- The AI industry could be worth more than $15 trillion by 2030. (PwC)
- By 2030, China will be the biggest AI market, accounting for 26.1% of the global AI market share. (PwC)
- There will be 8 billion voice assistants in use by 2023. (Statista)
- The autonomous vehicle industry, experts predict, could be worth $667.7 billion by 2026. (The Robot Report)
- Analysts predict 8 million autonomous vehicles will be shipped in 2025 alone. (ABI Research)
- 25 countries are currently working on designs for autonomous vehicles. (DriversEd.com)
- The self-driving car industry could be worth more than $600 billion over the next five years.
- Volkswagen has invested $2.6 billion in self-driving car software developer Argo AI. (The Robot Report)
- 85 million jobs will be eliminated, and 97 million new ones created thanks to AI by 2025, which is an overall addition of 12 million jobs. (World Economic Forum)
- The number of enterprises using AI in business grew by 270% between 2015 and 2019. (Gartner)
- In the healthcare industry, 38% of providers use computers as diagnosis assistants. (Gartner)
- Stats about AI reveal that 52% of telephone companies now employ chatbots. (Gartner)
- Global wearable AI market size is predicted to reach $180 billion by 2025. (Global Market Insights)

What do all of these statistics mean?

Essentially, these statistics mean that AI particularly in the business and development sector is far from a passing trend. A growing number of companies big and small are reorienting their plans to include more AI-driven technology. This development is going in two distinct directions: autonomous machines and machine learning. The former is already an important industrial branch, while the latter will become even more important in the coming years.

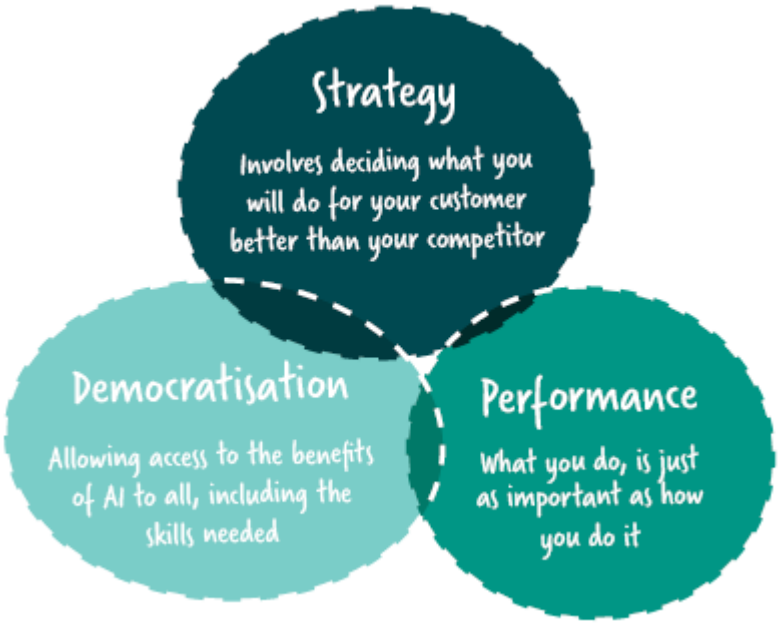
New jobs in AI are constantly being created to accommodate the growing needs of the global market and to provide solutions to once tedious tasks. Once-laborious processes, involving hundreds of hours and a lot of manpower, are becoming automated. The fact that humans will be replaced by robots and AI for certain jobs has been considered to be a negative by some, but with that also comes a much

lower risk of injury. Companies realize the obligation to train their employees for the new jobs this technology will create and to appropriately expand their field to incorporate AI in some way.

For this reason, investment in expensive artificial intelligence research must have as its goal the good of society, and includes collaboration with government bodies to address any questions that arise from the real-world impact of any AI driven solutions. Careful insights gathered from forums and workshops and other active platforms can also be a positive step in understanding whether an AI solution is the right fit for a particular challenge that is being faced. In this way, any innovations that are created for astoundingly complex problems and the toughest challenges will then be sensible, measured, and safe. It is thus imperative a sensible approach of AI applications, for the potential for good, is guaranteed.

Can AI turn against us, by outthinking us and outsmarting us?

AI can be potentially smarter than humans, as its behavior cannot be predicted with certainty. The question "Can machines think?" has haunted us since the dawn of computer science. Alan Turing proposed in his 1950s that machines could be taught like children. John McCarthy, inventor of the LISP programming language, coined the term "artificial intelligence" in 1955. In the 1960s and 1970s, when AI researchers began using computers to recognize images, translate between languages, and understand instructions in plain language rather than just code, computers eventually the idea arose to develop the ability to speak and think, thereby doing evil. Theorists insist that civilization will thrive as long as we win the race between the growing power of technology and the wisdom that wields it. For those who take a positive stance regarding AI, it is argued that the best position to be in in order to win this race is not to hinder the former, but to accelerate the latter by supporting AI safety research and ensure our wisdom protects us from any AI threats.



Stephen Hawking, Elon Musk, Steve Wozniak, Bill Gates, and other current tech giants, have recently expressed their concerns in the media and in open letters about the risks posed by AI, and many major AI research have expressed similar views. Why did this topic suddenly become so pressing? Thanks to recent breakthroughs, many of the AI milestones that experts thought were decades away have been quickly achieved, and future ones seemingly far away may be achieved in our lifetimes.

Some of the common myths

The question then concerning the future of AI advancements is do we actually have cause to fear it? There have been many examples of pseudo-controversies caused by misunderstandings and AI overtaking humans, and at this point, it is important to break some of the most common myths.

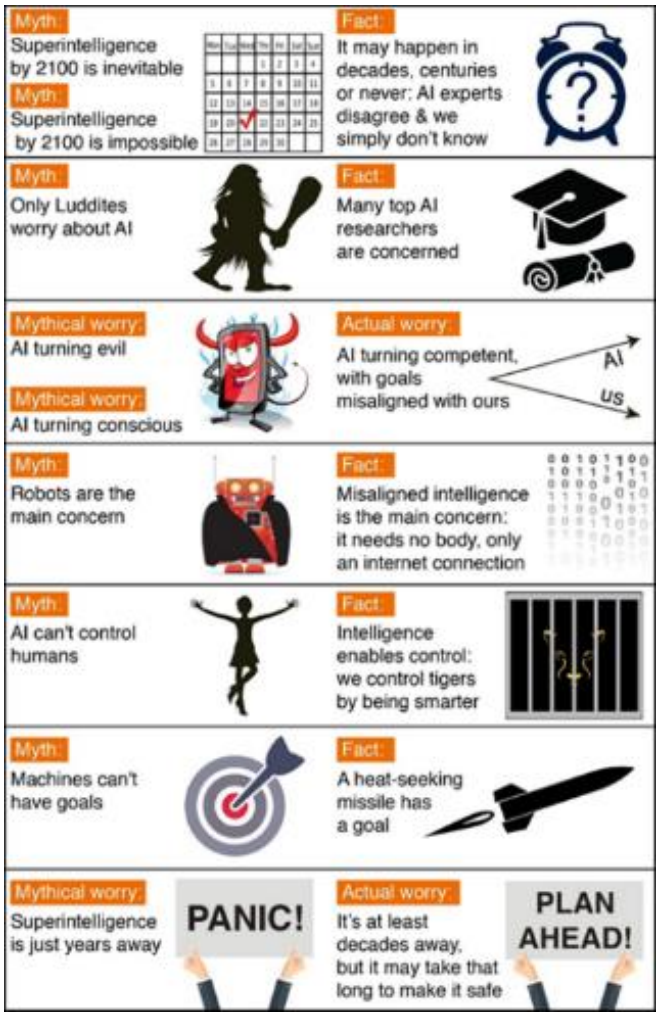


Figure 1. The Top Myths About Advanced AI
(source: https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/

The first myth concerns timing. How long will it take for machines to replace human-level intelligence? A popular theory is that we know of a superhuman AI coming sometime this century. In fact, history

is full of technical exaggerations. Where are flying cars now? (On the contrary, young kids have embraced the 1970s skateboard instead). And yet, contrary to this, another myth surrounds the idea that is not possible to achieve superhuman AI during the course of this century. Researchers have made a wide range of estimates for how far we are from superhuman AI, but we certainly cannot guarantee that the probability to achieve superhuman AI is zero this century. Ernest Rutherford, an imminent nuclear physicist of his time, said in 1933 — less than 24 hours before the invention of the nuclear chain reaction — that nuclear energy was “moonshine.” For this reason, due to the unpredictability of the timeline when superhuman AI will arise, it is a compelling argument that security protocol AI is developed now to prepare for the eventuality. This will be discussed later.

