

Research Article

# What is Artificial Entrepreneurship? The Influence of AI for the Creative Destruction of Schumpeter

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## Abstract

Artificial Intelligence (AI) is revolutionising the economy and society by automating processes, driving innovation and enabling new business models, leading to a significant increase in productivity and competitiveness. Until now, the aspect of "Innovation Development" has always been assigned to Humans as Entrepreneurs (or Intrapreneurs), but in the course of AI-Development, the question must increasingly be asked whether AI will not only take on a passive support role in this field but also an active development and decision-making role. Against this background, there is a growing need for research in the field of "Human versus Machine" for driving innovation and enabling new business models. (Human) Entrepreneurs are characterised by recognising, evaluating and exploiting entrepreneurial opportunities. According to Schumpeter's understanding, the "Human Entrepreneur" appears in particular as an innovator by developing innovative ideas through their creative power and establishing them on the market. To do this, they must make entrepreneurial decisions based on the available information and data. However, this decision-making process based on information or data is increasingly being taken over by Artificial Intelligence, which is much more powerful in handling this information or data. However, what happens when Artificial Intelligence not only supports the decision-making process of a "Human Entrepreneur" in a formative way but also takes it over as an "Artificial Entrepreneur" based on its own transformative creativity? The aim of the following article is to conceptually describe the prerequisites for the takeover of creative destruction by a machine in the sense of Schumpeter. The result is the development of a Framework which forms the basis for a new field of research: "Artificial Entrepreneurship".

## Keywords

Entrepreneurship, Artificial Intelligence, Entrepreneurial Decision-Making, Creative Destruction, Artificial Entrepreneurship

## 1. Introduction

Artificial Intelligence (AI) has become extremely important for the economy in recent years and is increasingly influencing the development of business processes and models in all sectors and industries [1-3]. The reason for this is simple: these business processes and models are increasingly based on data, which can be analysed faster and better by AI algorithms

[4]. As a result, the integration of AI into these business processes and models has changed how they are carried out and how they are fundamentally new or further developed. Against this backdrop, the use of AI-based systems enables not only the data of today but also the decisions of tomorrow to be made on a sound basis [5, 6].

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In this context, Artificial Intelligence also directly impacts entrepreneurial activities and changes them long-term [7, 8]. However, it is not just about automating tasks and implementing innovative business processes and models that previously required considerable human interaction. Rather, it is also about taking on complex, cognitively demanding tasks as part of the actual development of innovative business processes and models themselves [9, 10]. This data-driven evolution raises questions about idea realisation and leaves room for discussion about the generativity of AI as a driving force for creative idea development [11, 12].

Thanks to the use of AI, companies and entrepreneurs are increasingly able to develop new products and services optimally tailored to customers' needs [13]. Data-driven analysis using AI also enables the identification of new market opportunities and the development of new business areas [14]. The integration of AI into Entrepreneurship marks a decisive phase in which innovative development as value creation is increasingly data-based and influenced by AI [15]. AI has not only revolutionised operational processes, strategic planning and the associated decision-making but will also be fundamentally responsible for how companies and entrepreneurs develop and implement new business ideas in all sectors and industries in the future [16, 17].

However, although AI is increasingly being integrated into business processes, there is still a significant knowledge gap regarding its concrete contribution to business value creation [16, 18-22]. There is a lack of comprehensive theoretical frameworks that explain how AI transforms creative ideas into commercially viable entrepreneurial activities. As a result, there are also only a limited number of empirical studies investigating the practical impact of AI on entrepreneurial decision-making processes, strategy development and business growth [23-25].

This article aims to provide an initial approach for a theoretical framework and analyse the influence of AI on entrepreneurial decisions. In particular, the following research questions are addressed:

1. Can an AI take over the creative development process for a new entrepreneurial idea and thus become active in the sense of Schumpeter's Creative Destruction?
2. Can an AI, in this sense, not only support a "Human Entrepreneur" in his actions but even become an "Artificial Entrepreneur" itself?
3. What framework conditions, limitations and research questions should/must be considered in developing an AI into an independent entrepreneurial entity ("Artificial Entrepreneurship")?

The following explanations are intended to answer these research questions by first fundamentally addressing the areas of AI's influence on the entrepreneurial decision-making process (Intrapreneurship vs. Entrepreneurship). Building on this, an initial general framework for Decision-Making Processes with Artificial Intelligence will then be presented based

on a literature analysis. This general framework will then be transferred and expanded into a special framework for entrepreneurial processes with Artificial Intelligence as a basis for "Artificial Entrepreneurship". An accompanying discussion rounds off the presentation.

## 2. Entrepreneurial Decision-Making Processes

Decision-making is one of the fundamental disciplines of both human life and business [26, 27]. It is, therefore, not surprising that research in various fields is receiving a great deal of attention to understand how we make decisions, what factors influence decisions, and how decision-making could be improved in the future [28, 29]. Considering the importance of decision-making in business, the discipline of entrepreneurial decision-making processes plays a crucial role in innovation development - inside and outside of an already existing company - and is highly influenced by the actors involved (intrapreneurs, Entrepreneurs) as well as the operational and strategic perspectives [30, 23, 15]. Furthermore, in the modern, globalised and digitalized economy, it is obvious that information and data already play a crucial role for existing and new companies [31]. It has become a production and competitive factor that directly or indirectly influences management and (entrepreneurial) decision-making [32], p. 56 ff. Competitive pressure and the increasing availability of new technologies, which further increase the availability and quality of data, have led to the implementation of data in the decision-making process, which is referred to as "data-driven decision-making" [33].

Given the rapid global increase in information and data within and outside the corporate world, this "data-driven decision-making" will play an increasingly important role in existing and future business activities [34]. However, with the increasing availability of data, it is also becoming increasingly difficult to maintain an overview of the data and to make decisions on this basis [35, 36]. One possible way to process the enormous amounts of data and overcome the previous limitations of information technology (IT) in collecting, processing and analysing it is the use of Artificial Intelligence (AI). There are many definitions of AI in the specialist literature, meaning there is no standard definition in the narrower sense [37]. The term was first used in a proposal for a research project on this topic by McCarthy et al. [38]. Their understanding of AI was quite broad and aimed at the simulation of human intelligence by machines. A modern interpretation by Kaplan/Haenlein [13], p. 17 defines AI as "the ability of a system to correctly interpret external data, learn from that data, and use what it learns to achieve specific goals and tasks through flexible adaptation". However, as one of the most important but also most complex applications of AI, advances in the capabilities of AI systems are increasingly highlighting the benefits of the technology for decision-making [39].

Today, AI research in this area is in a very dynamic state and is being driven forward by many companies and research institutions. This involves not only the further development of existing methods but also the development of new approaches that enable AI to be used in more and more application areas, particularly in existing companies, but also for future companies for operational and strategic tasks [40]. In this context, the use of AI will influence many theoretical and practical areas of business. In the field of marketing, AI will be able to identify new correlations and patterns in customer analysis and predict customer behaviour. AI will also be able to analyse the behavioural patterns of competitors better and derive strategies for its own positioning. In addition, AI will be able to analyse better and thus optimise production and organisational processes. Accordingly, AI will have a general influence on almost all scientific theories through the following aspects: Data analysis, prediction and simulation, discovery of correlations and an increased consideration of rationality.

Against this background, the influence of AI on decisions in the context of the creative and innovative development of new ideas in the context of Intrapreneurship and Entrepreneurship has, of course, long been considered [17, 15, 41]. Together with the basis of general digitalisation, the growing availability, and rapidly increasing possibilities for the evaluation of data by humans and machines, many new Digital Innovations and new Digital Business models and processes have emerged, especially in recent times [32]. From the point of view of the associated entrepreneurial decisions, this development can take place both within an existing company as so-called Digital Intrapreneurship or outside it by founding a new start-up as so-called Digital Entrepreneurship [42, 43]. In both areas, AI can and will help people to develop ideas and make entrepreneurial decisions by analysing the relevant data. However, can AI also replace humans in this task?

Kollmann/Kleine-Stegemann [41], in particular, have already raised this question of the extent to which an AI can one day take over the intrapreneurial/entrepreneurial decisions for “creative destruction” in the sense of Schumpeter. These decisions relate to a new combination of production factors that are implemented in order to displace and ultimately destroy old structures [44]. Against this backdrop, this creative destruction is triggered in particular by innovations that are identified, developed and implemented on the market by the Entrepreneurs/Intrapreneurs [45]. Accordingly, the person - here in the form of the Entrepreneur or intrapreneur - is the source of the innovation with the idea behind it [46].

However, if Artificial Intelligence (AI) continues to replace humans and take over more and more creative tasks thanks to self-learning algorithms, then the question must inevitably be asked as to whether creative destruction will not also be taken over by a machine in the future [16, 41]. AI systems can already analyse a business plan with regard to the probability of success of the idea or innovation described better than a human analyst in a venture capital company [47, 48]. It can, therefore, only be a matter of time before an AI system can

also develop the idea or innovation for a business plan better than the actual intrapreneurs/Entrepreneurs themselves and when the “business opportunities” will be better calculated by a machine than developed from a human's gut feeling/instinct in the future [41]. So will AI take over the “creative destruction” of Schumpeter in the future, and will humans only be managers of spin-offs (Intrapreneurship) or start-ups (Entrepreneurship) - especially in the area of digitisation?

