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A conceptual framework for managing
the adoption of artificial intelligence

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The science of change framework

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Hochschule für Wirtschaft Zürich

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A conceptual framework for managing the adoption of artificial intelligence

The science of change framework

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Abstract

This research established a conceptual framework for managing organizational change for the adoption of artificial intelligence. The authors have worked through research and found 85 success factors for the adoption of AI. These 85 factors have been mapped onto a tentative framework consisting of the following items: Incentives (Success, Emotions, Ease), Organization (Culture, Process, Technology), and People (Behavior, Understanding, Mindset). This tentative framework has been developed based on almost 40 years of story fragments.

The conceptual framework has been established through different steps. First, success factors for the adoption of artificial intelligence have been distilled from a literature research. The literature research focuses on the adoption of new technology, the adoption of artificial intelligence as well as change management for the introduction of artificial intelligence in organizations. Secondly, the success factors are mapped onto the tentative framework. Lastly, the conceptual framework is established through showing that all success factors could be mapped and all items on the tentative framework are covered by success factors found in literature research. The conceptual framework for managing change together with the success factors allow for organizations to follow an approach for the adoption of artificial intelligence.

Overall, the conclusion is that the tentative framework on managing organizational change can be “proven” by the mapping of the success factors and can therefore be called a conceptual framework for “the science of change” with a focus on the adoption of artificial intelligence.

Keywords Artificial intelligence, change management, adoption, technology, organization, AI management, cultural change

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1. Introduction

1.1. Research background

The topic of artificial intelligence (“the study and development of computer systems that can copy intelligent human behavior” (Oxford Dictionary of English, 2010) (AI) has gained increased attention in organizations and in the literature. Many organizations struggle to generate business value with AI. Gartner argues that 85% of projects fail (van der Meulen, 2018). Yet, at the same time, studies argue that artificial intelligence is different from other type of innovations (Allen, 2017). But is this truly the case?

The objective of this study is to combine current change management approaches (Metzinger, 2006) with the adoption of artificial intelligence in an organization. This approach can be used by middle-management, change managers and top-level management to transform their businesses toward the adoption of AI across the organization.

This research is based on a practice-oriented visualized cultural change model. This model was created after almost 40 years of practice. It is called “The Science of Change Triangles”, or “The Science of Change”. This tentative framework, “a set of beliefs, ideas or rules that is used as the basis for making judgments, decisions, etc.” (Oxford Dictionary of English, 2010), is a condensed presentation of an older model called the Business Campaigning framework by Peter Metzinger. Business Campaigning was first published by the scientific publisher Springer in a book with the same name (Metzinger, 2006). The triangles in this tentative framework are Incentives (Success, Emotions, Ease), Organization (Culture, Process, Technology), People (Behavior, Understanding, Mindset) and “Interventions x Communication”.

This framework is a tentative conceptual framework based on “story fragments”. The objective of this study is to get to a conceptual framework that is supported by scientific literature.

The unit of analysis is organizations. Therefore, the framework can support companies in their cultural change with regards to artificial intelligence. The cultural change of artificial intelligence in society is out of scope.

Research Questions

- *Can we support the tentative conceptual framework with existing scientific literature?*
- *Does the tentative framework contain all relevant elements that need to be considered for initiating and managing organizational change with regards to the adoption of artificial intelligence within organizations or do we need to adjust it? If so, how?*