Hawking warned that AI “could mean the end of the human race" as humans will be unable to compete with advanced AI. Musk has offered a $10 million grant to his Institute for the Future of Life which is an organization that says it is "working to mitigate the existential risks to humanity" that could arise "from the development of human-scale artificial intelligence." No one is currently claiming that such a thing as superintelligence exists. In fact, we don't have anything close to universal artificial intelligence yet, and we don't even have a clear way to achieve it. Recent advances in AI, from automated assistants like Apple's Siri to Google's self-driving cars, also highlight the technology's severe limitations. Both Siri and Google cars can be upset by situations they have never encountered before. Another current example is that AI, in order to learn to recognize cats in photographs have to be shown hundreds of thousands of examples of cats, and even then, their accuracy in recognizing cats is far inferior to that of children. Extrapolating from the current state of AI to show that the emergence of superintelligence is imminent is, in fact, overreaching, as it is consistently shown that “malicious AI” won’t be a concern for at least hundreds of years.

The argument is that while it is important to recognize the risks of AI, it is also important to recognize the reality of continuing without the kind of technology that when in check, can bring much needed advances to humankind. To this end, theorists such as Eliezer Yudkowsky, Nick Bostrom, and Steve Omohundro describe AI systems could be potentially evil. Omohundro in particular lays out three fundamental ways to stop any potential threats. The first way is to consider the harm from AI at the very point of their creation, and their ethical outcomes be considered right from the start. The second way is to detect malicious AI activity before it is able to become more autonomous and having the wherewithal to stop it before it continues with its path of destruction, and the third way is to have a checkpoint that detects malicious AI even after it is launched, and to be able to have the resources to shut its implications down.

For this reason, Stuart Armstrong at the Future of Humanity Institute, stated in an interview that it is necessary to have research and careful study anytime an applicable AI solution is even at the mind mapping stage. His institute, a multidisciplinary research hub focused on the big questions about the future, he does not think that extinction due to AI activity is a realistic question. What Armstrong feels are actual concerns are based upon the idea that intelligence that is created and thus artificial will be able to think for itself to the point that humans become redundant as the artificial entity becomes a full replacement for any human activity. One example he does recognize as a risk is the situation of an AI program used to filter out viruses from incoming emails, but comes up as a solution that all emails and data transfer be shut down. With that capacity, the decision and the control over those types of

AI mechanisms spin out of human control. Armstrong anticipates the best conclusion as being one which would consider these nightmarish situations immediately and have adjustments in place accordingly prior to actually engaging in such a situation.

Most people **do not understand** that one of the main purposes of AI solutions is **not to** automate repetitive tasks but **to enable machines to learn new things**.

When asked to describe how they understand what AI can do and what the purpose of artificial intelligence is, people come up with really interesting answers, ranging from quite accurate to absolutely ludicrous:

35% ability to replicate human interaction
51% thinking logically
19% play games
18% surveillance on people
31% replacing human jobs
14% feeling emotions

8% controlling your mind
10% taking over the world
57% ability to learn
50% solving problems
37% interpreting speech

Why it is important to embrace AI and reap all the benefits it can bring

In the short term, the goal of sustaining the benefits of AI to society will motivate research in many areas, from economics and law to technical topics such as verification, effectiveness, security and control. Controls in place are a given, especially when it comes to controlling cars, planes, pacemakers and automated trading, some key examples where out of control AI behaviour can be devastating.

Longer term, the key question is what happens if the search for powerful AI succeeds and AI systems outperform humans on all cognitive tasks? Like I.J. Back in 1965, designing smarter AI systems was itself a cognitive task. Such a system could unleash an intelligence explosion far beyond human intelligence and undergo recursive self-improvement. By inventing revolutionary new technologies, such superintelligence could help eradicate war, disease and poverty, and the creation of powerful AI could be the greatest event in human history. But some experts have expressed concern that it could be lethal if it doesn't learn to align its goals with those of humans before it becomes super intelligent.

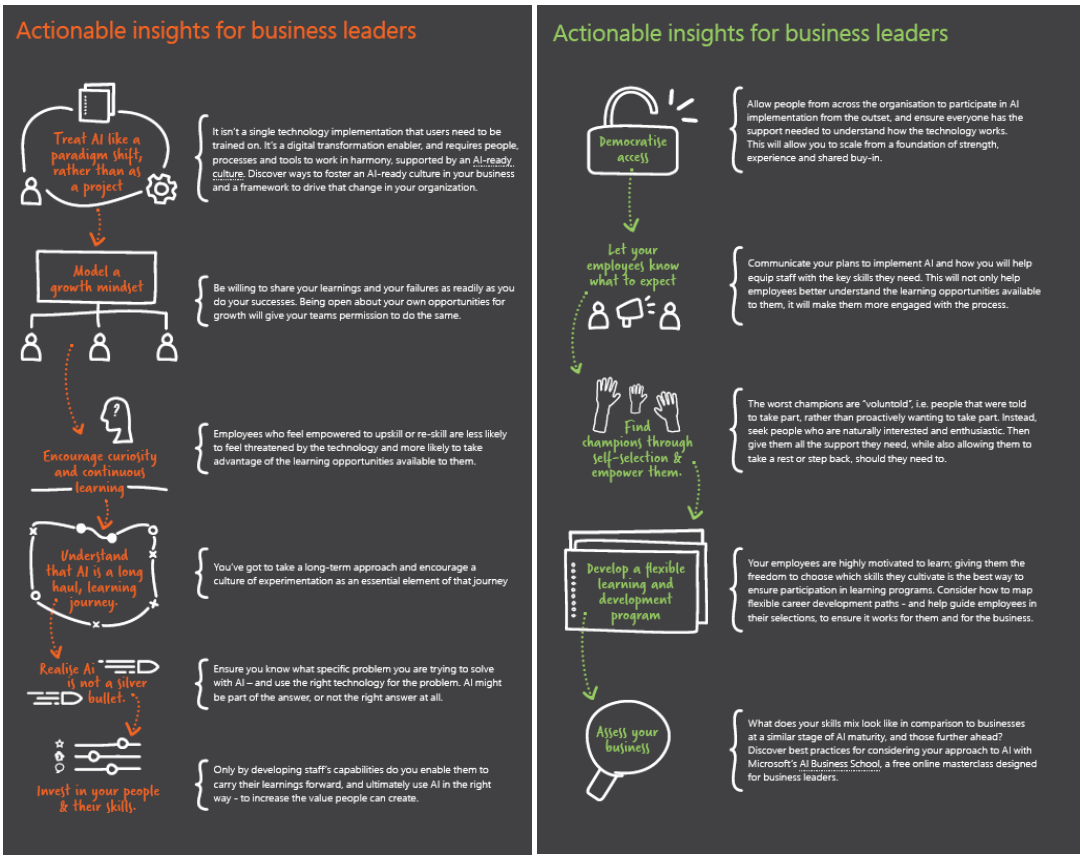


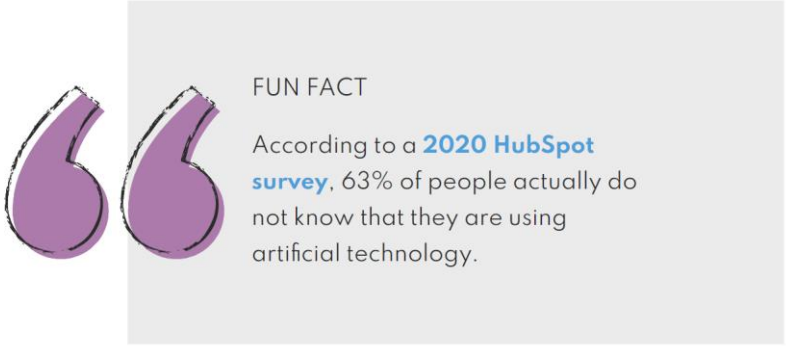
Figure 2. Actionable Insights for Business Leaders
(source: Microsoft, AI Skills in the UK)

And yet, in spite of this, it is undeniable that AI has the power and capacity to rule out problems that humans themselves create, particularly in examples which require data precision, or in tasks where anxiety can be fatal, such such as bomb removal. Moreover, human beings have a set limitation on how long they can be productive and do something well and with concentration, whereas AI offers unlimited capacity for work with the focus and the accuracy that human personnel cannot deliver.

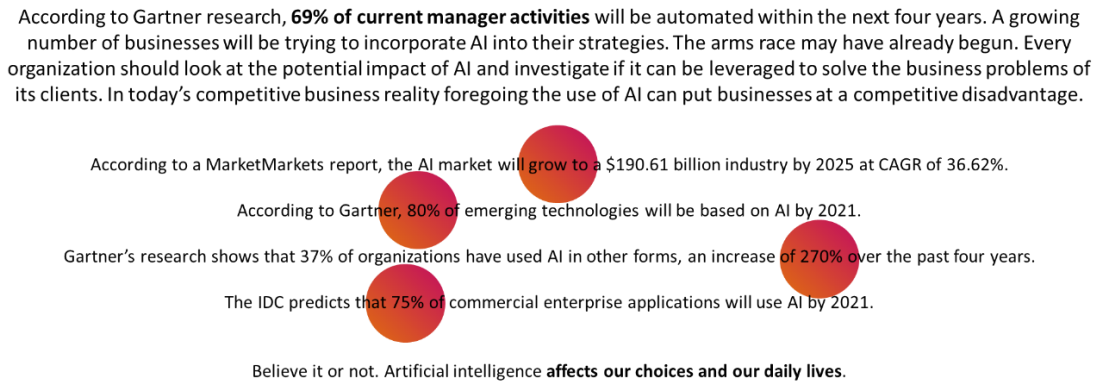
AI removes human discomfort and the margin for error through its very objectivity and precision. Even with the oft-cited narrative that an overreliance on AI technology can be addictive, or, remove the need for human involvement at all, there is nonetheless the overwhelming realization that such technology can help human beings achieve the kind of mastery of previously tedious jobs or offer access into an environment that may have been perceived as inhabitable or overly dangerous, or simply too boring, in the past. It is essential thus to not restrict AI creation and intervention, and to implement strict parameters that will not be trespassed as the main point of such technology is to bring solutions to problems rather than create new ones.

