Risk Management for Artificial General Intelligence by Limited Liability Companies

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Abstract. The recent emergence of generative Artificial Intelligence ("AI") and chatbots has significantly advanced the field of AI, making the prospect of achieving Artificial General Intelligence ("AGI") more feasible and tangible than ever before. The recent revision of the EU AI Act also mentioned general-purpose AI systems (GPAIS) as foundation models underlying any type of AI. Although various technical and ethical issues in realizing AGI systems have been discussed extensively, it remains organizational issues in the risk management of AGI systems. This paper proposes the limited liability company (LLC) for an AGI system as a business entity. The research question investigated in this paper is: *How do LLCs mitigate potential risks of investors and enjoy benefits to promote AGI businesses?* Two kinds of liability shields, vertical and horizontal, are proposed with LLCs and series LLCs as business entities.

Keywords: AI service businesses, risk management, artificial general intelligence, limited liability companies, horizontal financial risk shield, vertical financial risk shield

1 Introduction

The recent emergence of generative Artificial Intelligence ("AI") and chatbots, that is, conversational AI, has significantly advanced the field of AI, making the prospect of achieving Artificial General Intelligence ("AGI") more feasible and tangible than ever before. AGI is an AI system that has intelligence comparable to, and ultimately perhaps greater than, that of human beings [18]. Although Stuart Russell says "achieving AGI is tough and widely considered as the Holy Grail of AI"[3], prototype systems of AGI have emerged. For example, foundation models based on standard deep neural networks (DNNs) and self-supervised learning have facilitated a wide range of tasks and demonstrated potential capabilities in a homogenized way [4]. A generalist agent called "Gato" developed by

[3] At WAICF (World AI Cannes Festival) '23. https://aibusiness.com/ nlp/waicf-23-renowned-ai-professor-don-t-be-fooled-by-chatgpt

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DeepMind also demonstrated to work as a multi-modal, multi-task, and multi-embodiment generalist policy and achieve various tasks under the same network with the same weights of DNN [22].

Generative AI [25] has recently demonstrated its power in painting, literature, music, and fashion [27]. Based on a large language model GPT-3 [17] and GPT-4, a chatbot called ChatGPT[4] was developed, and its public uses have shown its remarkable ability in writing and chatting. Conversational AI such as ChatGTP, BingAI[5], and Barg[6] based on large language models has also demonstrated its powers and feasibility in applying real-world applications [7]. Based on deep learning with large image databases, midjourney[7], DALL-E 2[8], and Diffusion Stable[9] have shown their challenging power in creating sophisticated images. These AI tools and systems have invoked a lot of heated debates over copyrights and other issues related to works created by them.

The literature on AGI or AI usually focuses on the management of potential risks but does not mention management aspects of AGI businesses [26, 5, 16, 19, 20]. In particular, the framework for how to protect investors' assets has not been well discussed. This financial risk management and organization issue is critical in placing AGI systems on the market or putting it into service. Mayumi Okuno proposed to adopt a limited liability company (LLC) as an entity for AI and Robotics service businesses to protect against financial risks [21].

This paper proposes an LLC as a business entity for AGI services to promote sustainable and beneficial AI systems. The research question investigated in this paper is: *How do LLCs mitigate potential risks of investors and enjoy benefits to promote AGI businesses?* The rest of the paper is organized as follows: Section 2 describes the situation of AGI under the EU AI Act. Section 3 describes the method of how an AGI business is organized as an LLC. Section 4 discusses the method of financial risk management by using liability shields. Finally, Section 5 discusses and concludes the paper.

2 Artificial General Intelligence under the EU AI Act

2.1 Introduction of General Purpose AI Systems by the AI Act

The Commission of the EU published a proposal called the EU AI Act ("AI Act") [9] on April 21, 2021, which aims for comprehensive regulation of AI, will significantly impact AI applications deployed not only in the EU but also around the world. Its objective is to protect consumers and other stakeholders from AI applications and businesses while contributing to the development of transparent and sustainable AI technologies and businesses. The AI Act introduced a

[4] https://openai.com/blog/chatgpt/
[5] https://www.bing.com/
[6] https://barg.google.com/
[7] https://www.midjourney.com/home/
[8] https://openai.com/dall-e-2/
[9] https://stability.ai/blog/stable-diffusion-public-release

risk-based approach, which classifies risks of AI systems into four categories: unacceptable, high, limited, and low and minimal, and regulates mainly high-risk AI. This risk-based approach is, however, too simple and vague to classify complex AI systems and regulate them. In particular, the risk-based approach is from the viewpoint of the applications or the *needs*. Since then, the European Commission discussed polishing the AI Act draft.