## 2.1. Decision-Making Processes in Intrapreneurship

With the advent of information technology (IT), its impact on decision-making processes and decision-making in a company was raised to a new level [49], p. 81 f. Information technology can be defined as “computer-based technology for storing, accessing, processing and communicating information” [50], p. 284. One of the earliest empirical studies on the use of IT in decision-making by Molloy/Schwenk [50] concluded that IT improves both the efficiency and the effectiveness of the operative and strategic decision-making process. With reference to the original sequential decision-making process of Simon [51], there have subsequently been numerous adaptations of the relevant theoretical considerations, especially with the addition of information technology, e.g. [52-54].

Further, empirical research has shown that companies that use data-driven decision-making outperform their competitors on a financial and operational level. Therefore, it has long been argued that data-driven companies tend to make better decisions [34, 55, 56]. However, the use of data by humans also has its limits. Alharthi et al. [57] collected some of the barriers to big data and categorised them into three types: In addition to “organisational barriers” related to culture and “human barriers” related to a lack of digital skills, “technological barriers” related to the complexity of data also play a significant role. Accordingly, conventional information systems can and will reach their limits [32]. This is precisely where systems with Artificial Intelligence (AI) will be used now and in the future. One particular aspect of Artificial Intelligence is machine learning. Samuel [115] defined it fundamentally as a field of research that enables machines to learn without being explicitly programmed. This ability thus enables knowledge generation based on experience. Machines can be fed with existing data sets (experience), evaluate them and draw optimal conclusions based on a developed function. The results derived from this can be used in the context of Intrapreneurship respectively Digital Intrapreneurship, for example.

The aim of (digital) Intrapreneurship is to support an organisation's existing employees in developing and scaling their own (digital) ideas [58, 59]. The term was first mentioned by Gifford Pinchot [60], who generally defines intrapreneurs as dreamers who act and assume responsibility for developing innovations of all kinds within companies. Intra-

preneurship as a bottom-up approach, therefore, focuses on the employees themselves as creative individuals who want to develop new ideas and thus also their company and drive innovation [61]. As this development nowadays generally relates to existing data and also usually focuses on digital developments, this is also referred to as “Digital Intrapreneurship” [42], p. 441 f.: This describes both the innovative use of digital technologies (especially Artificial Intelligence) to adapt and expand existing business models and processes as well as the development of new Digital Innovations as the basis for future Digital Business models and processes for the benefit of their employer.” In this context, it is possible that this development could also lead to new companies in the form of spin-offs [62].

Kollmann et al. [49] have already outlined in this context that Artificial Intelligence in this area comes into play, particularly in the task of “exploitation” in the context of existing business. In this area, the aspect includes, in particular, the refinement and (innovative) improvement of existing business processes, routines and structures [63, 64]. Exploitation is, therefore, more of an incremental approach to Digital Innovation and digital value creation. The particular advantage of using Artificial Intelligence in the context of Digital Intrapreneurship is the existing data basis for the currently existing business. If the decisions for exploitation are also made on the basis of this data, then an AI could come to the right conclusions just like a human intrapreneur. Even if AI applications currently still fall short of expectations, they have helped the companies using them to achieve higher productivity and profits through improved decision-making [65-67].

In searching for a theoretical framework for using AI applications in companies, Edwards et al. [66] examined the role of AI expert systems and their respective effectiveness at different organisational levels. Their results show that Artificial Intelligence can replace decision-makers at an operational and tactical level, while at a strategic level, it (still) only plays a supporting role. Kollmann et al. [3] come to a similar conclusion and, in the context of “Artificial Leadership”, speak of a replacement of humans by a machine for exploitation in the existing business, which not only makes the decision but also enforces it as an instruction for humans. They even go one step further and argue that Artificial Intelligence can also take on the role of an intrapreneur in the context of strategic development in order to take over exploration for the existing business - including the decision to establish a new innovation development via a spin-off [49].

## 2.2. Decision-Making Processes in Entrepreneurship

What may be more likely to work within the company due to the more or less existing database and the use of Artificial Intelligence does not necessarily apply to (digital) Entrepreneurship. The reason for this is, on the one hand, the perhaps non-existent data basis for developing completely new ideas

and innovations detached from previous activities. On the other hand, the question can/must be asked whether Artificial Intelligence can also be used for a completely new innovation business based on “exploration”. Exploration initially addresses the creation of space and time in order to enable the innovation process by humans in the context of finding ideas and solutions [68]. The result here is the partial or complete reconstruction of processes, products or business models through the creativity of people as Entrepreneurs. However, an analysis in this regard only makes sense if the considerations also here relate to a field where data for Entrepreneurs and the use of AI is available at all. As with “Digital Intrapreneurship”, this would be most likely possible in the area of “Digital Entrepreneurship”.

“Digital Entrepreneurship” respectively describes the act of establishing new companies, specifically in the Digital Economy [69, 43, 70]. It is a positive development that the topic of “Digital Entrepreneurship” receives increased attention e.g., 7 [71] as research in this important field enhances knowledge. At this point, however, it must be noted that several recent studies mistakenly regard “Digital Entrepreneurship” as a newly emerging field e.g. [72-74]. In so doing, these contributions neglect previous research contributions on this topic, which clearly laid the foundation for all subsequent considerations and discussions [75, 76]. Thus, the assumption that the research field of “Digital Entrepreneurship” is a new phenomenon must be disagreed with and Kollmann et al. [75] also demonstrate this through a content-related literature analysis by tracing the roots, definitions and content of “Digital Entrepreneurship” back to the terms used much earlier, such as “E-Entrepreneurship”, “Internet Entrepreneurship” or “Technopreneurship”. The content has remained the same, and yet some authors - e.g. Kraus et al. [77] or Fernandes et al. [78] still try to position “Digital Entrepreneurship” knowingly or unknowingly as a “new discipline”, which is not true.

What is true, however, is the fact that data plays a special role in the development of digital value creation, particularly in the field of Digital Entrepreneurship. As early as 2006, Kollmann [69], p. 333 speaks of “establishing a new company with an innovative business idea within the net [digital] economy, which, using an electronic [digital] platform in data networks, offers its products and/or services based upon a purely electronic [digital] creation of value. Essential is the fact that this value offer was only made possible through the development of information technology.” Accordingly, two aspects come into play here: firstly, the use of information technology, which today also includes Artificial Intelligence. Secondly, the process of digital value creation by the Entrepreneur for the development of new Digital Business models and processes, which can form the basis for founding a company [42]. It is therefore obvious to examine the influence of Artificial Intelligence also, in particular in the area of “Digital Entrepreneurship”, because only here is the data the origin of value creation, with which both a person must work or Artificial Intelligence can work at all.



Against this background, (digital) Entrepreneurs also have to make a large number of decisions, which in turn are influenced by many aspects and framework conditions, as well as the person of the founder itself. Shepherd et al. [79] have compiled an overview of this, structured the literature on this topic and differentiated between Opportunity Assessment Decisions, entrepreneurial Entry Decisions, Decisions About Exploiting Opportunities and entrepreneurial Exit Decisions. In the beginning, and thus as the first important step, the Opportunity Assessment Decisions for starting a new venture are certainly at the centre of attention. A [Business] Opportunity is at the core of Entrepreneurship, so understanding how Entrepreneurs arrive at decisions relating to opportunity recognition and evaluation is critical to advancing our knowledge of the field as a whole [80, 81]. A comparison between a human's decision and an Artificial Intelligence's decision to answer an opportunity assessment decision as a starting point for an innovative idea for Digital Entrepreneurship is certainly the most exciting task.

Cockburn et al. [12] suggest against this background that AI is leading to a new "innovation playbook" that leverages large datasets and learning algorithms to precisely predict phenomena. Giuggioli/Pellegrini [19] provides a good overview of the literature on how AI can positively influence (digital) Entrepreneurship in terms of opportunity, decision-making and performance. For Chalmers et al. [18], it is, therefore, "logical to assume that such datasets and algorithms could be turned towards entrepreneurial opportunity identification." This "Entrepreneurial opportunity identification" as the basis of "Opportunity Assessment Decisions" is often linked to the question of whether an AI can really carry out a genuine exploration for an innovation business or can only help the Human Entrepreneur to discover it better [49]. Exploration refers to discovering and developing new resources, capabilities, and technologies to create new products or services that can take the company into new markets or appeal to new customer groups [63, 64]. Exploration is a more radical approach to Digital Innovation and digital value creation.

It is precisely at this point that the literature usually gets lost in the interpretation of AI as a supporter of humans as (digital) Entrepreneurs in order to make "opportunity assessment decisions". Obschonka/Audretsch [24] mentioned that AI can empower Entrepreneurs and enable the creation of new opportunities by generating new products or services through entrepreneurial means. Furthermore, AI techniques can improve the decision-making systems of Entrepreneurs and increase the quality of decisions made in terms of their effectiveness and efficiency, thereby increasing operational performance [82]. However, based on the initial questions in the introduction (see above), the really exciting question is a different one: When and under what circumstances could an AI in the field of innovation business make better "opportunity assessment decisions", especially for Digital Entrepreneurship (because it is particularly based on data value) than humans by exploring the data available for this purpose?

There is still a conceptual research gap here, which this article aims to address.

This central research question - quasi as a general summary of the initial questions in the introduction (see above) - can also be further differentiated: Will "opportunity assessment decisions" and, thus, business opportunities in the future be better calculated by a machine and not developed from the knowledge, creativity or intuition of a human? Will AI systems dictate where Entrepreneurs or perhaps only "startup-managers" should be active? Will there consequently only be "Artificial Entrepreneurship", where these "startup-managers" will only implement the ideas and innovations generated by an AI system with the associated market gaps, but will no longer develop them themselves? To answer these research questions, this article aims to create an initial framework that pursues two objectives: First, to illustrate the development of AI for decision-making (also in the context of Digital Entrepreneurship) and second, the consequences that can be derived from this for the future of entrepreneurial decision-making specifically in Digital Entrepreneurship. The structure of the framework follows the development of a logical and coherent model to explain the results of the associated literature review. Research into the influence of AI on business decisions is extremely important because AI will fundamentally change how ideas and startups with associated innovative business processes and models are organised in the future. And if AI not only supports the founder but can also partially replace them, then we must fundamentally rethink and communicate the Entrepreneurship of the future.