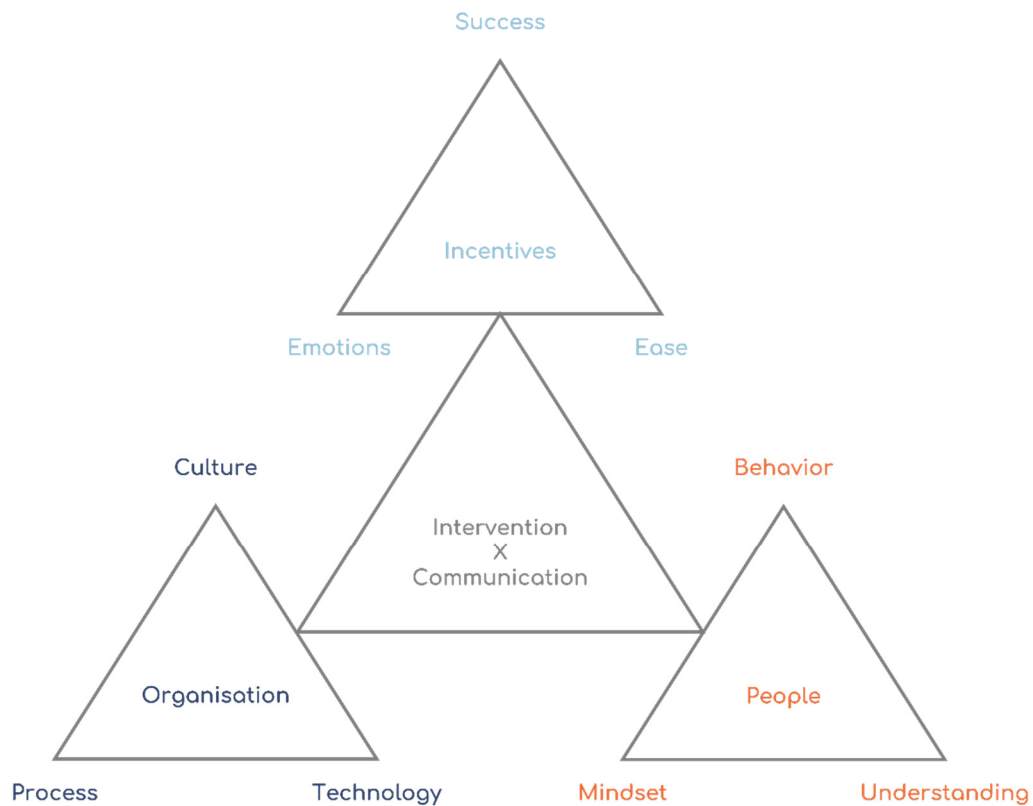
1.2. The tentative framework

The author of the tentative framework, Peter Metzinger, has gained experience in getting people to commit to an idea, product or organization since 1982. This involved objectives and topics as diverse as protecting a wetland, improving internal communication, changing corporate culture, stakeholder management and brand reputation for the World Economic Forum, launching new products, preventing operating licenses, increasing sales, winning referendums and significantly increasing seats in parliamentary elections, building and maintaining online communities, crisis communication, dealing with technology critics, educating people about the pension system, campaigning for facts and against disinformation, etc.

Metzinger developed a tentative framework for successful campaigning and change management in 1998, which was published as the “Business Campaigning” framework in 2003 with the scientific publisher Springer Heidelberg and is approximately 300 pages (Metzinger, 2006).

In November 2018, this comprehensive and extensive framework was summarized for a short presentation. The topic was how to initiate and steer the change that is needed when introducing artificial intelligence in an organization. This resulted in the following tentative framework, with four triangles containing all the essential elements to consider.

Figure 1 – The four triangles of change



The very first step is to define the overall goal of the process of change. What exactly does the company want to change? Is there a specific vision? How does one recognize and measure whether the goal has been achieved? What would be different from today? After this has been clearly defined, one can start working with the tentative framework. In fact, it does not really matter with which item one starts, but once the item is chosen, one always works one's way from there to the other items in the framework.³

³ Companies do not operate in a vacuum. Critical readers may have noticed that the environment of a company can also have a great influence on the success of a change process. For example, data protection laws and regulations can be either a help or a hindrance. However, if one accepts them they are no longer part of the changes to be aimed for. If one wants to change them, for example through public affairs, all four triangles must again be considered in such a project, because ultimately it is a matter of getting individuals to change their understanding, their mindset, or their behavior.

Example

Consider the hypothetical case where a company decides to use an AI-based tool (the "AI Explorer") that provides daily insights into the markets. It delivers information about current trends, keywords, sentiments, issues, etc. Implementing this new technology means opening an account with the service provider and setting up and scheduling a daily newsletter to all departments and work units that should be informed about the latest insights.

In the example, the desired change is that the **organization** uses the AI Explorer as intended. This requires new processes, described in a new checklist. The checklist is an **intervention** and a discussion about its purpose and instructions on how to use it would be an item of communication.