AI is a superior answer to increasing efficiencies by simplifying tasks allowing for new revenue streams to be generated, and freeing up humans to focus on creative job creation. Governments are well aware that this type of technology will always add jobs, contrary to the naysayers who predict that humans will become redundant. Humans will always be important in considering new and creative

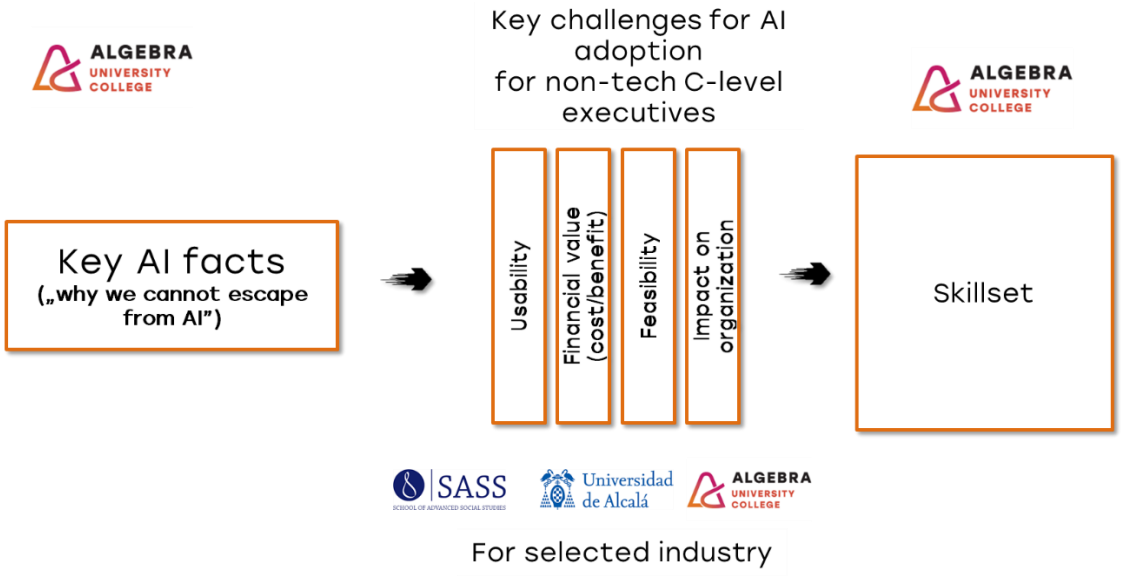
paths to venture upon, and what AI does is give them the right tools to overcome tedious work and look towards creative and solution driven tasks instead.



By having a regulatory effect that is commonplace with all AI, the focus then shifts to, for example, how AI tackles climate issues via smart homes which regulate energy consumption, or provides better ways of diagnosing human health, rather than to apocalyptic catastrophe myths of out-of-control androids. And it is also worth noting that because artificial intelligence is able to do tasks that replace intensive human labor, there is a net increase in profits as the reduction in operational costs are brought about through automation. That may lead to a redundancy of a certain level of task force, but that does not exclude the teaching of skills to become more AI literate.



In conclusion, the ability for technology to provide solutions to our everyday problems increases our overall living standards. There is less probability for errors, and particularly in the crime field, far less opportunity for wrongful convictions. Admittedly, there is room to blindly trust the efficiency of AI. Yet, with the proper controls from the start, AI allows our creativity to go far and beyond the stretch of the human imagination as it allows for ingenuity on a level that can only be seen with the kind of power that digital technology can harness. The main concerns that are always voiced by those who propound AI myths is that it will lead to job losses and there will be a rogue AI entity that will in fact affect the human race. With the proper ethical development procedures and ethical controls, however, these myths will only remain myths. The challenges that society will be forced to face in the near future are far outpacing our ability to solve them alone, and that reason is paramount in accepting the fact that the incredible power of AI is really the only way to not only solve these current problems, but also predict any that may arise before we are even fully aware of them.



Desktop research and interviews

Country: Croatia

Background and profile of an industry and interviewee

Algebra University College conducted a standardized interview with non-ICT high-level manager. The respondent has been employed for 10 years in a private distribution company as IT manager. He has a degree in economics.

Interview results

The interviewee, who was asked to briefly describe the procedure for conducting the annual profitability analysis through the cost and revenue analysis, stated that all documents are entered into the accounting system and thus reports are obtained for all organizational units, broken down by type of revenue and expenses. The obtained results are the basis for planning activities and making plans for the whole company and for each organizational unit separately.

When asked how business areas that can be improved are identified, the respondent stated that analysis is introduced in some of the most profitable business areas. The areas with increased costs

are analysed. Sales are also analysed, i.e., what can be done to increase revenues (expanding the range of products, increasing the number of stores and distribution channels). The company also pays attention to how partners and / or suppliers can participate in certain costs, e.g. through merchandise discounts.

When asked about the impact on specific areas with traditional methods or digital technology, the interviewee stated that his company use mainly traditional methods. The main reason he gave was that digital methods require investment, and that now is not a good time (in terms of energy prices and political instability). The interviewee also gave examples of his company's use of technology. "We have cameras in some stores that record customers. There has been a report on the impact of weather conditions on the number of customers in the stores. The data is recorded, but that's about it." At the same time, he pointed out that no conclusions were drawn from the technology used.

When asked about the evaluation of a IT solution that can potentially be used in the company, the interviewee replied that neither an assessment nor an evaluation is carried out. Also, the technological solutions already implemented, such as the customer counter or the impact of weather on customer behaviour, are not evaluated. The analysis carried out is primarily a comparison with last year.

According to the respondent, the most important factor influencing the continuation of digital technology implementation measures is the possibility of a significant increase in sales and the possibility of drawing specific conclusions and, on this basis, taking certain measures to reduce costs, "for example, reducing the number of salespeople or increasing their efficiency."

When asked to what extent the complexity of the solution, the price, the time needed for implementation, and the lack of skills of the employees are determining factors for working with the digital solution, the respondent stated that the most important factor is the complexity of the solution. He added that the high level of complexity of the digital solution definitely discourages a purchase decision. A complicated structure and a large number of people with a different structure cause problem. Price is not as important as the complexity of the solution. "We are willing to pay more for a good solution that does not require a large number of people and is not complicated. We tend to pay more for what gives us more." Execution time also does not matter as much as the complexity of the solution. "We have waited a long time for a IT solution designed specifically for us." The skills of employees who will be working with the digital solution has a significant impact on the decision, especially if the solution is complex and requires the involvement of many new employees.

When asked to briefly describe the process of analysing market options for purchasing IT solutions, the interviewee stated that a request for proposals is first issued, then the three selected proposals are analysed and the best one is selected. This process takes a little over a month.

When asked about the key elements that the respondent expected from a solution offering in order to make an easy decision, he cited the uniqueness of the solution. "The most important thing was that the company has its own solution that is customized to it and a IT service that maintains it." He stressed that it is also important that the solution can be customized to the company's needs in the future and implemented quickly.

The process of communication with employees/users after the decision to create a new IT solution is as follows: First, the managers of each area are informed, and then the information is passed on to the subordinate employees. Workshops and/or training sessions are organized and relevant materials

are provided. "For example, after the new distribution system was implemented, there was a two-day training session for employees."

When asked how business expectations are defined in the context of purchasing and implementing a new IT solution, the interviewee responded that expectations are defined upfront and solutions are refined over time, especially for the user.

When asked about the techniques/processes used to estimate the total cost of implementing and maintaining a digital solution, the respondent pointed the Excel spreadsheet.

When asked about tools to analyse and identify processes in the company that could be automated, the interviewee replied that there is no tool they use for this purpose. Most of the ideas come from the users, and the company analyses them in meetings and discussions with the supervisors. Processes that can be improved with AI technology are analysed in the same way, as well as processes in the company where it is possible to reduce human error or risk through the use of digital technology.

When asked about the possibilities of improving everyday business through intelligent digital solutions, the interviewee replied that this was certainly possible, but that the company was not focusing on it. As an example, he mentioned the possibility of improving the online store.

Country: Slovenia

Interview results

The automotive company, whose managers were interviewed, was founded in 2006 and has over 150 highly skilled experts. The annual revenue for 2021 was approx. 12 million EUR, which doubled compared to 2020. The specific company, is working and establishing the market for their product. Even if the company cannot be classified as a series production one, it has the aim to become one in the upcoming future. The company mainly focuses on R&D, testing, trials and engineering. In present it focuses also on production. Nonetheless, if the company considers itself as digital mature and has a rather high level of digital technology adaption, the interviewees pointed that there is still place for improvement, a process which is ongoing in present.