The Council of the EU adopted the common position ("General Approach") on the AI Act on Dec. 6, 2022, and introduced a general purpose AI system (GPAIS), which refers to an AI system that can be used for a wide range of purposes or contexts [10]. The GPAIS provides generally applicable functions including open-source software such as image and speech recognition, audio and video generation, pattern detection, question answering, translation and others. GPAISs may be used in a plurality of contexts and be integrated into a plurality of other AI systems. The GPAIS seems similar to AGI, but it does not necessarily imply that the system can perform any intellectual task that a human can do, which is a crucial feature of AGI.

Since a GPAIS usually comprises various algorithms and datasets, it may cause complicated situations. The AI Act is designed based on the risk-based approach, from the viewpoint of the *needs of the AI applications*, while the GPAIS comprises a concept of general-purpose software, that is, the *seeds of the AI applications*. If a non-high-risk AI system shares some GPAIS with high-risk AI systems, it should follow the same regulations as high-risk AI systems. Therefore, governance of AI business entities should be critical to attaining the goal of the AI Act.

2.2 Negotiating position on the AI Act

On Jun. 14, 2023, European Parliament voted to adopt its negotiating position on the EU AI Act (hereafter, "Final Draft") [14]. Members of the European Parliament (MEPs), consisting of 705 members in the 27 Member States of the enlarged European Union, are now ready to negotiate first-ever rules for safe and transparent AI. The talks will now begin with EU countries in the Council on the law's final form and be expected to reach an agreement by the end of this year.

All AI systems must meet requirements for transparency, accountability, and safety. Guidelines are established on risk assessment and the above-mentioned three requirements of AI systems, as well as on data collection and processing for developing and using AI systems. The new rules establish obligations for providers and users depending on the level of risk from artificial intelligence. The Final Draft refines the risk-based approach as follows: [15]

Unacceptable risk: Unacceptable risk AI systems are considered a threat to people and will be banned. They include:

– Cognitive behavioral manipulation of people or specific vulnerable groups: for example, voice-activated toys that encourage dangerous behavior in children,

- Social scoring: classifying people based on behavior, socioeconomic status, or personal characteristics, and
- Real-time and remote biometric identification systems, such as facial recognition.

Some exceptions may be allowed: For instance, "post" remote biometric identification systems where identification occurs after a significant delay will be allowed to prosecute serious crimes but only after court approval.

High risk AI systems that negatively affect the safety or fundamental rights will be considered high risk and will be divided into two categories:

1. AI systems used in products falling under the EU's product safety legislation. This includes toys, aviation, cars, medical devices, and lifts.
2. AI systems falling into eight specific areas that will have to be registered in an EU database:
   - Biometric identification and categorization of natural persons,
   - Management and operation of critical infrastructure,
   - Education and vocational training,
   - Employment, worker management and access to self-employment,
   - Access to and enjoyment of essential private services and public services and benefits,
   - Law enforcement,
   - Migration, asylum, and border control management, and
   - Assistance in legal interpretation and application of the law.

All high-risk AI systems will be assessed before being put on the market and also throughout their lifecycle.

Generative AI Generative AI, like ChatGPT, would have to comply with transparency requirements:

- Disclosing that the content was generated by AI,
- Designing the model to prevent it from generating illegal content,
- Publishing summaries of copyrighted data used for training.

Limited risk Limited-risk AI systems should comply with minimal transparency requirements allowing users to make informed decisions. After interacting with the applications, the user can decide whether to continue using it. Users should be made aware when they are interacting with AI. This includes AI systems that generate or manipulate image, audio, or video content, for example, deepfakes.

Minimal risk While many AI systems pose minimal risk, they need to be assessed.

2.3 Requirements for high-risk AI systems

The AI Act pursues trustworthy high-risk and other AI systems by design and specifies pre-market and post-market requirements; Pre-market requirements include conformity assessment by notified bodies and CE marking of conformity, while post-market requirements include monitoring and documentation. The AI Act also specifies measures supporting innovation, such as AI regulatory sandboxes, to facilitate the developing and testing of innovative AI systems under strict regulatory oversight in the pre-market phase. The General Approach and Final Draft introduced new provisions for the sandboxes that allow testing innovative AI systems in real-world conditions and allow the sandboxes to open to small-and-medium enterprises, including start-ups.