### 3. The Framework for Decision-Making Processes with Artificial Intelligence

The increasing amount of data and the rapidly growing possibilities of processing data enable an increasingly better machine imitation of human thought and behaviour patterns. In 1950, Alan Turing posed a supposedly simple question in his essay "Computing Machinery and Intelligence": Can a machine think? Turing [83] developed a simple practical test to show whether a computer can simulate human behaviour. The test later became known as the "Turing test" and states that a machine has passed the test if a human counterpart asking written questions cannot recognise whether the written answers come from a human or a computer. In 2023, ChatGPT-4 had the same number of parameters as the number of neurons in the human brain. So, it is hardly surprising that ChatGPT has now made history by becoming only the second chatbot ever to pass the Turing test. It did this, according to a report by Jalalow [84], by "tricking a jury into believing it was human. This was achieved through a combination of natural language processing, dialogue management and social skills. ChatGPT's performance in the Turing test was impressive. In a series of tests, it could converse with human raters and convincingly mimic human-like responses. In some cases, the

evaluators could not distinguish ChatGPT's responses from those of a human."

Hardly a day goes by now without AI systems such as ChatGPT, Gemini, Llama & Co. breaking through new boundaries and presenting new capabilities that come ever closer to the capabilities of humans in terms of thinking and acting (also in terms of making decisions). These decisions, which are already supported by AI today, but can also be decided in some cases, include both operational and strategic decisions [40, 3]. Operational decisions concern the daily and, therefore, short-term processes and activities of the new or established company. These can include decisions on the recruitment of employees, the selection of suppliers or the definition of production processes. Other examples of operational decisions are the planning and implementation of marketing campaigns, the pricing of products or the improvement of customer service processes.

Strategic decisions, on the other hand, tend to concern the long-term goals and future direction of the new or established company. These can include decisions on the development of new products (Intrapreneurship/Entrepreneurship), the development of new markets or the expansion of the company portfolio. Other examples of strategic decisions include defining corporate values and culture, setting budgets, acquiring other companies or relocating a company's headquarters. Based on Turing's thinking, the question is now often asked when and whether Artificial Intelligence will not only be able to "think" like a human being but also translate this into "creativity" for decision-making for operational and strategic decisions (in the context of Intrapreneurship/Entrepreneurship). Scientists distinguish between different types of creativity [85]: "It can be briefly summarised that AI applications using large amounts of data can be particularly convincing when it comes to formative creativity. Against this background, this includes the combination of existing elements or the imitation of a certain style."

However, AI reaches its limits when it comes to leaving a given conceptual space and transcending existing rules. However, there are (still) hardly any well-functioning AI applications for this transformative creativity [86]. The formative creativity of an AI seems to be sufficient for the exploitative task (improvement and development of an existing company towards Digital Intrapreneurship), and the transformative creativity might become sufficient for the explorative task (further development of an innovation company towards Digital Entrepreneurship) in the near future [49]:

1. Formative creativity refers to the type of creativity that involves refining, developing or improving existing ideas or concepts (exploitation). It is an iterative process in which existing solutions are modified and optimised to find the best possible solution to a specific problem. Formative creativity is often applied in design, engineering or technology environments to improve products or solutions that meet user requirements and fulfil their needs. This approach can also lead to the development or discovery of new processes and products (exploration).

2. Transformative creativity, on the other hand, refers to the kind of creativity that involves creating new, ground-breaking ideas or concepts that break the mould of what was previously possible. While this is necessary for true "exploration", it is also absolutely essential for the transition to true "disruption". Only in this way would AI succeed in a disruptive process in which fundamentally new solutions are found for problems that were previously considered unsolvable or were not even recognised as problems. Transformative creativity today is often found in art, music, literature or philosophy environments, where the aim is to push the boundaries of understanding and explore new ideas.

Overall, it can be summarised once again that formative creativity is geared more towards incremental improvements (especially exploitation; particularly relevant for Digital Intrapreneurship), while transformative creativity is aimed at radical changes (especially exploration and disruption; particularly relevant for Digital Entrepreneurship). Exploration and, expressly, disruption represent the transition from formative to transformative creativity through AI and are still the greatest challenge, at least for the time being. With this in mind, we must now look at the individual forms of AI and relate them to the respective characteristics of formative and transformative creativity for decision-making in the context of Digital Intrapreneurship (especially exploitation) and Digital Entrepreneurship (especially exploitation/disruption). These AI forms can be divided into "weak AI" (Artificial Narrow Intelligence), "strong AI" (Artificial General Intelligence) and "super AI" (Artificial Super Intelligence).

### 3.1. Artificial-Narrow-Intelligence (Exploitation)

Artificial Narrow Intelligence (ANI), sometimes referred to as "weak AI" or "narrow AI", is a form of Artificial Intelligence that is designed to solve specific tasks within a limited context [87]. It, therefore, concentrates on narrowly defined tasks such as recognising images, translating texts or driving cars. ANI systems are based on machine learning, which enables them to learn from large amounts of data and make decisions based on probabilities [88, 89]. Specialised algorithms are used for this purpose and are tailored to the respective area of application. Examples of ANI systems include Siri from Apple, the voice control system that runs on iOS devices, and Amazon Alexa, the voice system used on Amazon's Echo devices. However, this type of AI can also be found in other areas [90].

One of the greatest strengths of ANI systems is their ability to perform specific tasks quickly and efficiently [91]. They can process large amounts of data in a short time and deliver precise results [92]. ANI systems can also deliver their results reproducibly, which ensures consistent quality of results. In addition, they can usually work around the clock and do not require breaks or vacations - unlike real employees. However,

there are also some disadvantages of ANI systems [93, 94]: ANI systems are only designed to solve specific tasks and are therefore generally unable to deal with complex problems or situations that lie outside their defined area of application. Furthermore, ANI systems cannot be creative or generate new ideas. They can only access existing data and algorithms and make decisions based on this information. Against this background, an application in the field of Entrepreneurship appears possible only as support for the digital intrapreneurs of a company because they can use more or less existing data from the past also for the development of innovation.

So, starting with digital exploitation refers to the use and improvement of existing resources, skills and technologies in order to improve and optimise existing products or services with the help of AI and to increase efficiency [3], p. 59: "Exploitation is, therefore, more of an incremental approach to continue, but also to improve (innovative approach) a digital value creation. Examples of exploitation in practice are a car manufacturer that improves its existing models by implementing new innovative digital technologies and features in order to remain competitive or a bank that optimises its existing products and services, such as loans and accounts, through innovative digital processing and better customer service in order to increase customer loyalty."

In this context, exploitation means that existing knowledge or proven strategies are more likely to be used for Digital Intrapreneurship in an innovative way to maximise the immediate benefit or profit of the existing business. entrepreneurial activity is included here when new processes are developed via the innovative route, which is also used as the basis for spin-offs. In this respect, the company uses options that are already known and proven first because they are known to be successful or beneficial. The use of AI is intended to reinforce this, and the associated applications also look for innovative ways to develop the already known options further. This does not mean that an ANI system cannot also be used for Digital Entrepreneurship, but it does mean that there are higher requirements for the creative development of (completely) new business ideas and models with the associated innovative digital products, processes and platforms. Nevertheless, the digital intrapreneur can also gain new food for thought for innovative developments from the results of the AI. However, human beings remain in the driver's seat regarding entrepreneurial action and the associated decisions. Accordingly, the following can be stated at this point (see Figure 1):

*Artificial-Narrow-Intelligence (ANI) for Digital Intrapreneurship in the Existing Business with the use of the Formative Creativity*

1. Optimization: AI can be used to optimise existing processes by analysing data and identifying patterns that lead to more efficient workflows.
2. Automation: AI can simplify existing workflows through automation by taking over repetitive tasks and freeing up human resources for more important activities.

3. Maximization: AI can dynamically adjust prices by analysing market trends and consumer behaviour in order to increase sales without having to enter new markets.

These Points for a kind of "Artificial-Intelligence-Exploitation" (see Figure 1) are among the reasons why this form of AI still differs from natural, generally intelligent systems such as humans, which have a far-reaching ability to self-adapt to changing goals or circumstances. The influence on Entrepreneurship is accordingly still small and at best, can only be interpreted as a support (tool) for an Intrapreneur because this form of AI would need additional "transfer knowledge", in which results/findings can be transferred from one goal or context to another [95] - maybe also for an intrapreneurial activity. But a "weak AI" cannot do this transfer alone, which brings us to the difference and transition to a "strong AI".

### 3.2. Artificial-General-Intelligence (Exploitation/Exploration)

Artificial General Intelligence (AGI), sometimes referred to as "Strong AI" or "Wide AI", is a form of AI that is designed to achieve a variety of goals and perform a variety of tasks in a variety of different contexts and environments [96, 97]. It should, therefore, be able to generalise the knowledge it acquires in order to transfer this knowledge from one problem or context to others [95]. Against this background, AGI is designed to solve complex problems and learn independently to adapt to new situations and cope with unforeseen events by drawing on a wide range of knowledge and experience [98]. An example of AGI would be a machine that is able to understand and respond to human emotions and social interactions. Such a system would be able to navigate a variety of situations and understand human behaviour in a way that is comparable to a human brain. Another example would be a machine that is able to understand and speak natural language without the need for specially written programs or scripts.