The interview was conducted with two interviewees, both of them having important roles in the company. One of the is Chief of Operation Officer. This person is in charge of process and organization wise activities in the company, from financing and identifying public equity funding opportunities, direct communication with customers and reflecting the vision within the team in the organization. The Chief of Operation Officer, has 11 years of experience in the field and working on engineering (mechanical design and machining testing). PhD in Mechanical Engineering, combined production technologies and design techniques. The second interviewee has more than 20 years of experience in

automotive industry, running mainly development organizations and is responsible for mechanical design. PhD in Mechanical Engineering.

When it comes to the procedure of business efficiency, the interviewees pointed several steps that their company is taking. Thus, a quarter review meeting within the Steering Committee Meetings on the company level takes place. The heads of the departments are included in the Steering Committee Meetings. For example, the Sales department is in charge of predicting the financial incomes through the projects that are implemented at the enterprise. During these meetings, the board is checking what is the cashflow or inflow, in comparison with the predictions, what was the realisation of costs, human resource efforts and reviewing the plan for the next quarter and sometimes for the following months of the upcoming year.

The engineering team, focuses on increasing the efficiency of the teams working on the projects. It is a two-week planning and realisation of the resources for each specific project. When it comes to the business efficiency, the company tries to estimate the costs related to R&D. The majority of the income is generated by the bottom of development (motors). Thus, the company is having the aim to estimate the prices of the products upfront the efforts required for the engineering, development and validation of the products. In this framework the company checks the realisation of the engineering teams and project flow (such as business opportunities that can be quite complex to review the efficiency upfront, because it can be done in parallel when these opportunities come and the company decide to come).

In summary, it can be said that the process is constituted from the preparation of a strategic planning with the targets that are pursued though the year. Based on it, the company shapes the internal objects/ target activities, which are monitored through the year with the mechanism previously described. The strategy itself is recognised and setup based on the market trends.

During the discussions, it was highlighted that the company has ongoing digitalization projects. The company is being well-digitalized and at the same time other parts are in the process of inclusion into the increased digitalization. Thus, the interviewees pointed that within the company, there was a review from an external partner, focusing on which parts can be digitalized with business intelligence tools. Even more, the company started to implement the intelligent tools under tone of its departments. Additionally, there was implemented, couple of years ago, enterprise resource programme already (in the areas of procurement, production and sales). Even if a part of the company was not covered, it was constantly increasing the number of processes that going through the ERP (Enterprise resource planning). The usage of these platforms contributes to relying less on human factors. Thus, the platforms are being used in order to eliminate the potential errors. Even more, as the interviewees pointed, that there it is a very wide scope, because there is support from the Government for digitalization topics. The company is working for digital mechanisms, as for example for assembly production lines that are in development. Additionally, the company is working on digital mechanisms for other processes, so it is a lot of strings for increased digitalization in the company. The company has implemented product development, management system PBN, which contains technology from technical documentation of products that the company has.

It was pointed that the company has several streams for the evaluation of the different solutions. Thus, it relies on external consultants, but also internal. The company deals with external consultants and companies that work in business intelligence sector. Additionally, it has experts that have

experience with the ERP systems that the company is using. Even more, it has expert from other companies who also support is as consultants on the general idea of digitalization, production or complete production operations or logistics. Currently, since the production capacity is low, now company has very simplified logistics model, but this should be improved because the company is targeting serious production in the upcoming future and digital stream is very much useful for simulations and seem to impact on other departments. Thus, there are several streams, external consultants, it has internal IT and it is also hiring people with experience in this field. A digitalization officer is being pursued and the company is having challenges in identifying a person within this geographical part that would have experience in automotive and digitalization and would be able to join the company.

Among the most important factors that contribute for the final decision, can be highlighted the need to eliminate several steps that are at the moment being used, but also the vision to reduce the amount of administrative work using several platforms and excel sheets. Thus, these aspects are driving the company to include new tools, to use only one platform (or at least the minimum number of platforms), to simply the complete process and make it robust as possible.

For the company, it has a major impact. The company is roughly estimated to 1 million euros for implementation and several hundred thousand for maintenance. The software that the company is using is approx. 10 cheaper and the support is much faster.

For the company time is considered valuable for the implementation process. Thus, as the interviewees mentioned, the cycle time of requesting a change and obtaining the feedback form the provider is upfront. Even more, the respondents mentioned that it is crucial to have a competent support that is also giving the company feedback, content wise for the processes that are being build-up in the company and also the frequency of these feedback. Otherwise, the processes can be delayed and it might take much more time overall

The company is trying to hire experienced people, that are also experienced in the above-mentioned processes. These skills are important for knowing how to establish such processes. Also, people that are in the company for more than 10 years and younger colleagues that know how to implement such production-wise processes bring this know-how to the company. This aspect is very important for the company. Even if the company is pretty young, the employees have very good formal education and are capable to absorb new knowledge and information very fast. This aspect can be seen as a potential, meanwhile the challenge is the number of trainers.

The company uses the classical approach where the IT management sets the requirements. After the company gets aquatinted with those requirements coming from a particular department or does the market research and collects candidates that are available. Additionally, the company focused on visits to production related companies nearby, to check their experience, but in general it is a classical approach – the company makes a benchmark, they compare all the influential parameters and make the decision in a wider team.

The interviewees mentioned that it depends on the parameters that are selected, price, support, competences of the supplier, availability of their support, network within the nearby companies, dissemination opportunities that they offer. In other words, standards in the industry. E.g.: if the company speaks about CAT systems, they need to be very aware about the customers and buyers.

As it was highlighted, it depends for which purpose of IT solution is used for. For example, if it's only in a certain department then the head of the department is included in the selection of the tool, making some guidelines of usage and then disseminating these guidelines wider. If it is an IT solution that the entire company needs to be involved, then the process is a bit longer and the head of the IT department is making these guidelines and disseminating them within some meetings or workshop via conference calls or live sessions, so that every user brings their computer and try the tool usage. The company, also uses some external companies for workshops, giving them some guidelines how to use the tool. Thus, the company invited some external or supplier companies to give some instructions of how to use the tool in the company. In summary, it is important to understand that it is very case by case.

For this aspect, the respondents mentioned the reduction of costs, and time for design. Nevertheless, it depends on each purpose the tool is being used or making the company processes more robust, using less efforts to come to conclusion to a product within some customer requirements.

The interviewees mentioned that the company uses old tactics. When the company is collecting the information about a certain tool, one of the parameters is maintenance and non-reoccurring costs that are upfront. And then, the maintenance part can be estimated, but it depends from tool to tool within some engineering tools the company does not pay maintenance because after a certain number of years the company concluded that it is not really required. For some others, the maintenance is required to be paid just so that it is in line with customer versions of the tools, that it can speak same engineering language with them. Concluding, the costs can be well-anticipated, because it is clear what the costs for maintenance is.

It was highlighted that after a certain amount of time it is clear which processes are very repetitive and the ones have this in nature are normally digitalized/ automated and eventually upgraded with the process. Some other, activities quite complex are automated because of their engineering high-level. Additionally, because of high demands, some tools already have automation integrated because this is just the way they work.

The selected company, does not have any tool that is using AI. There were some ideas how to automate quality approaches like root-cost analysis when the company come to a non-conformity. Thus, what the interviewees pointed that there is a set of 50 or 100 questions that normally are being asked, answered and written in a report, so that the AI can be used to learn on these lessons learned and can give some outputs on how to improve the process or the product, or anything in between. Nonetheless, at this moment this is only an idea from the company's quality department and how to be a pioneer in this particular are of quality, but it will probably evolve in the near future.

The company identifies a process that has a repetitive nature. Afterwards, the company also concludes that if it eliminates the human factor, it can also reduce the possibility of having an error and process. All the above mentioned, can be considered as a motivation to have a digital technology implemented.

The company needs to focus on one process at a time in order to optimize its operation. Additionally, because the bandwidth is limited, the amount of time that the company has to enable some process to be updated, is limited. Thus, the responsible person needs to go step by step and kick-off one process to be optimized and then continue with another one. Though this is not the case of this particular company, because it has a lot of experienced colleagues in several departments so it is possible to have parallel streamlines of improving processes and implementing different digital/

digitalization workflows inside the company. Thus, it allows to avoid situations where the entire company waits only one person to digitalize one department/ process, but rather the company can focus on going with simultaneous work.

The analysis of both desktop research and interview with industry stakeholders pointed several important aspects, which some of them can be delimited into two categories: general industrial and particular for the enterprise that was selected as a case study.

Namely, the automotive industry includes everything from component suppliers to end-product manufacturers, including trailers, motorhomes, small cars, and even sport supercars. With several leading players in areas like electromotors and mechatronics. The Slovenian automotive industry can provide sophisticated components and unique solutions like high-torque in-wheel electric drive systems and AI based real traffic simulation solutions. Additionally, the Slovenian educational system is a source of highly skilled multilingual workers. A growing number of engineering students in key areas such as machinery, mechatronics, chemistry, and IT ensure a competitive advantage for the future. Also, the Slovenian automotive industry is highly efficient, utilizing modern processes and technologies that often follow industry 4.0 principles.