The aim is to change **behavior** because this is a prerequisite for a changed **culture** and the adherence to new **processes**. However, people only change their **behavior** in a sustainable way if they develop a positive **mindset** toward this change. (In the broadest sense, the desire to avoid sanctions also implies a positive **mindset** toward the new **behavior**). For the desired new **behavior** to have a lasting effect, **understanding** is inevitable. People want to **understand** why they should adopt something new. Creating **understanding** is therefore the first step on the path to **behavior** change.

Implementing the AI Explorer starts with training (with the aim of **understanding**) for all relevant employees. Here they learn why and how to use the AI Explorer. This training should be announced and conducted in a way that participants develop a positive **mindset** toward the new tool and are ready to change their work (**behavior**) toward adopting the AI Explorer and sticking to the new **processes**.

Understanding, mindset, and behavior form the "people triangle".

However, understanding this new technology is rarely sufficient for employees if one wants them to change their attitude or **mindset** and their **behavior**. In most cases additional **incentives** are necessary.

There are three types of **incentives**: incentives that make the individual more **successful**; incentives that make life and/or work easier; and things that evoke desired emotions. Most employees want to be **successful** or to belong to a successful team. Hardly anyone would say no to something that makes their life **easier**. On the other hand, any change that would be perceived as hindering one's professional career or leading to extra work or complicating one's work is met with rejection.

In some cases, it might be enough to explain how the employees' work will be more **successful** by using the AI Explorer during a training session. In other cases, more is needed.

Emotions can be a great **incentive**. They include feelings of belonging, identification, longing, tension, excitement, joy, trust, confidence, etc. Announcing the AI Explorer should be done in a way that at least one of these **emotions** is triggered. If employees are excited about being pioneers by adopting AI Explorer and leaving their competition behind, this feeling can become a major driver for the needed change. The number of **incentives** is completed if, on top of bringing more **success** and excitement, employees can see how much **easier** the AI Explorer can make it for them to achieve their goals.

Success, emotions, and ease form the triangle of incentives that can be used to create a positive attitude toward the desired changes.

The triangle in the center contains the product of **communication** and **intervention**. **Communication** in this context is the mutual exchange of information or, in other words, the product of interaction and information. **Interventions** are direct **interventions in processes** or (sub-) systems.

Communication and intervention are considered as a product. This is intended to express that every measure is to be considered under both aspects, because "one cannot not communicate" and because every **communication** does have an impact on the **organization** or its **processes**. Every single measure, whether a new **process** is defined, training is carried out to achieve **understanding** or a new **incentive** is created, represents a direct change to the system. However, it always has a **communicative** aspect as well, which must not be ignored under any circumstances.

Announcing the introduction of AI Explorer with a training session already scheduled sends out a message that is very different from announcing it without any training being scheduled. With training being scheduled the message can be perceived as "this must be important to our leadership and they care that we get everything we need to work with AI Explorer," while the message with no training being scheduled can be perceived as "it doesn't seem to be important if we use AI Explorer or not".

Successful change processes are unthinkable without considering the most important insight of Paul Watzlawick: "One cannot not communicate".

The hypothesis is that the four triangles contain a complete overview of all items relevant to such change processes. When analyzing other framework or studies, it should therefore turn out that all success factors mentioned there are also found in this tentative framework model and that no further items are found that are missing in this tentative framework.

1.3. Methodology

The performed research consisted of three steps. Firstly, literature was researched based on the following topics: change for the implementation of technology, change for the adoption of artificial intelligence, and the adoption of artificial intelligence in general. The second step was to extract the success factors for the introduction of the topic of AI in an organization as well as the adoption of AI. This resulted in a list of 85 success factors that were then mapped onto the tentative “the science of change” framework. Finally, this mapping has led to the establishment of a conceptual framework. It also resulted in a suggestion of how to implement this framework for the specific topic of artificial intelligence in an organization.

2. Literature review

In the literature research the focus lies on four different topics or criteria: cultural change for the implementation of technology, change for the adoption of artificial intelligence, adoption of artificial intelligence and frameworks for cultural change.

Several articles and books have been investigated. Articles that truly focus on the cultural change aspect of technology or AI specifically have not been found. Articles on the topics of the adoption of new technologies where culture is mentioned as one of the factors of success are present.

In this section, the different articles and the success factors that are mentioned are reviewed.