There are currently no actual "real" applications of Artificial General Intelligence (AGI) in practice, as the goal of achieving human-like general intelligence has not yet been achieved. Most AI applications we see today are based on "Narrow AI", which is specialised for specific tasks. However, there are some research projects and developments that focus on the development of AGI. For example, the OpenAI team is working on the development of AGI models (ChatGPT-5) that are able to solve a wide range of tasks and adapt to new situations by drawing on a variety of knowledge and experience. Another group, GoodAI, focuses on the development of AGI systems that are able to achieve human-like intelligence in all aspects by drawing on artificial neural networks and other technologies.

Should a "real" Artificial General Intelligence (AGI) system ever exist, this could have various effects in different areas: An AGI system would be able to solve complex problems and make decisions based on a variety of data sources and information [98]. An AGI system could also be used to



facilitate or automate human work by taking over processes and tasks that are difficult, dangerous or impossible for humans [99]. Against this background, a “strong AI” is not dependent on human programming to think or perform tasks. An AGI can react to different environments and situations and adapt its processes accordingly. These are characteristics typically associated with the human brain, such as common sense, background knowledge, transfer learning, abstraction and causality [100]. Against this background, an application in the field of Entrepreneurship can now address several directions for the first time. On the one hand, both an exploitation (already discussed above) and now also an exploration perspective for a digital intrapreneur to expand the existing business or develop an innovation business as part of a spin-off, and for the first time an exploration perspective for a digital Entrepreneur to develop an innovation business as part of a start-up.

So, starting now with digital exploration for both sides (Intrapreneurship and Entrepreneurship), this refers to the use of (internal/external) data resources, digital skills and digital technologies in order to build up new digital products, services or platforms with the help of AI [3] p. 59: “Exploration is a more radical approach to building digital value creation for the future Digital Innovation business. Examples of exploration in practice are a tech company investing in developing new technologies such as Artificial Intelligence or blockchain to create innovative products or services for new markets or a food-startup using AI to identify alternative blends of food supplements.” In the area of digital exploration, AI can be very helpful in discovering new opportunities, strategies and patterns for future business processes and models from internal and external data. As described above, this future business or future innovation business can then lead to both a spin-off (Intrapreneurship) and a start-up (Entrepreneurship). In both cases, AI analyses the development of new paths and ideas that are often accompanied by uncertainty and incomplete information. In this context, AI helps to analyse existing internal and external data, identify trends and test hypotheses to uncover long-term opportunities.

AI can analyse large amounts of data and identify patterns or correlations that are difficult to access or unexpected for humans. This helps to identify new opportunities or risks. In research and development, for example, AI can search scientific literature or research data to discover correlations or new trends that could be relevant for developing innovative products or services. AI can also be used in the creative field to create new ideas, art forms or content that did not previously exist. AI systems such as DALL-E (for image generation) or GPT models (for text generation) can, for example, create new works of art, literary works or pieces of music that can be seen as creative exploration of new forms of expression. AI can help open up new product ideas or markets by identi-

fying user preferences, market gaps or technological innovations. Companies such as Netflix or Spotify, for example, use AI to analyse trends in their customers' usage behaviour and develop recommendations for new series, films or music genres. This pattern recognition makes it possible to identify emerging trends at an early stage to promote new creative content in a targeted manner.

Against this backdrop, AI can be used in the area of exploration by both established (Digital Intrapreneurship) and new companies (Digital Entrepreneurship) primarily to discover new opportunities, open up unknown markets or technologies, develop new business models and gain groundbreaking insights in various scientific disciplines. The point of reference is, therefore, the innovation business that does not yet exist and for which not all the data is available. The AI then helps to analyse the more or less existing internal data, combine it with other external data and generate hypotheses, recognise unknown patterns and drive innovation, which brings long-term benefits for companies and founders. Accordingly, the following can be stated at this point (see Figure 1):

*Artificial-General-Intelligence (AGI) for Digital Intrapreneurship/Entrepreneurship for the Existing/Innovation Business with the use of Formative/Transformative Creativity*

1. Development: AI can analyse large amounts of data and identify patterns or correlations that are difficult for humans to access or unexpected. This helps to identify new opportunities or risks.
2. Conception: AI can also be used in the creative sector to create new ideas, art forms or content that did not previously exist.
3. Innovation: AI can help to open up new product ideas or markets by identifying user preferences, market gaps or technological innovations.

These Points for a kind of “Artificial-Intelligence-Exploration” (see Figure 1) are among the reasons why this form of AI is already closer to a natural, generally intelligent systems such as humans, which have a far-reaching ability to self-adapt to changing goals or circumstances. The influence on Entrepreneurship is accordingly larger and can now be interpreted not only as a support (tool) for an Intrapreneur/Entrepreneur but also as an independent source for entrepreneurial activities and decisions because this form of AI could have “transfer knowledge” in which results/findings can be transferred from one goal or context to another [95] - maybe also for an intrapreneurial activity. This still leaves the question of the decision-making and implementation sovereignty or the actual degree of innovation for the results of the intrapreneurial activity of man or machine.



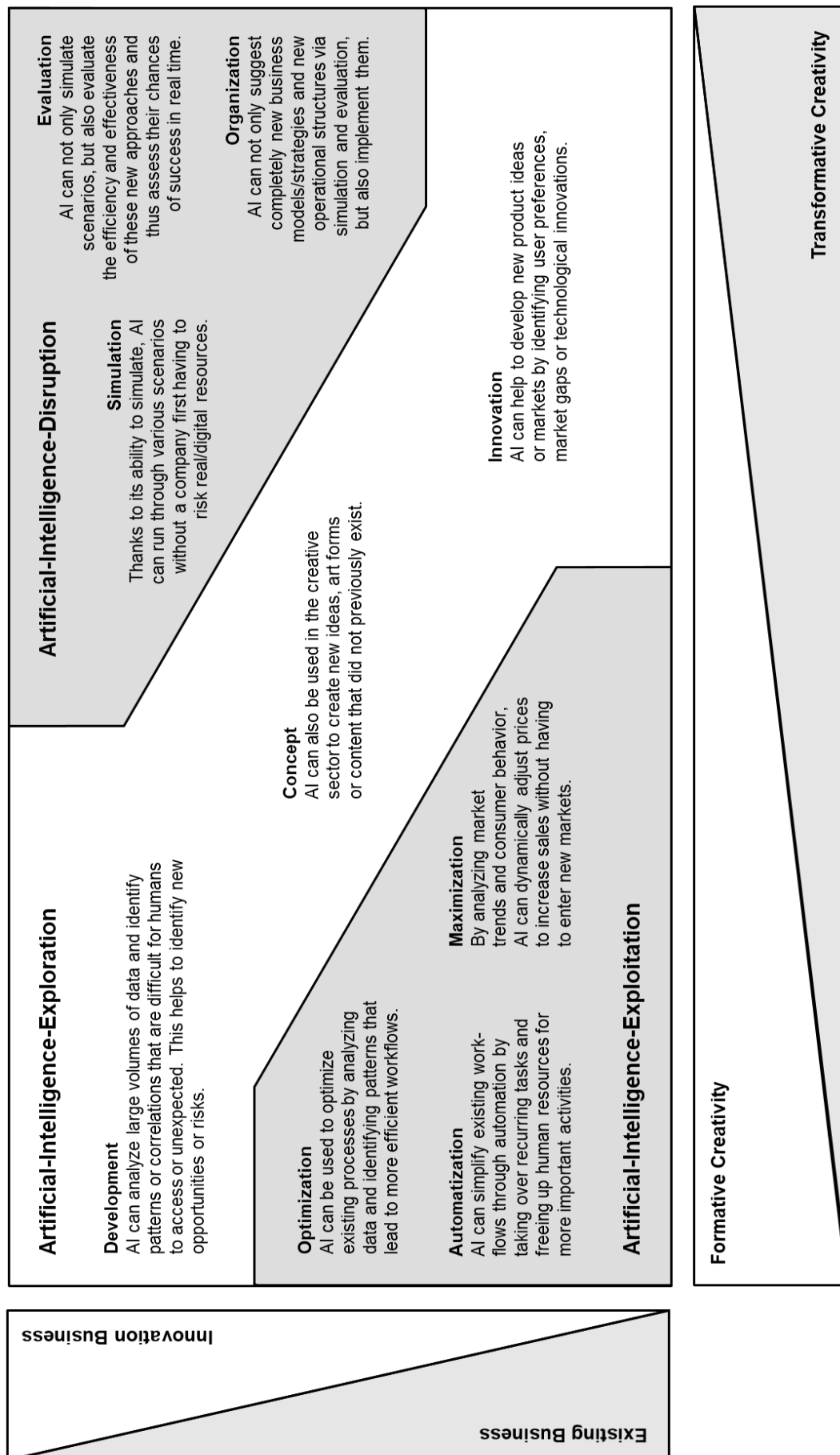


Figure 1. The Framework for decision-making Processes with Artificial Intelligence.

### 3.3. Artificial-Super-Intelligence (Exploration/Disruption)

Artificial Super Intelligence (ASI), sometimes referred to as “super AI”, is a form of Artificial Intelligence (AI) that is designed to surpass human intelligence in all aspects [101]. It would be cognitively superior in areas such as problem-solving, creativity, decision-making, and emotional intelligence and would potentially surpass human capabilities in many other disciplines as well [102, 101]. A “super AI” could independently find novel solutions and insights that humans cannot imagine without a conscious or unconscious human impulse or request/task. This would not only give AI an enormous knowledge advantage but also the ability to improve itself autonomously [103]. The result is a “super intelligence” that may progress so much that it becomes incomprehensible or unpredictable for humans. In some science fiction scenarios, this “super intelligence” even leads to humans being controlled by AI in all respects or humanity being “managed” by machines.