Regarding the challenges that the industry faces, it can be highlighted the restructuring against the backdrop of the Fourth Industrial Revolution seems crucial for Slovenia to retain a prominent place on the international automotive map and climate change, which is one of the main challenges of the mankind.

Meanwhile, the electronic sector in the area of energy production and storage, Slovenian companies offer various power grid components, including state-of-the-art transformers, generators, small hydropower plants, measurement systems, switches, and other elements for large networks. Additionally, home appliances remain one of the most successful subbranches of the industry with over 2 billion euros of annual sales and a strong local network of suppliers

A niche with a very strong Slovenian presence is that of protection solutions for various electric installations: a Slovenian manufacturer is one of the world's five largest fuse producers and is also one of the leading developers of switches and circuit breakers. A large share of Slovenian electro companies is focusing on the needs of the automotive industry. They supply their automotive partners with lighting systems, cables, coils, sensors, antennas for keyless start systems, electronic and mechatronic components, Li-ion batteries, and – above all – electro motors. Thus, it makes it a reliable partner of the automotive industry.

Lastly, the Slovenian electro and electronics industry has proactively responded to the challenges of the future; providing solutions that are integrated, digital, and – above all – friendlier to the planet. An additional challenge is the high price for industrial tools.

The research pointed several challenges that the selected company faces. Even if the company is relatively young, it has already established mechanisms of analysis that contribute to the well operation of the company. As an example, comes at forefront the usage of both internal and expertise when it comes to business improvement and usage of IT solutions. Factors are of key importance to the company for carrying out further activities in the direction of digitalization are: time, price, and new tools (to use only one platform or at least the minimum number of platforms), to simply the complete process and make it robust as possible. Additionally, the company is trying to hire

experienced people and tries to internalise/ externalise most processes in order to get the best feedback

Besides the ongoing process of digitalization of the processes, the company also encounters several challenges. Among these challenges there can be mentioned: low number of trainers, identifying a person within this geographical part that would have experience in automotive and digitalization and would be able to join the company, price for industrial tools, low level of AI usage.

Lastly, the expectations from the purchase and implementation of a new IT solution rely on reduction of costs, and time for design, considering that it depends on each purpose the tool is being used or making the company processes more robust, using less efforts to come to conclusion to a product within some customer requirements.

Country: Spain

Interview results

Interviewee profile: Public Administration, Regional Healthcare Service, General Services and Supply Coordinator, 18 years, Bachelor of Laws, Graduated Business Administration, Master in Management and Change Management.

With more than 26,000 employees, it is the largest company in the Castilla La Mancha region, Spain. The priority of this Regional Health Service is the health and well-being of the patient. To this end, the Castilla-La Mancha Health Service provides quality healthcare made up of highly qualified professionals and an extensive healthcare network comprising 18 hospitals, 11 specialty, diagnostic and treatment centres, 204 health centers and 1,116 local clinics, where activities related to healthcare, research, treatment and rehabilitation, as well as disease prevention and health promotion are carried out.

With a budget of 3,618,452,210 euros for 2022, which comes from public taxes, it serves a population of 2,000,000 inhabitants.

The Regional Health Service employs 26,000 people, distributed in the five provinces of the Region: Guadalajara, Toledo, Albacete, Ciudad Real and Cuenca. Last year (2020), 113,000 surgical interventions and 869,000 emergencies were attended. There is a long way to go. Digital maturity is not as great as expected, however, there a lot of work has been already done.

Today, synergy between medical equipment manufacturers, software developers and new technologies with decision-makers is urgent for the digital transformation of one of the critical sectors for well-being in general: healthcare. The use of new technologies such as artificial intelligence, big data analytics, mobile apps and devices, and cloudbased information storage, among other things,

can contribute significantly to the improvement of any healthcare system, but it requires a lot of hard work to achieve this.

Lines of work include, amongst other things, patient information and health status, as well as electronically shared services and resources: Technologies include telemedicine, mobile devices and phones, artificial intelligence, robotics and genomics. The latter has made it possible to learn about the human genome and better diagnose patients; digital devices help control heart rate and monitor blood glucose; and remote monitoring devices can help better manage health and reduce the burden on healthcare systems.

One of the lines that have been developed the most are electronic medical records, regulation, projects by private companies and implementation in hospitals in the Region.

But interoperability is probably one of the main problems. The existence and homogeneity of the regulation allows the long-awaited interoperability. That is, much more complete information can be provided to physicians, instantaneously, between different medical units. For example, if a patient moves from one city to another, his or her clinical data can be accessed for review anywhere and at any time through a computer connected to the Internet. It also allows information to be exchanged with all the institutions in the healthcare system, whether public or private.

This section reflects the answers provided during the interview. It is not exactly a cost and revenue system from a standard business. Instead, it is better to refer to it as a fixed annual budget. First of all, the periodical evaluation consists in the detection of the needs of the different hospitals, and then, the best analysis methodology is chosen to establish the priorities to be covered. That analysis consists of finding cost efficiency, comparing the best purchasing options. As a public administration, it is subject to the Spanish Public Contract Law.

We try to add value to our areas, procuring the most economically advantageous offer (Spanish Public Contract Law), according to several areas, patients, employees' work and Public Health. We try to measure health through indicators and outcomes that show the health status of the population by monitoring the different trends. On the other hand, we need to adjust the different expenses to the assigned budget through different indicators:

Increase in expenditure compared to the previous year/month. Monthly deviation according to the budget, etc. We try to identify the areas where expenses are increased compared to last month and last year, according to the activity, not only with prices or expenses.

Due to the large amount of data, the support of IT solutions is very important. Traditional IT purchasing methods are normally used. We have an IT department that assesses the needs of the different areas. We have to recall that we are subject to the Spanish Public Contract Law.

In this process we need the help and compliance of the different Heads of the medical services, as they detect what the services and patients really need.

We have and IT department that provides support and develop solutions. According the complexity of the project, can be required external help, but this help, must be obtain according the Public Administration Contracts Law Profile: computer engineer, system development engineers, computer specialists etc.

We have an IT department (IT engineer, system development engineers, computer scientists, etc.) that provides support and develops solutions. Depending on the complexity of the project, external help may be required, but this help must be obtained according to the Spanish Public Contract Law.

Involvement of top management from top to bottom, all people must be involved, otherwise there is a risk that the project will not be successful. A good definition of the specifications in the bid is a key element for both internal and external users. Monitoring the project execution/performance by means of relevant KPIs and metrics. The complexity of the solution should not affect the project decision. The objectives are much more important than the complexity challenges. Logically a simpler solution will be preferred. It should be considered both a challenge and an opportunity to improve for professionals and patients. It must be said again that the decision to purchase, or the choice of the best project, does not only depend on the price, as we have said, the Public Administration Contracts Law does not intend to choose the cheapest offer, but the most economically advantageous one.

It must be said again that the decision to purchase, the time factor is under the contents of the Public Administration Contracts Law. Both the profile and the training of the members of the IT Area are of great importance. In the event that the employees lack sufficient training, the specifications of the offer request training to acquire the necessary experience in the development of the project. This process is referred to in the Public Administration Contracts Law as “Market consultation”. The law sets out the procedure to be followed. The Health Service's interest in carrying out the development of a project must be publicly announced. This process is attended by interested companies and they all share and express their knowledge of what is being proposed to all of them.

Briefly describe the key elements you expect to see in the solution offer, that would make it easier for you to make a decision:

- Degree of complexity Covered by Compliance Matrix with key elements
- Execution time Covered by Compliance Matrix with key elements
- Contact person with decision-making power
- People who will be part of the project
- Performance indicators Covered by Compliance Matrix with key elements
- Price Covered by Compliance Matrix with key elements
- Project deviation indicators Project and Payments Milestones that need to be accomplished and deliverables of the projects
- Penalties Part of the proposal/contractual agreements

Normally, in advance, a working group has been formed in which technicians, together with the users of the applications or software to be used, take part. Once the purchase decision has been taken and the specifications have been defined, this is communicated through the company's website and through meetings with the end users who are going to use it. If no solution exists on the market, then the help of external company/consultancy for specification and/or final product depending on the available resources (in house programmers, budget, etc.) is put in place (always under the Spanish Public Contract Law). Specification is KEY to define the Business Expectations.

This must be analysed through the prism of what Public Administration Contracts Law calls the “Life cycle of the product or service”. The contracting regulations consider it an indicator of efficiency or profitability. That is, a relationship between the income it would produce and the cost of the

investment. In other words, how much investment will be required over time and what sources of financing are available (taxes, loans, grants, etc.) in the conceptualisation and design phases of the project and subsequent construction, as well as to cover operating and maintenance costs until its final disposal, cessation of activity, recycling or elimination. What does the life cycle cost include in the Public Administration Contracts Law? It includes all attributable costs, from conception to the extinction or deactivation of the investment. What is life-cycle costing used for in the Public Administration Contracts Law? It allows for a detailed analysis of when a product becomes more or less environmentally friendly. This analysis makes it possible to identify opportunities to improve environmental impacts by considering the entire life cycle of the product.