The first article (Soni et al., 2019) focuses on the impact of AI on businesses. The authors argue that the consequences of the adoption of AI in business processes is under-explored and needs attention. They also mention that any company needs to focus on the race to make their company an AI company. The success criteria listed are the availability of (big) data, the computing power, the ability to convert data to AI, the required skills, investing in core-AI companies and acquiring AI start-ups. Lastly, they describe the fact that companies need to have the possibility to automate many tasks to be successful with AI. This makes sense as investing in developing capabilities without the possibility of automating tasks makes it hard to generate a return on investment.

The second article investigated is an article in the space of the adoption of a technology, in this case blockchain. The article (Janssen et al., 2020) describes a framework for analyzing blockchain technology adoption and it proposes a conceptual framework. While blockchain is not artificial intelligence, both are novel technologies that are often misunderstood by the public and both have the potential to

disrupt complete industries. The factors mentioned which are relevant for the adoption of AI are that customers need to get used to the new technology, roles and responsibilities need to change, the current way of operation needs to stay the same while building new technologies and that there is a lack of understanding for the use cases. Furthermore, the authors argue that appropriate governance frameworks need to be put in place. These factors can also be applied to the adoption of artificial intelligence.

The third article (Fountain et al., 2019), written by McKinsey partners, includes many different success factors. The main high-level categories are explained in this section, the individual success criteria are available upon request. The article explains the shifts a company needs to make from traditional toward AI adoption, how to set up for success, how to organize for scale, educate the workforce and reinforce the change that needs to happen. The authors of this article would like to highlight the following statements from “Budgeting as much for integration and adoption as for technology (if not more)”：“To ensure the adoption of AI, companies need to educate everyone, from the top leaders down.” (Fountain et al., 2019). And “Walk the talk. Role modeling is essential.” (ibid). This is only a hint toward the different success factors mentioned in the article, the other success factors are available upon request and are processed into the conceptual framework.

Another article from McKinsey authors focusing on the adoption of artificial intelligence, as well as digital adoption is the article by Bughin et al. (2017). This discussion paper starts with suggestion that the adoption of AI outside the tech sector is at an early, often experimental stage. They surveyed 3000 AI aware executives and reached two different conclusions. The conclusions relevant for this article are that a digital foundation is required and that systems need to be trained from unique data so there are no shortcuts for firms. A successful program requires firms to address the following: identifying business cases, setting up the right data ecosystem, building or buying AI tools, adapting workflow processes, capabilities and culture and leadership from the top, management, technical capabilities, and seamless data access are key enablers (Bughin et al., 2017). They summarize using the characteristics of early adopters: digitally mature, larger business adopting AI in core-activities, adopting multiple technologies, focusing on growth over savings and C-level support. The article mentions the five elements for successful AI transformations which are: “use cases or a source of value available”, “data ecosystem”, “techniques and tools”, “workflow integration” and an “open culture and organization”. As with the previous article, this article mentions many more success factors for the adoption of AI that are available to the reader upon request.

The last article (Chen, 2019) discusses the impact of success factors on AI adoption and concludes: “The results indicate that compatibility, relative advantage, complexity, managerial support, government involvement, and vendor partnership are significantly related to AI adoption.” The authors of the paper have tested the different success factors in an empirical manner for the telecom industry in China.

2.1. Developing success factors based on the literature research

As a result of the literature research, 85 different success factors have been distilled. These 85 different success factors are textual snippets from the literature indicating key activities or success factors for organizations to engage on the topic of AI. The list of success factors is available upon request.

3. Mapping onto the tentative framework

In a next step, the different success factors have been mapped onto the different parts of the tentative framework. To do this, the authors have distilled the meaning of the different success factors in relation to the different items within the tentative framework. To avoid ambiguity, the mapping has been commented on. The mapping of the success factors on the tentative framework is available upon request.

The 85 success factors are mapped onto different parts of the triangles. This is a consequence of the ability to view the same criterion under different aspects or angles. This had no impact on the underlying objective to identify criteria that that could not be mapped onto the tentative framework. The different success factors are summarized and structured by the triangles of the tentative framework in the following chapters.

3.1. Technology

From a technology perspective, one can distinguish between data (storage), tools, integration of data and tools, investing (in technology) at scale, and the capability of application.