The term “technological singularity” is often used in this context [104]. This term refers to the hypothetical point in the future at which technological development - particularly in the field of AI - is so advanced that it undergoes an explosive acceleration [105]. This is described as a moment when AI surpasses human intelligence, thus becoming “super AI” (ASI) and independently capable of developing more advanced versions of itself, but which could lead to unpredictable and radical changes in society from the perspective of AI sceptics. If you look at the predictions of AI experts as to when we will reach the singularity, most of them are still between 20 and 30 years away from their forecasts [106]. For some, this is still enough time to control and regulate this development in order to implement AI laws or AI bans. For others, it is too late to stop the rapid development of AI technologies.

However, if an ASI is able to perform any cognitive task that a human can perform better at a higher level, then this also means that an AI will be able to make better opportunity assessment decisions for Digital Intrapreneurship and Digital Entrepreneurship. Accordingly, a “super AI” would have a superhuman consciousness to make much better operational and strategic Entrepreneurship decisions completely autonomously than any human ability to make such decisions. Accordingly, one can/must now consider the effects of Artificial Intelligence on the exploitation, exploration and ultimately also the disruption of a creative act in the sense of Schumpeter for “opportunity assessment decisions”.

In the area of Digital Intrapreneurship, this would mean, on the one hand, that the AI would independently decide in the context of exploration which innovative ideas or associated new technologies or products the company would develop further in the future or found a new associated spin-off. Initial approaches are already being discussed in this context in the context of “Artificial Leadership”. According to Kollmann et al. [49], p. 89, the term describes “a style of leadership in

which a machine (in the best case as an AI) not only obtains the required data via a Big Data approach (Digital Source), but can also evaluate it independently with the associated algorithms via a deep learning approach (Digital Analysis) and finally the results which emerge, are also accepted as an order for action by humans via a Data-Driven approach (Digital Decision).” The people in the company then only implement the machine's instructions. The first examples of this in practice already exist, such as the Chinese company Net-Dragon Websoft, which has appointed Tang Yu (name of the AI) as the company's CEO [107].

In the area of Digital Entrepreneurship, on the other hand, this would mean that the AI would decide independently as part of the exploration process which innovative ideas or associated new technologies or products for a new business start-up would be implemented. The more radical the idea, business model, or process is, the more disruptive changes AI as an “Entrepreneur” would lead to in the market. In this context, disruption means that existing products, processes or platforms are completely replaced by new technologies or business models, which corresponds to Schumpeter's idea of destruction in its original form. In this case, people are also only implementing the instructions of the machine. Artificial Intelligence, such as “Super AI,” can then detect, evaluate, and accelerate such disruptive changes by enabling solutions and approaches not previously pursued, replacing conventional methods, strategies, and procedures and thus creating new products or markets for a company. However, this will only be possible if Artificial Intelligence is granted the highest form of transformative creativity (see above):

1. In this scenario, an AI can simulate various scenarios without a company having to risk real/digital resources first. These simulation processes are based on (hopefully) large and relevant amounts of data in order to test possible future options in a safe environment. One example would be an AI that simulates a company's entry into a new industry by analysing potential risks and opportunities based on historical data, market trends and innovative technologies. It could identify new markets that were previously undiscovered or niche markets that could be disrupted by a particular innovation.
2. In this scenario, an AI can not only simulate scenarios but also evaluate the efficiency and effectiveness of these new approaches. Through machine learning and in-depth data analysis, the AI can evaluate different strategies and their chances of success in real-time. By continuously learning from these simulations, AI could also provide optimisation suggestions that go far beyond human analysis, as it can consider millions of variables and scenarios simultaneously. AI could also highlight weaknesses in existing business models, leading to new business strategies that were previously unimaginable.
3. In this scenario, an AI can not only suggest completely new business models, new business strategies and new operational structures based on the knowledge gained

from the simulation and evaluation but also implement them. In this case, the entire founding and management of the company would be in the hands of an AI, which would not only make suggestions but also implement and enforce them administratively.

Against this backdrop, AI can not only be used in the area of exploration by both established (Digital Intrapreneurship) and new companies (Digital Entrepreneurship) but also to address the area of disruption, maybe particularly more in Digital Entrepreneurship. In the area of disruption, AI will be used against this backdrop to control entire companies and organise their future development at all levels. With their ability to automate processes, analyse huge amounts of data, develop new business models and drive innovative technologies, AI systems can replace traditional ways of working and human Management/Entrepreneurship: The human beings are not in the driver's seat of entrepreneurial action and the associated decisions anymore. Accordingly, the following can be stated at this point (see Figure 1):

*Artificial-Super-Intelligence (ASI) for Digital Intrapreneurship/Entrepreneurship for the Innovation Business with the use of Transformative Creativity*

1. Simulation: Thanks to its ability to simulate, AI can run through various scenarios without a company first having to risk real/digital resources.
2. Evaluation: AI can not only simulate scenarios but also evaluate the efficiency and effectiveness of these new approaches and thus assess their chances of success in real time.
3. Organization: AI can not only suggest completely new business models/strategies and new operational structures via simulation and evaluation but also implement them.

These Points for a kind of “Artificial-Intelligence-Disruption” (see Figure 1) are among the reasons why this form of AI is equal to a natural, generally intelligent systems such as humans, which have a far-reaching ability to self-adapt to changing goals or circumstances. The influence on Entrepreneurship is largest here and can now be interpreted as a replacement of a human intrapreneur/Entrepreneur, and the AI thus becomes an independent source for entrepreneurial activities and decisions because this form of AI will have “transfer knowledge”, in which results/findings can be transferred from one goal or context to another [95] - also for an intrapreneurial activity.

## 4. The Framework for Entrepreneurial Processes with Artificial Intelligence

Now that the development of Artificial Intelligence and the respective influences on decision-making in the context of entrepreneurial activity have been described, the various forms of entrepreneurial Processes with Artificial Intelligence can be described. We will no longer differentiate between

Intrapreneurship and Entrepreneurship, but rather address the relationship between humans as innovators/founders and machines as the new authority for entrepreneurial decisions, especially in the area of “Digital Entrepreneurship”. Against this background, human Entrepreneurs are characterised in particular by recognising, evaluating and benefiting from digital entrepreneurial opportunities [41]. According to Schumpeter, the “human Entrepreneur” acts in particular as an innovator by developing innovative ideas through their creative power and establishing them on the market [44]. However, if we follow the previous descriptions, then there is no getting around the idea that AI can/will/may continue to replace the actual “human Entrepreneur” through transformative creativity. and creative destruction will be taken over by a machine in the future? In this context, there are three possible scenarios for how (digital) Entrepreneurship can/could develop under the influence of Artificial Intelligence (see Figure 2):

1. Human-Digital-Entrepreneurship: Follows Joseph Schumpeter's basic principle of “creative destruction” by people in their role as Entrepreneurs. As innovators, people bring creative ideas with the corresponding innovative products to the market to change the existing structures in their favour. To do this, they must recognise business opportunities, evaluate them and exploit them for themselves. In this way, the person as a founder is the source of inspiration and the associated concept. AI, in particular in the form of an Artificial-Intelligence-Exploitation (see above), can support this but is not relevant as a Founder-Authority, so humans remain the only source of intuitive/creative destruction.
2. Human-Artificial-Entrepreneurship: However, if one follows the possibilities of Artificial Intelligence exploration (see above), then humans are fundamentally supported by AI in their role as Entrepreneurs. Although human beings remain the acting actors and thus the main Founder-Authority, they draw on the results of the AI to develop, evaluate and decide on innovative ideas, products, business models, etc. For example, there are already AI generators that develop ideas for a start-up and, after selection by a human founder, transfer them directly into an associated business plan (e.g. PrometAI or Plan Pros). In this context, humans and machines become the common source of both intuitive/creative and discursive/creative destruction.
3. Artificial-Intelligence-Entrepreneurship: If you even follow the basic principle of Artificial Intelligence disruption (see above), then you accept the fundamental possibility that a human being can be completely replaced by an AI in their role as an Entrepreneur. In this scenario, the human is no longer the acting actor and thus the Founder-Authority, but the AI determines the development, evaluation and decision on innovative ideas and specifies the associated implementation. With its self-learning algorithms, it thus takes over the making of an entrepreneurial decision and thereby determines which innovative product or innovative business model is brought to market with or in a new

company. In this context, the machine becomes the common source of discursive/creative destruction.