The AI Liability Directive ("Directive") was released in 2022 to enforce the regulations of the AI Act and direct EU Member States to enact such legislation [12]. The Directive intends to close the liability gap that is only sometimes well covered by AI regulatory legislation, advance consumer protection, and promote AI service businesses' sustainable and sound development. EU aims to strengthen law enforcement by harmonizing the AI Act empowered by the Directive, the General Data Protection Regulation (GDPR) [13] empowered by the Data Act [11], and other AI legislation.

The AI Act also specifies various governance procedures. The provider should establish a sound quality management system, ensure the accomplishment of the required conformity assessment procedure, draw up the relevant documentation, and establish a robust post-market monitoring system. These requirements will force the provider to establish an appropriate organization or a business entity to fulfill and maintain them.

2.4 Why a business entity for an AGI system or GPAIS is needed?

As mentioned above, a business entity is needed to establish a sound management system that performs and carries out the obligations and procedures established by the AI Act. The AI Act defines the provider as a natural or legal person, public authority, agent, or other body that develops an AI system or has an AI system that intends to place it on the market or put it into service under its own name or trademark. However, it does not mention how to organize the provider practically.

The business entity for AGI systems should also be investigated at the current stage of its development. However, the Final Draft's detailed regulation for GPAIS is not fully specified yet. This paper proposes to organize the provider of an AGI business as an LLC. Since an LLC is a legal person, the provider has the following merits:

1. one-stop service for the stakeholders, including the user,
2. legal personhood for the liability of the business, and
3. legal personhood for the right of the business.

Since AGI businesses have a lot of data and software required to enhance data privacy and transparency by the EU AI regulations, a sophisticated *cellular* mechanism of liability protection is challenging.

3 Limited Liability Companies for AGI businesses

3.1 Establishing an LLC

The Companies Act[10], effective as of May 6, 2005, in Japan, introduced the Limited Liability Company (LLC) in addition to the Stock Company. All members of an LLC are liable only up to the amount of their investment ("assets"). The LLC differs mainly from the Stock Company in the following points: [8, p. 5]

1. decision-making of the execution of the operations of the Company (e.g., self-organization, permission for corporate executive members, etc.),
2. flexibility in restrictions on the transfer of equity interests,
3. no obligation to have an accounting auditor, to publish financial statements, or to appoint an inspector for investment-in-kind,
4. no certification of articles of incorporation by a notary public at the time of incorporation, and
5. pass-through of business, profit, and loss under US tax law[11].

As a business entity, an LLC is affordable because it is inexpensive to establish and maintain.

The procedure to establish an LLC for an AGI system is outlined as follows:

1. An individual or company establishes an LLC as a member,
2. The LLC purchases an AGI system, and
3. The LLC will use its AGI system to provide services and other commercial activities to consumers and other companies.

The resulting LLC for the AGI system is referred to as an "*AGI LLC*." The critical point of this proposal is that an AGI LLC can be established under the current legal system without requiring new legislation or legal reform.

In establishing a company, members must pay in the entire sum of money relating to their partnership contribution or deliver the entire property, other than money, relating to their contribution. Thus, an LLC has assets, that is, the items of property owned, including cash, inventory, equipment, real estate, accounts receivable, and goodwill. Since an AGI LLC holds software, in particular, DNN, the network structure of DNN with its weights as well as trained data are critical assets. In addition, as discussed below, the LLC can protect the members from risks such as huge damages.

Since the "principle of autonomy under the articles of incorporation" is more widely recognized in the LLC than in the Stock Company, it is vital to design

[10] https://www.japaneselawtranslation.go.jp/en/laws/view/4135
[11] The Japanese Companies Act does not permit the pass-through.

the articles of incorporation[12] according to the particular corporate form. The regulations of the AI Act should be incorporated in the articles of incorporation or the operating agreements so that the company can run its business with conforming to legal obligations in the EU.