It is usually a need that is detected by the heads of service of the different departments. It usually manifests itself when there are repetitive activities or activities that normally occur very frequently and which are subsequently requested, or for which standardised information has to be reported.

Normally covered during weekly/monthly meetings as an ACTION ITEM that is later then addressed. There is currently no process or department that does this specifically. However, there are ongoing projects, especially with patient records, where work is being done to convert and use the natural language used in patient records to make them interoperable. Given that we are working with a particularly sensitive sector, such as the health sector, there are procedures such as the declaration of adverse effects, which allow us to record the production of risks. The use of IA could be very important and beneficial if it could combine economic and care activity data for decision-making. This requires combining clinical and care information with economic information. AI for predictive medicine as future potential. This section highlights the most important elements/insights gained during the interview and were extracted by the interviewer. In order to keep track of the context, the question where it was raised has been attached.

Little flexibility as all investments and operations are based on annual budgets, subject to Spanish Public Contract Law. Public sector cannot make direct decisions as opposed to private healthcare companies. Spanish Public Contract Law forces that decisions cannot be based on costs alone, must be based on cost/benefit efficiency decisions. Public sector decisions are generally slower due to Contract Law, annual budgets, etc. Regarding how improvement is done, the head responsibles discuss their needs in the periodical meetings and initiate the analysis for solutions.

The followed indicators and metrics are usually set by the Ministry of Health which then leads to a decision or area that needs to be addressed (look for a solution). Budgets are closed which leads to the creation of indications that monitor the progress of activities/tasks/projects/rehabilitations/investments, etc. Budgets are usually fixed (no negotiation) with some increases due to different initiatives of the Government or Regional Services/Hospitals. After you have identified business areas that could be improved, how do you analyze whether it is possible to influence on them with traditional methods or by applying/purchasing/developing IT solutions (meaning, with the help of digital technology). Public Administration Contracts Law: The solution has to benefit the maximum number population.

The IT procurement also depends if the solution already exists on the market or needs to be developed specifically:

a) If many companies offer the product on the market, then a public bidding (Spanish Public Contract Law) is done

b) If only one company provide it, then a particular procedure is initiated following Spanish Public Contract Law.
c) If no solution exists on the market, then the help of external company/consultancy for specification and/or final product depending on the available resources (in house programmers, budget, etc.) is put in place (always under the Spanish Public Contract Law).

The NEEDS must be converted into clear SPECIFICATIONS. It is mandatory to CLEARLY define the scope of the project and the BUSINESS EXPECTATIONS. If everyone understands the scope there is a higher % of success. The Public Administration Contracts Law does no t intend to choose the cheapest offer, but the most economically advantageous one. Target Time is fixed as part of the offer/tender, but not the key decision element as time could be secondary where a more technical/better solution is preferred under the umbrella of milestones checks and penalties agreements (Public Administration Contracts Law). Specification is key: Includes all requirements regarding the solution but also for the Training aspects. Normally IF new product is required, normally a third-party consultancy company (following Public Administration Contracts Law) can help or make the specification. IF the department is familiar with the subject, then the specification is done in-house by the specialist (software developers, system analysts, system engineers, etc). Transparency is key and mandatory (Public Administration Contracts Law): It is mandatory to publically publish the "need" of the solution (that can include draft specifications) (RFI/RFP) and evaluate the answers and costs. After the analysis it is decided to GO AHEAD or NOGO (if technical solution is sufficient and/or budget can cover it). Public Administration Contracts Law promotes standardization and unification of decision criteria by means of Compliance Matrix with key elements for cost and technical aspects evaluation between multiple IT solutions. Public Administration requires to publish all the needs online (Government centralized database), therefore this information is public and can be seen by companies and both end-users. End-users normally check this information and help them to know what decisions/solutions are taking place locally but also at national level in all Public Administration sectors. Specification is KEY to define the Business Expectations.

This a process that is clearly defined under the Public Administration Contracts Law, covering all the lifecycle of the product: from start to the end of the project (including maintenance and remove of service). The Public Administration provides an extremely interesting point of view, especially in regards to the comparison to Private Sector where the year-to-year business analysis strategy and IT procurement or investment processes are totally different.

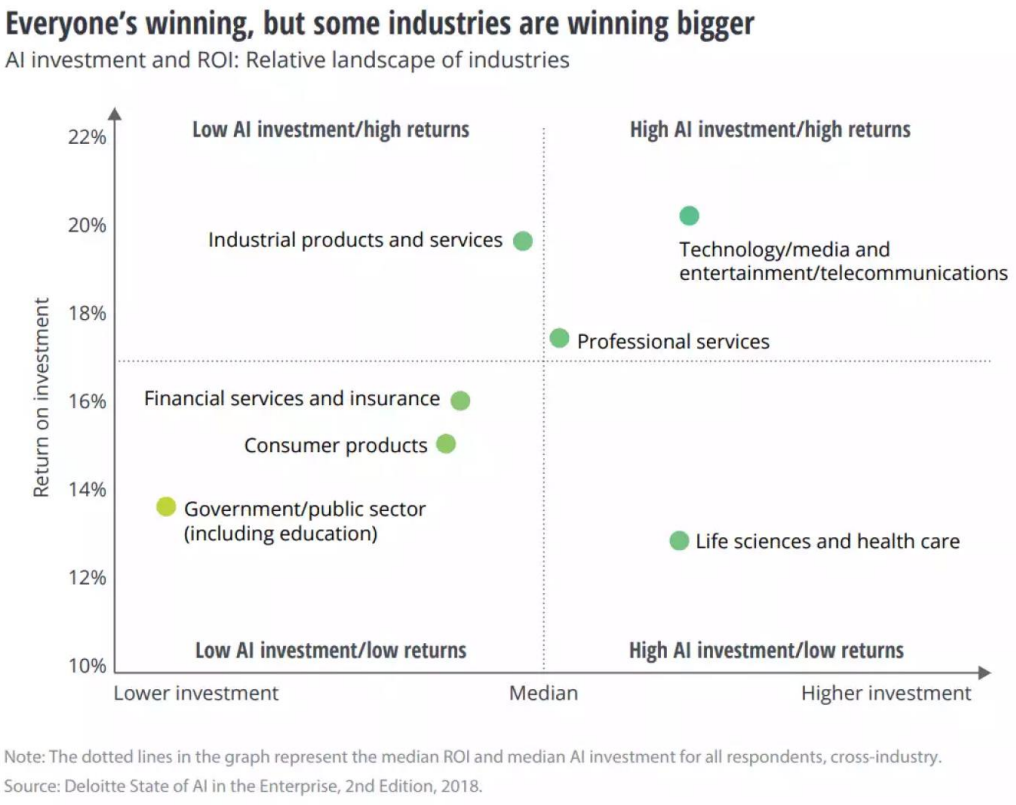
During the interview it was noticed that the Public Administration, despite of the traditional belief of targeting for the most economical solution (cost only decision), in reality not only is false, but a standardized process is put in place under the Public Administration Contracts Law (focusing on a balance between costs and benefits), that provides a complete methodology from procurement to the actual technical and cost evaluation, up to the delivery and product end of life cycle.

On one hand, the Public Administration Contracts Law adds complexity to the decision-making process (as this kind of methodology is limited to big companies, where small and medium companies normally lack all these procedures due to scarce resources), providing some delays in the procurement, however it fosters fair competitiveness and transparent environment where all private companies can compete under equal fair advantage.

Despite this complexity, it seems encouraging to see that Public Administration is interested in Artificial Intelligence solutions and even undergoing some pilot programs such as AI-supported clinical data analysis. Therefore, making this sector a very interesting subject of study for the AI4PPP, as it would be very important for the Public Administration to provide adequate training for the internal Managers and generate value for the society.

Research wrap up: industries and skillset

Following research it is clear that some industries are more into AI but there are many industries that are catching up fast.