From a data perspective, the building of the **data ecosystem** as well as availability of (big) data is mentioned as success criterion. That is to say the data doesn't just need to exist. It also needs to be made available through an ecosystem, which is an aspect of technology.

When considering the tools perspective, the **adoption** of the **right**, but also **multiple technologies or tools** is considered as a success factor. This also requires building the needed capabilities and the availability of **computing power**.

Thirdly, the **integration of tools and the data ecosystem into the workplace processes** and investing in data and tools close to the core business is a success criterion.

Investing in scalability of the technology stack (cloud services, big data (defined as "sets of information that are too large or too complex to handle, analyze or use with standard methods, (Oxford Dictionary of English, 2010)), etc.) was found during the research.

The actual **ability** of **automating many tasks** is a question of technology as defined above.

3.2. Process

The **process of developing and choosing use cases** needs is the start of a journey, rather than building architectures and data lakes. The (potential) bottom line impact should be calculated up front and measured through a performance management framework to track each initiative. When choosing which use cases to work on, feasibility, time investment and value need to be balanced.

Integration of AI into the core processes of an organization is a success criterion. Similarly, companies will need to ensure integration of workflows in both new and old processes while focusing on the needs of the potential adopters and the actual availability of automating many tasks.

The role of **governance in processes** is from a perspective of setting up new roles and responsibilities within an organization as well as governance frameworks in terms of decision making bodies.

Business needs to be made **accountable**. Governance needs to be set up focus on ethical, social, and regulatory implications, and furthermore developed on a governmental level.

Building 'new' process capabilities in decision making is required, e.g. the speed of investment in large companies is a question of processes. Processes in large companies are usually slower and more bureaucratic.

3.3. Culture

The item of culture can be summarized in five different success factors which were found to cover relevant aspects of culture.

The first one is the way organizations **collaborate**. Literature shows this requires adopting an open, collaborative, agile, experimental, and adaptable culture.

Secondly, the culture of being **data-** and **AI-driven** and establishing this early in the journey. Using data-driven and AI-driven insights and trusting them as the basis for making decisions.

Thirdly, the **involvement of leadership**. C-level support, executive buy-in, leaders anticipating the barriers to change, assessment of AI initiatives and co-leading between business and technical leaders are listed as key success factors in the literature.

The fourth group is that of **reskilling and upskilling** and culture of doing so. This also involves setting up new roles and responsibilities and the appropriate governance framework around this.

Lastly, having a digital culture and investment in **AI at scale**, and focus on growth over savings are mentioned in the literature for successful adoption of AI.

3.4. Understanding

The item understanding can be summarized into five different factors.

The first one is an **understanding of AI**, analytics and how to use and apply AI in the organization.

The second is a general understanding of the **need of upskilling in the organization**.

The third is the **new roles and responsibilities** and in particular, the role of the analytics translators.

The fourth is in the **understanding** of the **big picture** and what is present in the industry of an organization.

Lastly, the **understanding of the data**, and **use cases** that are present or possible in an organization and the alignment of the data (consolidation) strategy with the most valuable use cases can be considered.

3.5. Mindset

The mindset that is listed in the literature is classified in the mindsets of commitment, agility, upskilling and collaboration.

Commitment. AI isn't a side project and organizations, especially leadership, need to have the mindset of serious adoption.

Agility. The mindset of working in a fast, agile, test and learn approach is important.

Upskilling. The mindset of a lifetime of reskilling and upskilling is required. The formation of certain mindsets can be the result of an organizational culture, which itself consists of "the customs, rituals, and values shared by the members of an organization," (Guha, 2016). But mindsets or attitudes toward specific topics or technologies are also influenced by individual values, prejudices, information from inside and outside the organization, peers and other influencing factors.

Collaboration. Co-leading by business and technology leaders as well as collaboration cross-functionally is a required mindset.

Focus. Having the mindset of implementing AI close to the core business and a strategy that goes beyond a few use cases.

Changing the mindset can be an indispensable prerequisite to changing culture. At the same time, a changed culture can lead to a changed mindset.

3.6. Behavior

The following success factors with regards to behavior were found following recommendations.

Retraining the workforce and redefining **roles and responsibilities** may lead to behavioral change.

The **behavior of the leadership** is listed as a key success factor in changing the behavior of the team for the adoption of AI.