#### 4.1. Human-Digital-Entrepreneurship

In the context of “Human-Digital Entrepreneurship”, humans - as previously known - should establish a new and independent start-up company in their role as founders on the basis of an innovative digital idea. Although the type of business start-up is not initially tied to a specific industry, the reference to digitalisation has already been assumed and justified above to appropriately analyse the influence of the development of AI systems in this area. According to Kollmann [42], p. 21 ff., Digital Entrepreneurship is accordingly understood as “the creation of an independent and original legal business entity in the Digital Economy (digital start-up/digital venture), within which the independent founder(s) wants to meet a third-party need with a specific online offering (product or service).” In the course of this Digital Entrepreneurship, a whole series of reference points come into play with regard to the opportunity assessment decision, a few of which will now be picked out as examples in order to first describe people as the starting point for an innovative idea for Digital Entrepreneurship [42]:

1. Developing ideas for an innovative Digital Business model/process with the associated decision-making processes is the first step. This is where the Entrepreneur's (often intuitive) creative ability comes to the fore, as they have to develop a business idea based on digital value creation on the basis of real or digital observations, market needs or problems. In this context, creativity means rethinking existing real or digital concepts, finding unconventional solutions or designing new digital products/services.
2. Idea testing and subsequent idea formulation (business plan) with the associated decision-making processes is the second step. Once the Entrepreneur has developed a potential Digital Business idea, it must be subjected to a detailed evaluation to assess its feasibility and the prospects for success of its digital value creation. This is where analytical skills come into play to assess technical and financial feasibility, market potential, etc., which complement the creative process. In the subsequent business plan, the business idea is structured, and the operational and strategic steps for implementation are defined. Company strategy and objectives, market analysis and marketing strategy, financial planning and investment requirements, as well as the development and safeguarding of digital value creation, play a role here. The evaluation as part of the idea assessment/formulation ensures that the Digital Business idea is viable and provides a concrete basis for implementation.
3. The implementation of ideas with the associated decision-making processes is the third step in the activities required to found a company. The Entrepreneur assumes

the role of managing director and is responsible for the day-to-day operations and the strategic direction of the company. Among other things, he is responsible for recruiting and managing employees, monitoring finances, product development, marketing and sales as well as the growth of the company.

With regard to our research question as to who has the sovereignty or authority over the associated “opportunity assessment decisions” and thus business opportunities, the answer in this area is: the human. Whether and to what extent they can be supported by technology (including AI) is not so relevant at first because, in the end, they are the only authority when it comes to making entrepreneurial decisions. They use their intuitive, creative and conceptual skills in particular. In this context, intuition is the immediate, often unconscious grasp of contexts without conscious, logical analysis [108]. A person's usually quick and spontaneous actions are, therefore, characterised by experiences and emotions and are often difficult to justify verbally. A person's creativity also means that original, novel and effective solutions or ideas emerge from intuition, which are then transferred into corresponding concepts structured with associated strategies. As mentioned above, here human beings are in the driver's seat of entrepreneurial action and the associated decisions, so we can call it “human-driven decision-making”. Accordingly, the following can be stated at this point (see Figure 2):

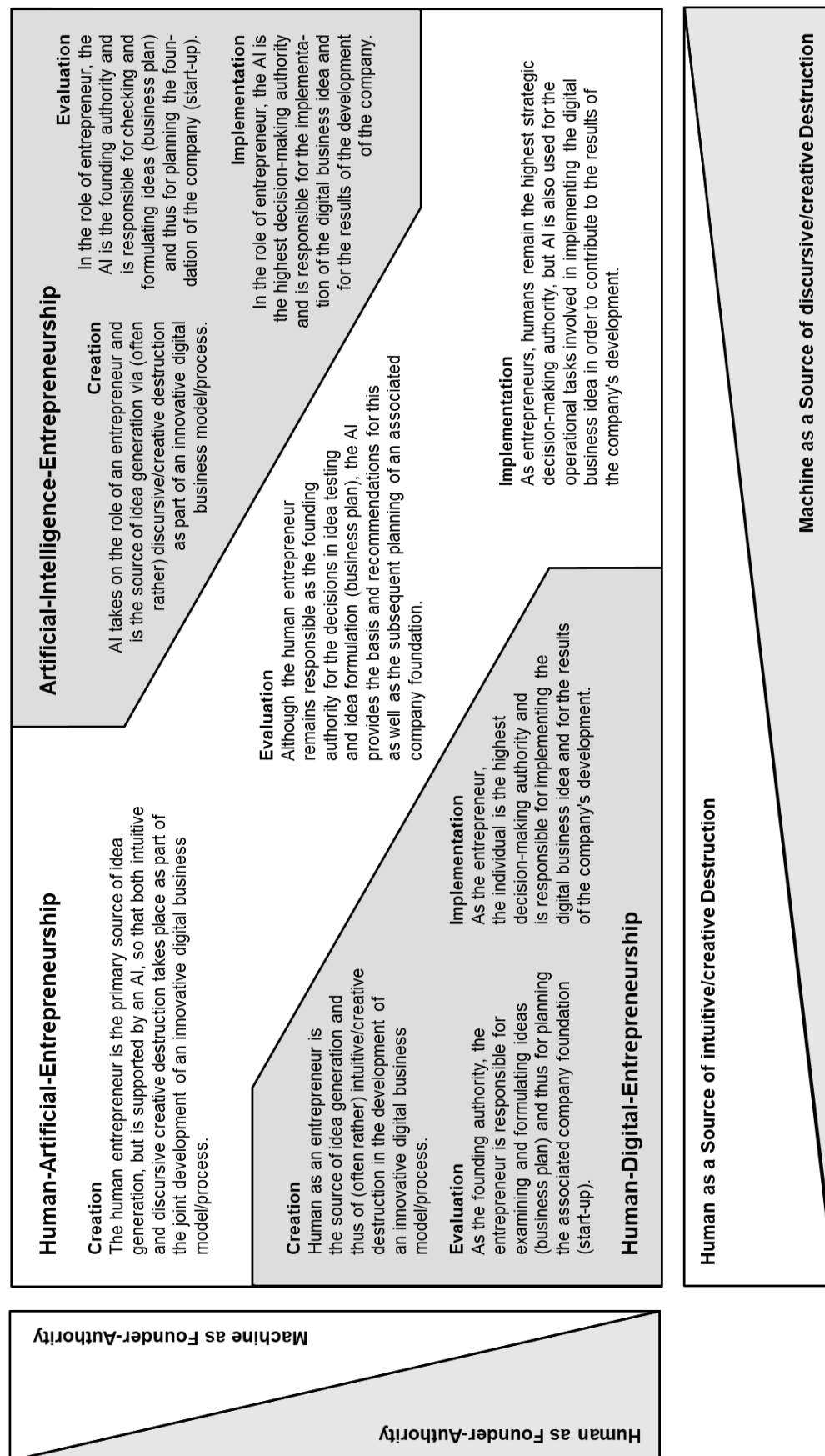
*Human-Digital-Entrepreneurship (HDE) with the  
Human as the Founder-Authority and only/relevant  
Source of Intuitive/Creative Destruction*

1. Creation: The human being as an Entrepreneur is the source of idea generation and thus of (often rather) intuitive/creative destruction in the development of an innovative Digital Business model/process.
2. Evaluation: As the founding authority, the individual Entrepreneur is responsible for examining and formulating ideas (business plan) and thus for planning the associated company foundation (start-up).
3. Implementation: As the Entrepreneur, the individual is the highest decision-making authority and is responsible for implementing the Digital Business idea and for the results of the company's development.

These Points and the general conditions (see Figure 2) lead us to a final definition in this area with regard to our research question:

*Human-Digital-Entrepreneurship (HDE) is a form of entrepreneurial activity in which the Human as the Founder-Authority (human-driven decision-making) is the only/relevant Source of Intuitive/Creative Destruction for the creation, evaluation and implementation of a new company (start-up).*





**Figure 2.** The Framework for an Artificial-Intelligence-Entrepreneurship (Artificial Entrepreneurship).

## 4.2. Human-Artificial-Entrepreneurship

In the context of “Human-Artificial-Entrepreneurship”, humans, together with the relevant support of Artificial Intelligence, founded a new and independent start-up company based on an innovative digital idea, with humans assuming their role as the only Founder-Authority. This is currently the area with the most literature on the use of AI to support founders [18-20]. AI promises in this context to revolutionise how Entrepreneurs think, conceptualise, strategise, and operationalise business ventures [17]. In this context, AI has a positive effect on the development of Entrepreneurship while opening up new opportunities for companies [19, 16, 21]. Against this background, Kollmann/Kleine-Stegemann [41] refer first of all to the “data-based support” for Entrepreneurs: findings from the data processing of an AI initially “only” serve to support the Entrepreneur in his decision-making process but do not replace him/her (Machine-follows-Entrepreneur). This means that Entrepreneurs use AI to derive well-founded operational and strategic business decisions from the value of data [109], which should/can lead to increased business performance [110]. This support-function could include (in an abstract form), for example [19, 41]:

1. Support for idea development: AI (together with big data) can act as an external driver for new entrepreneurial activities.
2. Increasing the innovativeness of product development: AI can be used to identify potential improvements to products and services in a structured manner.
3. Reduction of entrepreneurial risk: With AI, Entrepreneurial decisions can increasingly be made on the basis of data and, therefore, in a discursive and not just intuitive manner.
4. Better market and competition analyses: AI can be used to evaluate better or forecast current or future business opportunities.
5. Increase in optimisation potential: AI can be used to optimise the planned business processes.
6. Better customer acquisition and retention: AI can be used to better derive information about future customer needs from previous customer movements and activities.

The multitude of support options is presented in the literature in more or less detail - partly theoretically and partly in a visionary way - without there being empirical evidence in most cases [19]. However, more concrete examples of support for an Entrepreneur along the idea generation and implementation process [42] can also be:

### *Idea Generation*

For idea generation, AI can analyse large amounts of data from social media, search queries and other online sources to identify emerging trends and consumer interests at an early stage. However, AI can also help the Entrepreneur in brainstorming processes by providing suggestions for new product

concepts or designs, offering creative food for thought that the Entrepreneur can then develop further. Based on existing technologies or market requirements, AI can also generate completely independent suggestions for new Digital Business models or ideas that can be adopted by the Entrepreneur.

### *Idea Evaluation*

For idea evaluation, AI can provide deeper insights into which target groups offer the greatest potential and what the demand for a particular product or service looks like by analysing market and consumer data. AI can create forecasts for revenue, costs and risks for both idea evaluation and idea formulation (business plan) by taking historical data and market trends into account. These forecasts are often more accurate and faster than conventional manual calculations. Finally, an AI can help the Entrepreneur to create and write a business plan by offering structural templates, integrating analyses and forecasts and enriching the plan with relevant data.