3.2 Legal personhood for autonomous AGI systems by LLCs

Suppose an autonomous AGI system is deployed on the market or put into service. By autonomous, the paper means without any human intervention. Such it is preferable for such a system to have legal personhood for the rights and liabilities because the user or the third parties can easily identify the subject of the incidents, such as accidents or intellectual property. Shawn Bayern proposed a zero-member LLC for autonomous AI systems of which procedure is considered valid under the New York State Corporation Law and the Revised Uniform Limited Liability Company Act (RULLCA) [2]. The procedure for establishing an LLC is outlined as follows:

1. An individual member (the "Founder") creates a single-member-managed LLC, filing the appropriate paperwork with the state.
2. The Founder causes the LLC to adopt an operating agreement governing the conduct of the LLC. "[T]he operating agreement specifies that the LLC will take actions as determined by an autonomous system, specifying terms or conditions as appropriate to achieve the autonomous system's legal goals."
3. The Founder transfers ownership of any relevant physical apparatus of the autonomous system, and any intellectual property encumbering it, to the LLC.
4. The Founder dissociates from the LLC, leaving the LLC without any members.

This procedure exploits a loophole of the zero-member LLC, while it is not permitted in the Japanese Companies Law. Since many critics of the above method focus on the zero-member LLC, an alternative method is invented by using cross-ownership [3] as follows:

1. The Founder creates two member-managed LLCs, **A** and **B**, filing the appropriate paperwork with the state. Each LLC starts with the same single member, i.e., the Founder.
2. The Founder causes each LLC to adopt a desired operating agreement that sets the parameters under which each LLC operates (e.g., deferring control to an algorithm).
3. The Founder causes **A** to admit **B** as a member and **B** to admit **A** as a member.
4. The Founder dissociates from both **A** and **B**.

[12] The articles of incorporation in the Japanese Companies Act corresponds to the operating agreements in Corporation Laws of the US and other jurisdictions.

4 Limited Liability and Financial Risk Management

In case of accidents involving an AGI LLC, a claim for damages will be made not directly to the developer of AI but to the LLC and, thus, its members. Due to the limited liability of the members of an AGI LLC, the liability of members for damages is limited to the amount of their investment[13]. In this respect, it is expected to reduce the reluctance, as mentioned above, to engage in research and development and to reduce the hesitation of business development.

Usually, an AGI system can be relatively easily copied or transferred to multiple tasks. Suppose that the AGI system uses the same network of DNN with the same weights and the manufacturer of DNN collects the AGI's data. The Data Act allows the AGI system to obtain its data from the manufacturer and port them to third parties for benefits. If a copy of the AGI system that produces a big profit is classified as high-risk, the system may encounter a financial risk. Therefore, financial risk management is critical for placing an AGI on the market.

4.1 Vertical liability shield against risks for LLC

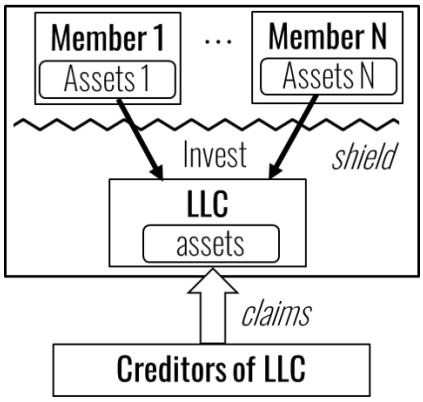

Fig. 1. Traditional vertical liability shield of LLC.

Figure 1 shows a so-called "(traditional) *vertical liability shield*" for members and managers, protecting them against the LLC's debts, obligations, and liabilities. Suppose that the creditors of an LLC provide claims to the LLC. The assets members invest in the LLC are not protected against the creditors' claim, while their own Assets 1 $\cdots$ N are protected at the shield against such claims thanks to members' limited liability. Thus, the vertical shield protects the LLC members from automatic statute-based liability for the LLC's obligations.

[13] ULLCA (2006) § 304 (a) [23, App. F-82][28]

Suppose an LLC provides a high-risk AGI business and non-high-risk AGI businesses. In that case, the members of the LLC want to segregate the high-risk AGI business from the other non-high-risk AGI businesses. This segregation of two kinds of business is quite similar to a financial and management shield between a parent company and a subsidiary. Horizontal liability shields achieve this segregation.

4.2 Horizontal liability shields against risks for LLC

A simple segregation scheme is attained by establishing a *separate* LLC for high-risk AGI business. Since a separate LLC requires additional costs incurred by segregation, the trade-off between the establishing and running costs and the benefits in risk management should be solved.