3.7. Success

Success as an incentive can be viewed from different perspectives, according to the following findings.

Firstly, the **focus on growth** rather than savings is mentioned as a factor for success. The focus should be at least as much on growth as on savings because the upside potential is much higher than the cost saving potential.

This is a good example why a semantic analysis of success factors found during this research is indispensable. How can future growth be a success factor for a change that will hopefully lead to that growth? It cannot be such a factor in the real world. It is the hope for growth or the promise of growth that can make it a success factor. As such, it is a promise for success and success as a promise turns into a success factor.

Secondly, the incentive for change should be there in making the **business accountable**. As such, one can say there is a threat of “negative” success. Punishment because of failure can be seen as the mirror image of success.

Thirdly, **balancing short term wins with longer term larger payoffs** by assessing feasibility business value and the different time horizons.

Fourthly, developing a **strategy** that is **beyond a few use cases** sets up for success as well as addressing more than one use case at the same time.

Lastly, finding the **right value-adding use cases** while considering the needs of potential adopters focuses on creating success.

These five factors represent different aspects of success as an incentive to change behavior, mindset or understanding.

3.8. Emotions

Emotions play an important role in decision making and, thus in the adoption of new technologies and success with AI.

The first emotional aspect is **trust**. Trust can be the consequence of evidence-based observations but trust is a feeling that we have toward the reliability of a person or object. As such it is an enabler and systems need to be trusted to be used as a basis for making decisions.

The way **leadership** involves in **creating positive emotions** toward AI is also a success factor. This can be shown through creating a strategy that goes beyond a few use cases, as well as addressing concerns that employees may have early on.

Getting the emotions right (**taking away the fear**) when implementing multiple new technologies is key for the adoption.

Another emotion often used in change processes is pride. Feeling proud to be a pioneer or early adopter can be a major driver for change.

3.9. Ease

Throughout human history innovation has tried to make lives more successful, more pleasant or simply easier. Making lives or work **easier** or making it easier to achieve more with less resources in less time is one of the key drivers of adopting innovation. Apart from that, ease is about taking away barriers for the adoption.

For this the **C-level support** is key in taking away barriers to adoption.

The availability **of technology for scale** such as cloud computing and big data ecosystems and, at the same time, not specializing in one type of technology.

Making it **easy to adopt** is an incentive to change.

The **possibility of automating many tasks** also makes it easier to implement.

3.10. Intervention x communication

Budgeting as much for integration and adoption as for technology (if not more) is a translation of this view into action.

That customers (internal and external) need to get used to new technology, according to the findings, as a matter of culture, understanding, mindset or behavior.

In the center of the tentative framework is a triangle with the product of intervention and communication. Interventions are direct changes of processes and systems without the diversions of having to convince someone. E.g. placing a new checklist on the screen saver of every employee's computer is an intervention. Communication is the interactive exchange of information. Every action can be seen under both aspects. It is not possible to place a new checklist on the screen saver of every employee's computer without sending a signal that will lead to feedback. Following this logic, intervention and communication become integral aspects of every action and every action can be seen from those two different angles. Therefore, both are not success factors themselves but being aware of and respecting them is a central success factor.

4. Establishing a conceptual framework

The mapping of the 85 collected success factors for the initiation and adoption of artificial intelligence in organizations has shown that on the one hand, all success factors could be mapped onto the tentative framework. On the other hand, all parts of the items of the tentative framework are represented with success factors from the literature. As such, a conceptual framework can be established from the tentative framework. This answers the first research question, *“Can we support the tentative conceptual framework with existing scientific literature?”*

We now turn to the second research question *“Does the tentative framework contain all relevant elements that need to be considered for initiating and managing organizational change with regards to the adoption of artificial intelligence within organizations or do we need to adjust it? If so, how?”*

The answer to this question is that, according to our literature research and semantic analysis, the framework appears complete and does not need any adjustment. Key factors and guidelines to be considered in such projects and transformations are described in the literature that we found. They can all be mapped to the framework. The terms used are not identical with those in the framework in all instances. When this is the case they are either synonyms or they reflect a specific interpretation of a more abstract term that is identical with an existing term within the framework. This is visualized in figure 2, representing an extension of the conceptual framework.