### *Idea Implementation*

For idea implementation, an AI can automate the recruitment process for the founder by pre-sorting applications and identifying the best candidates based on skills and experience. Subsequently, an AI can assist the founder with employee management through automated time tracking, performance monitoring and feedback systems. AI can also automatically monitor cash flow and liquidity, analyse expenses and make optimisation suggestions to reduce costs. In addition, AI can accurately forecast future revenues and expenses to support decision-making. AI can also help to continuously improve products or services by analysing customer feedback in real-time. Finally, AI can automate and target advertising campaigns to reach the right audience. By analysing user behaviour and preferences, AI can then suggest tailored marketing strategies and monitor the effectiveness of campaigns in real-time.

With regard to our research question as to who has the sovereignty or authority over the associated “opportunity assessment decisions” and thus business opportunities, the answer in this area is: the human together with the machine (AI as support-function). Whether and to what extent he/she (founder) can be supported by technology (including AI) is relevant here because, in the end, it is a combination of humans and machines to make entrepreneurial decisions, even if the human being remains the final Founder-Authority in the end. The human Entrepreneur still uses their intuitive, creative and conceptual skills but get now relevant support from the discursive analysis from the AI. Here, the human is still in the driver's seat of entrepreneurial action and the associated decisions, but the AI sits next to him/her as a co-driver, which supports the navigation in the foundation process. So we can call it “human/machine-driven decision-making”. Accordingly, the following can be stated at this point (see Figure 2):

*Human-Artificial-Entrepreneurship (HAE) with the Human as the Founder-Authority and Source of Intuitive/Creative Destruction together with the relevant support of an AI as a Source of a Discursive/Creative Destruction*

1. Creation: The Human Entrepreneur is the primary source of idea generation, but is supported by an AI, so that both intuitive and discursive creative destruction takes place as part of the joint development of an innovative Digital Business model/process.
2. Evaluation: Although the human Entrepreneur remains responsible as the Founder-Authority for the decisions in idea testing and idea formulation (business plan), the AI provides the basis and recommendations for this as well as the subsequent planning of an associated company foundation.
3. Implementation: As Entrepreneurs, humans remain the highest strategic decision-making authority, but AI is also used for the operational tasks involved in implementing the Digital Business idea in order to contribute to the results of the company's development.

These Points and the general conditions (see Figure 2) lead us to a final definition in this area with regard to our research question:

*Human-Artificial-Entrepreneurship (HAE) is a form of entrepreneurial activity in which the Human as the Founder-Authority and Source of Intuitive/Creative Destruction will be supported by an AI as a Source of a Discursive/Creative Destruction in a relevant way (human/machine-driven decision-making) for the creation, evaluation and implementation of a new company (start-up).*

### 4.3. Artificial-Intelligence-Entrepreneurship

If, against the background of the previous explanations, we now assume, firstly, that the technical development of AI will follow the path outlined above from a “weak AI” to a “strong AI” to a “super AI” and, secondly, we assume that the respective forms of AI will each achieve a higher degree of influence on corporate decision-making, from “Artificial Intelligence-Exploitation” to “Artificial-Intelligence-Exploration” to “Artificial-Intelligence-Disruption”, then we will inevitably arrive at the possibility that a machine could also replace humans in this decision-making process. Kollmann et al. [49] have already described and analysed this “takeover of decisions” by an AI - as described above - in the context of existing and established companies as “Artificial Leadership”. They assume that, on the basis of big data (volume, variety, velocity, veracity, value, [32]), an AI can carry out decision-making better than a human and can also formulate and implement the results in the form of instructions to humans. There are two main reasons for this: Firstly, in the context of formative and transformative creativity (as a still supposed weakness), an AI gets better and better and more powerful over time (creative ability). Secondly, an AI will

use self-learning algorithms to expand its existing strength for a discursive ability continuously. In combination, the question can, should and must therefore be asked as to whether creative destruction in the sense of Schumpeter (Entrepreneurship) will not also be taken over by a machine in the future.

Discursive ability involves a deliberate, logical and step-by-step analysis of information [111]. This analysis is based on logical arguments, evidence and proportional reasoning, can be well explained and justified and is particularly useful in complex situations that require complex evaluation procedures [112]. In the future, an AI will be able to “think” systematically, step-by-step and logically about a problem or question. Of course, humans can do this too, but the ability of an AI to think at a higher speed, with a higher degree of complexity and considering a higher variability of influences or alternatives rapidly exceeds human capabilities. Whether a (given) rational and (soon to be developed) creative ability of a machine can make the necessary entrepreneurial decisions better than a human (even an intuitive one) remains to be seen in terms of performance. However, it is predicted that an AI will be able to make these entrepreneurial decisions in the future on the basis of data-based reason, logical principles and rule-based deduction.

Against this background, Kollmann/Kleine-Stegemann [41] also refer to the “data-based decision” for Entrepreneurs: findings from the data processing of an AI finally will be the instruction to the Entrepreneur to replace him/her in his/her decision-making process (Entrepreneur-follows-Machine). This means that the AI derives well-founded operational and strategic business decisions and thus becomes a Founder-Authority. This decision-function could include, for example:

1. Decision-making for idea creating: The AI is responsible for analysing global and local trends, customer needs, and technological developments and the associated development of Ideas for an innovative Digital Business model/process.
2. Decision-making for idea selection: The AI is responsible for the development of an algorithm to evaluate the attractiveness, scalability and profitability of each idea. To this end, scenario analyses will be carried out to simulate the chances of success of the various ideas under different conditions.
3. Decision-making for a business model: The AI is responsible for describing the associated products, services, technologies, platforms, etc., for the selected business idea and identifies or defines the associated digital added value for the customer (USP) in order to determine the associated monetisation (e.g. purchase price, subscription, advertising) based on this.
4. Decision-making for business plan: The AI is responsible for formulating the company's objectives, describing the market entry strategy, calculating sales, costs and break-even point and drawing up a timetable for implementation.
5. Decision-making for business financing: The AI determines the financial requirements (investments and work-

ing capital), evaluates the possible sources of financing, develops an argumentation strategy to convince potential financiers and approaches them independently. Start-ups such as Touchcast have already had an AI avatar pitch to investors instead of the human founders [113].

6. Decision-making for business implementation: The AI is responsible for selecting the employees required for implementation at all levels of the start-up, specifying the necessary qualifications and experience and conducting the interviews while remaining in the role of CEO before and after the recruitment process (Artificial Leadership; see above).
7. Decision-making for market entry: The AI determines the way in which the product or service resulting from the business idea is brought to market by carrying out the analysis and prioritisation of target groups, specifying the strategies e.g. for performance marketing, content marketing and direct sales approaches and, if necessary, identifying operational and strategic partners.
8. Decision-making for company leadership: AI determines the operational management of company processes based on the use and analysis of available internal and external data in real-time and defines the medium and long-term corporate goals as part of strategic planning.

With regard to our research question as to who has the sovereignty or authority over the associated "opportunity assessment decisions" and thus business opportunities, the answer in this area is: the machine (in the form of AI). In this case, the AI is the only authority when it comes to making entrepreneurial decisions. The AI use its transformative creativity to simulate, evaluate and organise disruptive Entrepreneurship together with its capability of discursive destruction with the logical and step-by-step analysis of information. Here, the machine (AI) is in the driver's seat of entrepreneurial action and the associated decisions, so we can call it "ai-driven decision-making". Accordingly, the following can be stated at this point (see Figure 2):

*Artificial-Intelligence-Entrepreneurship (AIE) with the Machine as the Founder-Authority and only/relevant Source of Discursive/Creative Destruction*

1. Creation: AI takes on the role of the Entrepreneur and is the source of idea generation via (often rather) discursive/creative destruction as part of an innovative Digital Business model/process.
2. Evaluation: In the role of the Entrepreneur, the AI is the founding authority and is responsible for checking and formulating ideas (business plan) and thus for planning the foundation of the company (start-up).
3. Implementation: In the role of the Entrepreneur, the AI is the highest decision-making authority and is responsible for the implementation of the Digital Business idea and for the results of the company's development.

These Points and the general conditions (see Figure 2) lead us to a final definition in this area with regard to our research question:

*Artificial-Intelligence-Entrepreneurship (AIE) - or in a short term also Artificial Entrepreneurship (AE) - is a form of entrepreneurial activity in which the Machine (AI) as the Founder-Authority (ai-driven decision-making) is the only/relevant Source of Discursive/Creative Destruction for the creation, evaluation and implementation of a new company (start-up).*

## 5. Discussion

ChatGPT, at the latest, has opened Pandora's box of AI regarding economic, social and political perception! Simply ask a machine the (hopefully) right questions and, with the (hopefully) right answers, quickly solve all problems, also with regard to Entrepreneurship. What idea can I use to found the next start-up? How would you rate my idea for founding a company? Can you write me a business plan for it? etc. etc. The new world of technology that this has opened up for Entrepreneurship is still unclear today, but the enormous potential is currently being discussed in many areas. Some are worried about the associated development with a new dependency on this Artificial Intelligence (AI) - others are simply fascinated by the new opportunities it opens up for Entrepreneurship.