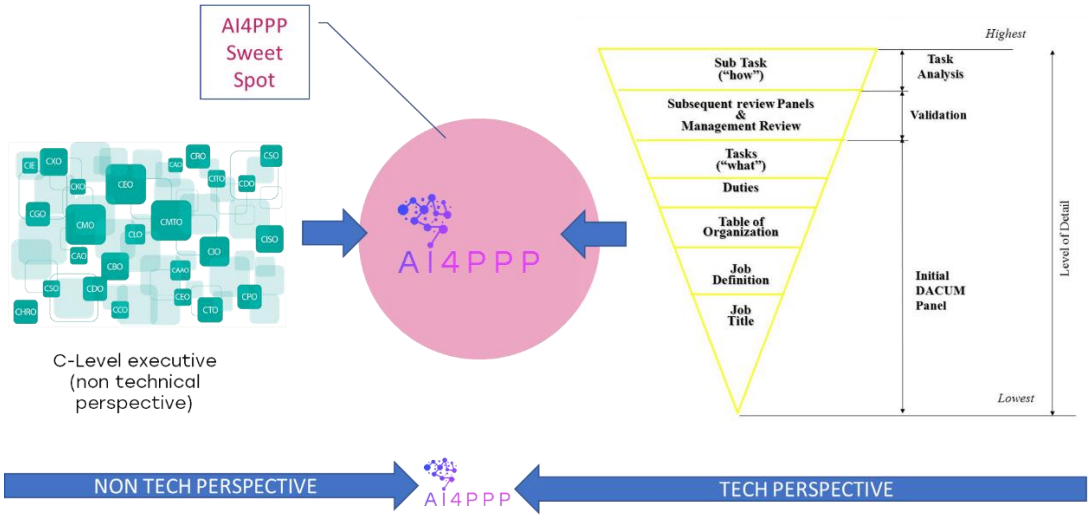
Return on investment on AI initiatives across industries. Source: Deloitte

As our final guidelines towareds identification of skills, we narrowed down groups, skillsets as follows:

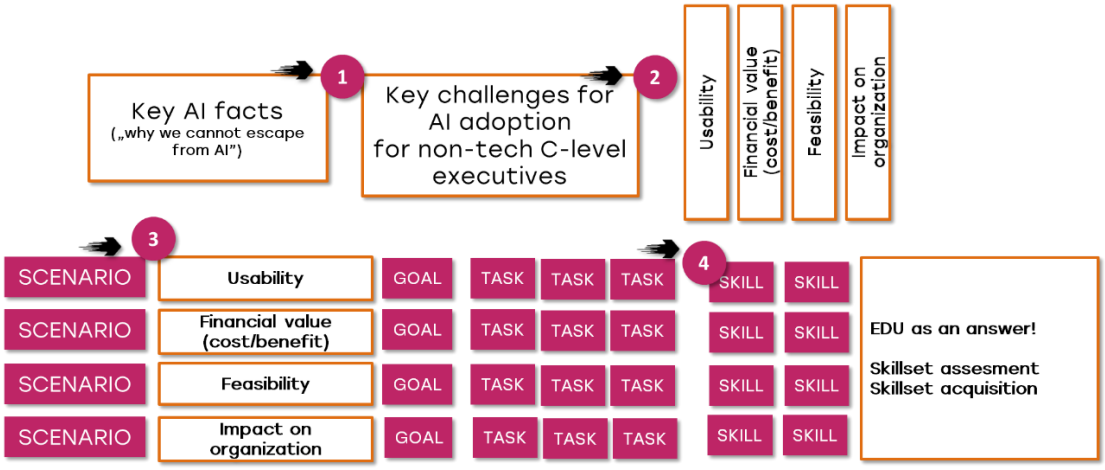
Skillset #1: Identify, recognize, understand and describe elements of AI solution
Skillset #2: Recognize difference between business and technical elements of AI
Skillset #3: Describe business and technical elements of AI
Skillset #4: Recognize impact/usage of AI when faced with different digital services
Skillset #5: Describe business challenge suitable to be tackled with AI solution
Skillset #6: Understand and describe AI solution complexity from cost/benefit perspective and time-to-vale
Skillset #7: Understand and describe AI team composition and management
Skillset #8: Understand and describe AI models management, models management cost and models precision metrics
Skillset #9: Understand and describe how much data is enough for selected model and scenario
Skillset #10: Understand and describe how to build/grow by managing uncertainty
Skillset #11: Mapping your company for AI benefit pro/cons
Skillset #12: Understand and describe AI solution flexibility potential (risk to become obsolete)
Skillset #13: Understand and describe how to build components into whole and plan long term AI investment

Identification of skills

AI-ready manager skills are a must-have for anyone looking for a rewarding career in AI-ready management. Every new product brings its own set of challenges. In 2020, UX Cam shared data indicating that managers spend as much as 52% of their time on unplanned activities. Those are far from the only setbacks and difficulties that managers experience on the job.



We must remember that managers have to juggle a myriad of responsibilities on the job. AI-ready managers are no different. The nature of this type of position means facing several challenges on the job. In order to do so, you need to have a particular set of skills. The skills you need to have under your belt exceed the typical ones that traditional managers need. This guide serves to break down the key skills that you must master in order to succeed as an AI-ready manager. We also discuss how you acquire and improve these skills over time. Let's dive right into those skills that you'll need.



Technical Skills

As an AI-ready manager, not having a strong command of the technical aspects of product development is out of the question. All managers need to have a deep understanding of the products

they're managing. You need to know what the product does, the role it plays, and how it improves its target customers' lives. Therefore, being a successful AI-ready manager involves having a solid understanding of artificial intelligence and machine learning models. It also requires you to have a sound foundation in the technologies that developers use to build AI products. This includes any relevant programming languages that they use in app development. It also takes into account the various software building technology that they use to facilitate how well the product operates once the team has launched it. Having a solid understanding of both AI and other types of technologies means that AI-ready managers need to spend time sharpening their technical skills. Studying artificial intelligence and machine learning via a specialized course is a solid option to help you develop in the field. These types of courses familiarize you with terms and features of the machine learning world such as neural networks, feedback loops, ML and data products, and training data sets. However, bear in mind that most of these courses do not cover other key aspects of technical product management that you need to have under your belt.

Management Skills

Being an AI-ready manager also means being able to manage teams and projects. AI-ready manager often find themselves having to solve a range of complex problems that present themselves in cross-functional teams.

In order to keep everyone on the same page and ensure that the project goes according to plan, AI-ready managers need to exhibit responsiveness, versatility, and leadership. This is because the entire product team looks to you to guide the way through AI projects. As the manager, you'll be the first person the engineering and development teams turn to when they need assistance. That's why you must demonstrate strong organizational and leadership abilities to manage a project from start to finish. Effective product management involves mastering several different skills. Working as a manager in a previous post helps you sharpen most of these skills. However, in case you haven't, it is more challenging to manage your product team. Besides, even if you have worked as a manager in the past, chances are you haven't developed all the skills needed to be an AI-ready manager. A good way to prepare for this and strengthen your managerial standing is with the help of a training course. PMHQ's Manager Course is a solid option to help you fortify the skills you need to succeed at managing your product team.

Communication Skills

No manager hopes to build AI-based products and solutions on their own. It takes the effort of an entire product team to create innovative new solutions. Effective communication within the product team is key to ensuring that everyone follows the plan and aligns with the initial product vision. Inadequate communication leads to several unwanted scenarios. These include:

- Poor prioritization of tasks from both the manager as well as other members of the product team.
- Inability to meet deadlines on key product design and development milestones.
- Failed product features and functionalities.
- Unsuccessful product launches

AI-ready managers need to be some of the most effective communicators of the entire process. You need to communicate with different groups in different ways. On one hand, you must maintain constant communication with developers and engineers about the technical side of the project. You must also liaise with investors and potential customers about possible product features and expected delivery dates, among other things. You develop solid communication skills over time as you participate in more team projects and take on more leadership roles. Framework for Communication Strategy. Some managers leverage communication frameworks such as the one above to help structure how you approach your product team.

Research Skills

As an AI-ready manager, having a strong understanding of data science and deep learning systems is not enough. AI-ready managers also need to understand their customers and carry out the necessary research. Solid research helps you to make smart, informed decisions.

Research abilities are therefore an important piece of the AI product management puzzle.Some of the common research tasks that managers have to carry out include:

- Identifying customer needs and validating the intended product's value.
- Finding out about new customer behavior and market trends.
- Studying the products of competitors to determine the best way to position your product within its market.

In the world of machine learning and computer science, new innovations and developments occur all the time. You can't afford to get left behind. Aspiring AI-ready managers should get into the habit of keeping up to date on the latest news in the world of machine learning on a regular basis. Don't assume that the knowledge you have now is sufficient. Find reliable sources and keep abreast with all of the latest AI-powered developments, AI initiatives, and AI products.

Business Skills

Over time, the role of managers has become more and more strategic. Not only do today's AI PMs need to manage teams and oversee product development. They also need to have a keen understanding of the business opportunities, principles, and potential behind every product decision.

As a result, you need to see the business side of each part of the AI strategy and product development. This involves understanding the product's respective financial implications, risks, and potential returns, among others. You must also have a thorough understanding of how to market, brand, and launch your product in the most successful way.

That's why AI PMs need to ensure that they have a solid grasp of business fundamentals. You must be adept at making data-driven decisions bearing in mind the financial ramifications of each stage of the product development process.

Analytical Skills

In many ways, AI-ready managers need to have most of the skills that global business leaders and data scientists have. Not only do you need to be a good manager, leader, researcher, and communicator, but you also have to have strong analytical abilities. This involves interpreting and understanding a range of data such as performance metrics and business metrics.

Data literacy is essential in this kind of role. After all, you need to make decisions throughout each project you oversee. This requires you to have the right data and information that helps you to make the smartest decision for your project as it progresses. Analytical and interpreting skills help you make those decisions.

Again, the best way to build these specific types of skills is through education. Statistical and analytical courses are available online that help you improve your understanding of data collection and analysis. You also have the option to work alongside technical teams of analytics experts to see how they analyze and interpret data. That also give you insight into the latest analytical tools.