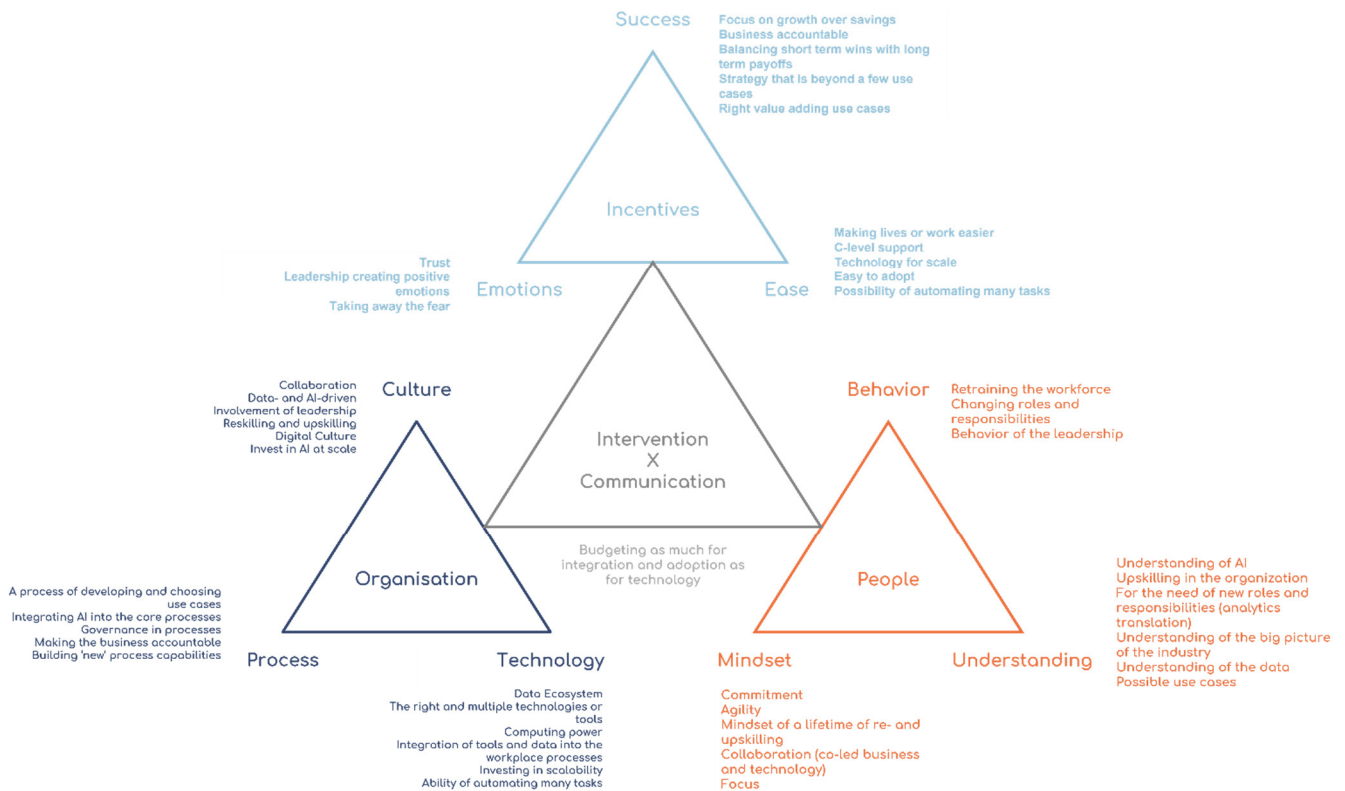


Figure 2 – Framework adopted for organizational change with regards to artificial intelligence

5. Implications for practice and discussion

The authors suggest that leaders who want to ensure adoption of artificial intelligence in their organizations consult the triangles and success factors. After their vision is determined, the leader can use the framework to determine the strategy of their change programs focusing on the adoption of AI. Furthermore, if organizations engage external support in delivering such programs, the conceptual framework can be used to verify the completeness of such programs.

This research has not provided information in terms of the level of importance of the different success factors found. Furthermore, based on this research there is no that by following the different success factors, successful adoption is ensured. The authors suggest quantitative follow up research that examines different organizations, the successful adoption of artificial intelligence and the presence of the different success factors in their organizational change programs with respect to artificial intelligence.

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