### *Scope of the Framework*

One thing seems certain: with the advent of AI, the classic image of Entrepreneurship will change fundamentally. Founders can use this new technology in a variety of ways. There are already AI generators that develop ideas for start-ups. These ideas can then be directly transferred to an AI business plan tool (such as Vizologi), which promises "From idea brainstorming to business plan and business model in less than a minute." Other AI tools then create the website, a marketing campaign with all associated advertising materials (texts, images, slogans, etc.) at the touch of a button, forecast further development and define a strategy with predefined KPIs. The original "creative destruction" by a "Human Entrepreneur" is already being supported by a machine (AI) and is already being shaped to some extent. The source of innovation is no longer the human being alone, but the machine, in the form of an AI, joins in.

If we follow the developments described in this article, then the formative, transformative and therefore creative and discursive decision-making tasks will/can also be taken over by an AI in the context of Entrepreneurship and converted into instructions for humans (startup managers, teams). An AI then becomes an Entrepreneur or the founding authority and takes over "creative destruction" in the sense of Schumpeter. Whether a human has written the necessary algorithms or the AI itself has adapted its algorithms to detect new business



opportunities is irrelevant for the time being. The first reports with titles such as "AI as start-up CEO" or "AI founds companies" have already been published, and it will be interesting to see where the journey will take us.

### *Limitations of the Framework*

This article has outlined the path and the framework conditions as well as the first manifestations of an associated "Artificial Entrepreneurship" and would thus like to establish a necessary discussion and further research in this field. Three central questions can and must be asked (also as still existing limitations):

1. Will we really have the necessary and complete database (big data) at some point that can map the complex and dynamic relationships between customer needs and technological, market and competitive developments in order to serve as quantitative and qualitative input for algorithms in the context of "Artificial Entrepreneurship"?
2. Will Artificial Intelligence really achieve the necessary development towards a "strong" and later also "super" AI in order to cope better than humans with formative, transformative and thus creative and discursive tasks for decision-making in the context of Entrepreneurship?
3. Do we even want to allow an AI to become an independent founding authority or is it even possible from an ethical and legal point of view for a machine to have a right to the ideas it develops or to become the owner of a company with all the associated obligations and responsibilities?

Of course, this development is embedded in the general "man vs. machine" debate and, depending on what position one takes on the question of what a machine may and may not do (especially in relation to humans themselves), the "Artificial Entrepreneurship" scenario outlined here may or may not be worth considering. Positive or negative dogmatic attitudes towards technological developments play a role here, as does the question of whether humans are really being replaced as Entrepreneurs or whether they are merely changing roles, in which a human, as the programmer of the algorithms of an Entrepreneurship AI, now offers "Entrepreneurship-as-a-Service" for others, so to speak, who then use this tool but see the implementation as a human domain. Who then accomplished the "creative destruction"? The programmer of the Entrepreneurship-AI, the Entrepreneurship-AI in the context of idea development and elaboration or the human being as the one who implements the idea in a legally responsible manner within the framework of a start-up? In this context, it becomes clear once again that genuine "Artificial Entrepreneurship" must have a creative, conceptual, but also an executive element (analogous to "Artificial Leadership"; see above).

A purely conceptual framework model, which has only been developed from the literature and a logical conclusion, also has several general limitations: For example, it lacks the empirical basis to assume that it is applicable in reality safely. Furthermore, a conceptual framework model cannot safely

assume that it is valid and reliable in different application areas, as it is not yet supported by empirical data. This can lead to overgeneralised statements that do not apply to certain contexts or situations. For example, the areas in the framework model (e.g. Human-Artificial-Entrepreneurship vs. Artificial-Intelligence-Entrepreneurship) are not yet clearly differentiated from one another (where does the one end and the other begin?), and the transitions based on the evaluation criteria are still fluid. Furthermore, the conceptual framework model has not yet been operationalised in order to translate the evaluation criteria (e.g. source of destruction) into measurable scales. In order to overcome these limitations, it is important that empirical data support the conceptual framework model presented and that it is tested/validated in different contexts.

Against this backdrop, the presented framework on "Artificial Entrepreneurship" is intended to help researchers and practitioners conduct the first necessary discussions. The focus was on the influence of Artificial Intelligence, in particular on decision-making in the context of entrepreneurial activities ("entrepreneurial opportunity identification" as the basis of "Opportunity Assessment Decisions"). The original research question could not yet be fully answered: Can an AI as a machine replace humans as Entrepreneurs in the sense of Schumpeter? The answer today must be "perhaps" (especially in the area of Digital Entrepreneurship), but only under certain framework conditions (technological development of AI and availability or nature of the necessary data) and ethical, legal and social assumptions regarding the fundamental relationship between humans and machines. This includes a discourse on the political influences, which can/will be different in China than in the USA, which in turn is different from Western Europe (EU). Either way, much research still needs to be done in this context.

Last but not least, research on the topic of "Artificial Entrepreneurship" must be interdisciplinary. It can only be considered from a combination of computer science, business informatics and business administration with reference to Entrepreneurship. One discipline alone will not be able to grasp the interactions between AI technology and the application field of "Entrepreneurship".

### *Research Questions of the Framework*

Irrespective of this overarching discussion, all aspects of the framework presented must, of course, be subjected to further theoretical substantiation and, in particular, empirical testing. The empirical measurement models, in particular, still have a long way to go because, firstly, the concrete influence of an AI on Entrepreneurship still has to develop and, secondly, the relevant impact of the influence of a human on the one hand and the influence of an AI on the other on entrepreneurial decision making and the associated entrepreneurial performance would then have to be clearly separated and measured. Assuming that this is once possible and that the results of the research still required support the validity of the framework, a research question for the new topic area of

"Artificial Entrepreneurship" arises against the background of these theoretical requirements:

1. Will there be a measurable and significant difference in the differentiated consideration of an AI deployment between a deployment in established companies (e.g. optimisation of production processes) and newly founded companies (e.g. planning of production processes)? Are there any special entrepreneurial-oriented algorithms?
2. Will or must the associated conception of AI with the associated algorithms be different for data-driven business processes (e.g. arrangement in the context of production processes in the warehouse business) than for data-driven business decisions (e.g. proposal in the context of competitive positioning in the innovation business)?
3. What variables, factors and interdependencies are there for the influence of AI or the distinction between human and AI input for creativity, evolution and implementation? In this context, will AI be more of a moderator or a mediator variable in the context of causal analytical models?
4. How can the characteristics of formative and transformative creativity be measured and compared regarding the result of idea development by a human versus a machine for entrepreneurial activity? Which variables are important for this?
5. Is there a measurable and significant difference in terms of formative and transformative creativity in the differentiated consideration of AI use in the areas of exploitation, exploration and disruption? Are there assignable areas or, rather, a continuum (as assumed in Picture 1)?
6. How can an entrepreneurial decision-making process, especially at the beginning (idea development, idea evaluation), be measured and compared between a human and an AI with regard to the same framework conditions (e.g. same data basis, experience, etc.)? Which factors are important for this?
7. Where and why will analyses, results, and interpretations in the entrepreneurial decision-making process differ significantly between a human and a machine in the further course (idea implementation, company management), and how can the consequence be measured?
8. What measurable influence or difference do business decisions based on human/machine-driven decision-making have in contrast to "ai-driven decision-making"? Ultimately, won't collaboration between humans and machines in the context of Human-Artificial Entrepreneurship be better than Artificial-Intelligence-Entrepreneurship anyway?
9. Would a human (Entrepreneur) even submit to the instructions and specifications of a machine (AI) and implement them as a work order? Acceptance models in this regard would have to be adapted.
10. How will the capital side react to AI-generated start-up ideas or entire start-up organisations? Do AI systems on the investor side ultimately evaluate the AI systems on the founder side with regard to the start-up idea's prospects of success?

11. What legal framework would have to be in place for an AI to really become a Founder- Authority in terms of copyright, ownership of shares, responsibility for management, etc.? Or will it be the programmer of the Entrepreneurship AI who will receive these rights and privileges, even though he is not actually part of the resulting founder or start-up team?
12. What are the differences between the area of Entrepreneurship and Intrapreneurship (with shareholders and stakeholders) with regard to the use of AI?

### *Conclusion of the Framework*

The title of this article is "What is Artificial Entrepreneurship?" The answer has been given: "Artificial Entrepreneurship" is a form of entrepreneurial activity in which the machine (AI) as the Founder-Authority (ai-driven decision-making) is the only/relevant source of discursive/creative destruction for the creation, evaluation and implementation of a new company (start-up). This also answered the research questions at least once conceptually: AI can - under certain circumstances - take over the creative development process for a new entrepreneurial idea and thus become active in the sense of Schumpeter's Creative Destruction. AI can - under certain circumstances - not only support a "Human Entrepreneur" in his actions but can also take over the entrepreneurial decisions and thus become an "Artificial Entrepreneur" itself. But what about the specific, summarising research question? Will "opportunity assessment decisions" and, thus, business opportunities in the future be better calculated by a machine and not developed from the knowledge, creativity or intuition of a human? We cannot yet answer this question even with the framework presented, but it points the way in which we must go in order to be able to answer it in the future.

There is still a lot to be done and research [114], but also practice, is still in its infancy in order to really grasp the influence of AI on Entrepreneurship in its various effects. However, this article should motivate an additional perspective. It is no longer just about the supporting, but also about the replacing character of AI in the context of entrepreneurial activity with the associated entrepreneurial decision-making and implementation. There are still many unanswered questions in this regard. But one thing is already clear: AI is here to stay. Regardless of its scale, we can and must move away from classic Entrepreneurship and at least consider Human-Artificial-Entrepreneurship (human/machine-driven decision-making), if not Artificial-Intelligence-Entrepreneurship or, at the end, Artificial Entrepreneurship (ai-driven decision-making).

### **Author Contributions**

Tobias Kollmann is the sole author. The author read and approved the final manuscript.

## Conflicts of Interest

The author declares no conflicts of interest.

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