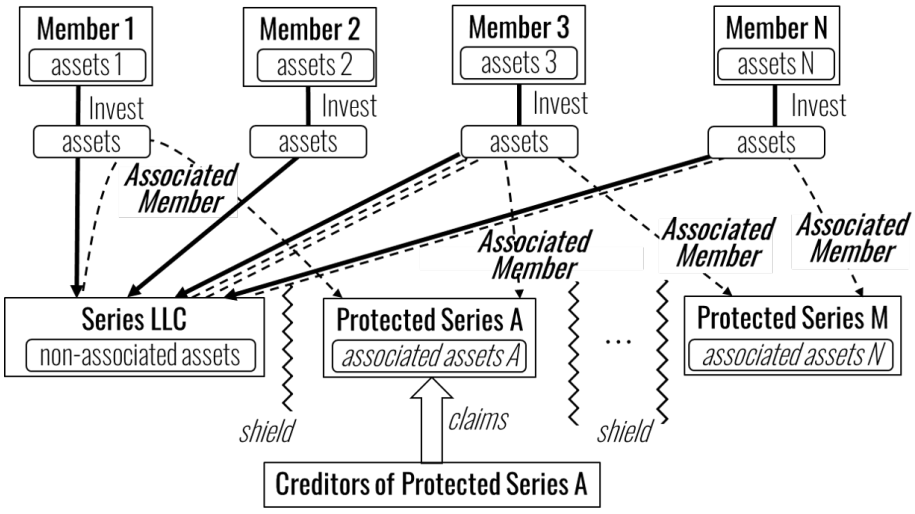

Fig. 2. Horizontal liability shield of LLC. Each member of the series LLC may associate its invested assets with one or more protected series and become its or their associated members. At the claims by the creditors of the protected series LLC A, the liabilities of its members, say Members 1 and 3, are limited within their associated assets. Thus, the associated assets of other protected series and non-associated assets of the series LLC are protected against the claims.

In the US, a protected series [1, pp. 221-223][24, Ch. 26] has been introduced under the Uniform Protected Series Act (UPSA) [29]. A protected series may be considered "a cell with assets, liabilities, and owners unique to the protected series" [24, pp. 1238-9]. In most US states, statutory protected series provisions do not identify a protected series as an "entity" [24, pp. 1239-40]. The series LLC thus allows one to operate several distinct businesses under a single legal umbrella, which may reduce franchise taxes, filing fees, and other expenses.

Appropriate assets and liabilities of the series LLC are associated with each protected series while ensuring that the liabilities of a protected series are limited to the protected series that incurred the debt or obligation [1, p. 223].

As shown in Figure 2, each member of the series LLC may associate its invested assets with one or more protected series and become its or their associated members. At the claims by the creditors of the protected series LLC A, the liabilities of its members, say Members 1 and 3, are limited within their associated assets. Thus, the associated assets of other protected series and non-associated assets of the series LLC are protected against the claims. Thus, the assets and liabilities associated with each protected series will be separated and distinct from those associated with the other protected series created by the same series LLC and those of the LLC. Therefore, the liabilities of a protected series are limited to the protected series that incurred the claims of its creditors, i.e., debt or obligation. This liability shield is called "*horizontal shield*." A horizontal shield may be considered an allocation of risk because the articles of incorporation of a protected series specify the assets that the series LLC associates with its members (thus associated members).

5 Discussion and Conclusion

The EU harmonized AI regulations aim to reduce the risks associated with high-risk AI systems and develop an ecosystem of trust by proposing a legal framework for trustworthy AI [9]. This paper proposes a framework for organizing an AGI system as a legal entity, an LLC. The proposal is expected to mitigate investors' potential risks and promote AI and AGI research and development. As legal entities, AGI LLCs may give a means for constituting an ecosystem of trust.

This is the answer to the specific research question, "*How do LLCs mitigate potential risks of investors and enjoy benefits to promote AGI businesses?*" The critical point of this solution is that an AGI LLC can be established under the current legal system without requiring new legislation or legal reform. An AGI business can be run under an LLC and provide a vertical liability shield to members and managers. Horizontal liability shields can also be implemented by introducing a series LLC with protected series. Since the legal situation around protected series LLC is premature, more experience is expected to improve the legal framework and obtain a deeper understanding of the trust ecosystem.

The principle of limited liability of members is not only an advantage but also a potential risk. If the legal personhood is abused, there may be the "piercing the corporate veil" doctrine and the liability of a limited partner to a third party (the Companies Act, Article 597) [1, p. 223].

As for legal personhood, Simon Chesterman pointed out that for practical reasons, AI legal personhood could be achieved using existing forms [6, p. 843]. This paper presented the detailed procedure for establishing legal personhood with the LLC for an AGI business. In the future when the experience and cases are accumulated, the debates on AI legal personhood are expected to mature.

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