Delegation Skills

As stated before, an AI-ready manager finds themselves in charge of the entire product team. That includes the engineering, design, and marketing teams. For that reason, a big part of the job has to do with delegating roles and responsibilities to team members.

In this sense, managing an AI product is no different from product management. As an AI PM, you need a good understanding of the skill sets and capacities of each team member. This is important as it provides you with an idea of which individual members should carry out the processes involved in product development. You then use that to delegate the tasks associated with each process.

You pick up these essential management skills in a course such as our Product HQ Manager Course. Once you understand the fundamentals of product management, delegating tasks becomes second nature.

Marketing and Sales Skills

A successful AI-ready manager also needs to have a solid understanding of the principles of marketing and sales. The role of a manager is becoming more business-oriented with each passing day. PMs need to devise and implement the right strategies to help their products be successful.

The same goes for managers who oversee the development of AI products. Let’s say that you’re in charge of an AI-powered program for the healthcare industry, You’ll need to have a good level of knowledge of how to market and sell your product to healthcare institutions in order to ensure that it is successful. This involves studying trends and new ideas in the industry, being aware of the best branding techniques, and much more.

In today’s world, making incredible AI products and being able to leverage AI in bold new ways isn’t enough. You also have to sell those products and get customers interested and engaged. If you need to improve your marketing skills, take marketing and sales courses. You must also spend time working alongside sales professionals. Also, be sure to make use of online and educational resources to find out more about marketing.

Prioritization Skills

As an AI-ready manager, at times you feel overwhelmed having to accomplish a long list of tasks on a daily basis. This is even more true for those without experience managing machine learning projects and products. However, one of the key skills that managers tend to pick up over time is the ability to prioritize.

A good machine learning manager does not get overwhelmed or intimidated by a long to-do list. You must look at your list of tasks and make use of your own insightful and dynamic thinking abilities. With it, you decide which of those tasks is the most important and prioritize them to suit. This helps you to maintain smart, efficient, and effective workflows in your product teams.

Once again, knowledge of ML models and real-world AI applications is not enough. Prioritization is a skill that you acquire over time. Management training courses help you with this. Start looking at tasks and duties on a deeper level. Try to understand the importance of each one as well as why you need to get them done. Then, rank each one based on urgency and importance. This helps to point you in the right direction.

Strategic Thinking Skills

At times, AI projects do not go according to plan. Unexpected obstacles crop up along the way. These include:

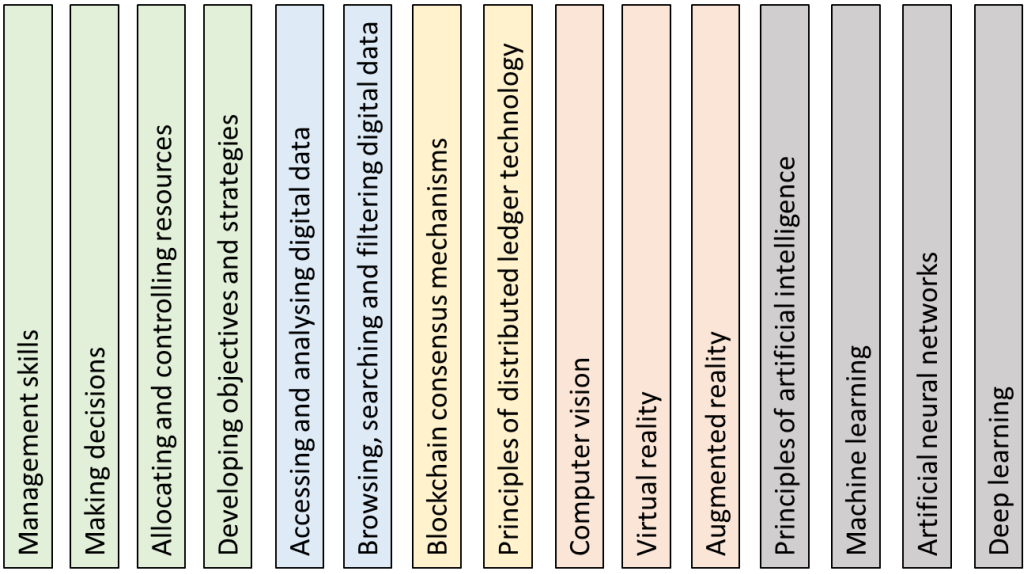
- Interruptions and alterations to the initial product vision
- Failed product-market fit that lead you to pivot your product strategy
- Technical glitches and unforced errors in development that hinder optimal product functionality
- Possible delays to your original schedule
- Interruptions and alterations to the initial product vision

As the manager, you play an essential role when things go wrong with your AI product. You must use strategic thinking to adapt your approach and meet the changes and challenges of the process head-on.Go-to Market Strategy. When challenges come knocking on your door, you have to think of ways to solve them. This involves thinking outside of the box. Limiting yourself to the original product roadmap contradicts the spirit of product management. Instead, you must anticipate possible problems that come your way. You must then come up with a plan to handle those problems if and when they show up. Educational courses and programs assist you with developing your strategic thinking skills. Don’t be afraid to take steps to improve your strategic abilities on your own. Try to get into the habit of thinking ahead in the product lifecycle and imagining possible problems that appear.

Then, come up with ways to overcome them. Adopting this mindset aids you in becoming a much better problem solver and more adaptable AI PM.

Identified skills

As a final result we identified 15 crucial skills to be covered by education materials, named as follows:



ESCO mapping matrix
management skills
http://data.europa.eu/esco/skill/c1a13ee0-b00d-4cfa-a22c-20d284e398b0
developing objectives and strategies
http://data.europa.eu/esco/skill/6f89dcbe-4315-4533-8801-3aadf9190b86
making decisions
http://data.europa.eu/esco/skill/bb99a123-88be-42a2-8758-f5a18e06ccc6
allocating and controlling resources
http://data.europa.eu/esco/skill/9827c329-3492-4e8d-852c-da0894228ff6
browsing, searching and filtering digital data
http://data.europa.eu/esco/skill/258fea29-09db-4918-8235-0d7d529cd31c
accessing and analysing digital data
http://data.europa.eu/esco/skill/4d6a48ae-352e-4823-bc3a-3f3e9e2cae86
computer vision
http://data.europa.eu/esco/skill/7b0d5000-00da-4864-b776-6de49a87a669
virtual reality
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blockchain consensus mechanisms
http://data.europa.eu/esco/skill/f7e051fc-8f7b-45b3-8911-8ffb9b951f4a
principles of distributed ledger technology
http://data.europa.eu/esco/skill/3be79ccc-a455-49b9-8c65-55c50071ba5b
principles of artificial intelligence
http://data.europa.eu/esco/skill/e465a154-93f7-4973-9ce1-31659fe16dd2
augmented reality
http://data.europa.eu/esco/skill/abdc7ac8-151f-40c6-bc1a-1e9b4b073290
artificial neural networks
http://data.europa.eu/esco/skill/5608d5a0-6d5e-43b7-be37-616501729bb4

machine learning
http://data.europa.eu/esco/skill/3a2d5b45-56e4-4f5a-a55a-4a4a65afdc43
deep learning
http://data.europa.eu/esco/skill/ecc4552a-92c5-4222-b18d-faf5ac841080

Links to References

1. https://www.forbes.com/sites/forbestechcouncil/2018/03/01/14-ways-ai-will-benefit-or-harm-society/?sh=2873e8544ef0
2. https://info.microsoft.com/DE-DIGTRNS-CNTNT-FY21-07Jul-24-AISkillsintheUKreport-AID-3013784-SRGCM3647_01Registration-ForminBody.html
3. https://www.simplilearn.com/advantages-and-disadvantages-of-artificial-intelligence-article#what_is_artificial_intelligence
4. https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/)
5. https://www.newyorker.com/tech/annals-of-technology/why-we-should-think-about-the-threat-of-artificial-intelligence
6. https://www.businessinsider.com/stephen-hawking-on-artificial-intelligence-2014-5
7. https://www.edge.org/response-detail/26157
8. https://spectrum.ieee.org/the-institute/
9. https://www.abiresearch.com/
10. https://www.gartner.com/en
11. https://www.businessinsider.com/stephen-hawking-on-artificial-intelligence-2014-5
12. https://www.fhi.ox.ac.uk/
13. https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf
14. https://ai100.stanford.edu/
15. https://nickbostrom.com/superintelligentwill.pdf
16. http://intelligence.org/files/AIPosNegFactor.pdf
17. https://www.sloveniabusiness.eu/industries-and-technologies/electrical-and-electronics
18. https://www.sloveniabusiness.eu/industries-and-technologies/automotive-industry
19. https://www.gov.si/en/news/2021-10-12-prime-minister-janez-jansa-at-a-working-meeting-with-representatives-of-the-slovenian-automotive-industry/
20. https://www.see-industry.com/en/slovenia-s-electronic-components-market/2/2088/
21. https://producthq.org/career/ai-product-manager/ai-product-manager-skills/