

Artificial Intelligence Risk Management Framework (AI RMF 1.0)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

NIST AI 100-1



人工智能风险管理框架（AI RMF 1.0）

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Update Schedule and Versions

The Artificial Intelligence Risk Management Framework (AI RMF) is intended to be a living document.

NIST will review the content and usefulness of the Framework regularly to determine if an update is appropriate; a review with formal input from the AI community is expected to take place no later than 2028. The Framework will employ a two-number versioning system to track and identify major and minor changes. The first number will represent the generation of the AI RMF and its companion documents (e.g., 1.0) and will change only with major revisions. Minor revisions will be tracked using ".n" after the generation number (e.g., 1.1). All changes will be tracked using a Version Control Table which identifies the history, including version number, date of change, and description of change. NIST plans to update the AI RMF Playbook frequently. Comments on the AI RMF Playbook may be sent via email to AIframework@nist.gov at any time and will be reviewed and integrated on a semi-annual basis.

更新计划与版本

人工智能风险管理框架(AI RMF)旨在成为一份动态更新的文件。

NIST 将定期审查框架的内容和实用性，以确定是否适合更新；预计不迟于 2028 年进行一项包含 AI 社区正式意见的审查。框架将采用双数字版本系统来跟踪和识别重大和次要变更。第一个数字将代表 AI RMF 及其配套文档的世代(例如 1.0)，并且仅在重大修订时更改。次要修订将使用世代号后的".n"进行跟踪(例如 1.1)。所有变更将使用版本控制表进行跟踪，该表标识历史记录，包括版本号、变更日期和变更描述。NIST 计划频繁更新 AI RMF Playbook。有关 AI RMF Playbook 的意见可随时通过电子邮件发送至 AIframework@nist.gov，并将每半年审查和整合一次。

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Executive Summary

Artificial intelligence (AI) technologies have significant potential to transform society and people's lives – from commerce and health to transportation and cybersecurity to the environment and our planet. AI technologies can drive inclusive economic growth and support scientific advancements that improve the conditions of our world. AI technologies, however, also pose risks that can negatively impact individuals, groups, organizations, communities, society, the environment, and the planet. Like risks for other types of technology, AI risks can emerge in a variety of ways and can be characterized as long- or short-term, high- or low-probability, systemic or localized, and high- or low-impact.

> The AI RMF refers to an *AI system* as an engineered or machine-based system that can, for a given set of objectives, generate outputs such as predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy (Adapted from: OECD Recommendation on AI:2019; ISO/IEC 22989:2022).

While there are myriad standards and best practices to help organizations mitigate the risks of traditional software or information-based systems, the risks posed by AI systems are in many ways unique (See Appendix B). AI systems, for example, may be trained on data that can change over time, sometimes significantly and unexpectedly, affecting system functionality and trustworthiness in ways that are hard to understand. AI systems and the contexts in which they are deployed are frequently complex, making it difficult to detect and respond to failures when they occur. AI systems are inherently socio-technical in nature, meaning they are influenced by societal dynamics and human behavior. AI risks – and benefits – can emerge from the interplay of technical aspects combined with societal factors related to how a system is used, its interactions with other AI systems, who operates it, and the social context in which it is deployed.

These risks make AI a uniquely challenging technology to deploy and utilize both for organizations and within society. Without proper controls, AI systems can amplify, perpetuate, or exacerbate inequitable or undesirable outcomes for individuals and communities. With proper controls, AI systems can mitigate and manage inequitable outcomes.

AI risk management is a key component of responsible development and use of AI systems. Responsible AI practices can help align the decisions about AI system design, development, and uses with intended aim and values. Core concepts in responsible AI emphasize human centricity, social responsibility, and sustainability. AI risk management can drive responsible uses and practices by prompting organizations and their internal teams who design, develop, and deploy AI to think more critically about context and potential or unexpected negative and positive impacts. Understanding and managing the risks of AI systems will help to enhance trustworthiness, and in turn, cultivate public trust.

执行摘要

人工智能(AI)技术具有改变社会和人们生活的巨大潜力--从商业和健康到交通和网络安全，再到环境和我们的星球。AI 技术可以推动包容性经济增长，并支持改善我们世界状况的科学进步。然而，AI 技术也带来风险，可能对个人、群体、组织、社区、社会、环境和地球产生负面影响。与其他类型技术的风险一样，AI 风险可以以多种方式出现，并且可以表征为长期或短期、高概率或低概率、系统性或局部性，以及高影响或低影响。

> AI RMF将人工智能系统称为一种工程化或基于机器的系统，对于给定的一组目标，该系统可以生成影响真实或虚拟环境的预测、建议或决策等输出。人工智能系统被设计为以不同程度的自主性运行(改编自：OECD人工智能建议书：2019;ISO / IEC 22989:2022)。

尽管有无数标准和最佳实践可帮助组织减轻传统软件或基于信息的系统的风险，但 AI 系统带来的风险在许多方面是独特的(见附录 B)。例如，AI 系统可能基于随时间变化的数据进行训练，有时变化显著且出乎意料，以难以理解的方式影响系统功能和可信度。AI 系统及其部署环境通常很复杂，使得在发生故障时难以检测和响应。AI 系统本质上是社会技术性的，这意味着它们受到社会动态和人类行为的影响。AI 风险--以及收益--可能来自技术方面与以下社会因素的相互作用：系统的使用方式、与其他 AI 系统的交互、操作者以及部署的社会背景。

这些风险使人工智能成为对组织和社会而言部署和利用都极具挑战性的技术。如果没有适当的控制措施，人工智能系统可能放大、延续或加剧对个人和社区的不公平或不良后果。有了适当的控制措施，人工智能系统可以减轻和管理不公平的后果。

AI 风险管理是负责任地开发和使用 AI 系统的关键组成部分。负责任的 AI 实践有助于使有关 AI 系统设计、开发和使用的决策与预期目标和价值观保持一致。负责任的 AI 核心概念强调以人为本、社会责任和可持续性。AI 风险管理可以通过促使设计、开发和部署 AI 的组织及其内部团队更批判性地思考背景以及潜在或意外的负面和正面影响，来推动负责任的使用和实践。理解和管理 AI 系统的风险将有助于增强可信度，进而培养公众信任。

Social responsibility can refer to the organization's responsibility "for the impacts of its decisions and activities on society and the environment through transparent and ethical behavior" (ISO 26000:2010). *Sustainability* refers to the "state of the global system, including environmental, social, and economic aspects, in which the needs of the present are met without compromising the ability of future generations to meet their own needs" (ISO/IEC TR 24368:2022). Responsible AI is meant to result in technology that is also equitable and accountable. The expectation is that organizational practices are carried out in accord with "*professional responsibility*," defined by ISO as an approach that "aims to ensure that professionals who design, develop, or deploy AI systems and applications or AI-based products or systems, recognize their unique position to exert influence on people, society, and the future of AI" (ISO/IEC TR 24368:2022).

As directed by the National Artificial Intelligence Initiative Act of 2020 (P.L. 116-283), the goal of the AI RMF is to offer a resource to the organizations designing, developing, deploying, or using AI systems to help manage the many risks of AI and promote trustworthy and responsible development and use of AI systems. The Framework is intended to be ***voluntary***, rights-preserving, non-sector-specific, and use-case agnostic, providing flexibility to organizations of all sizes and in all sectors and throughout society to implement the approaches in the Framework.

The Framework is designed to equip organizations and individuals – referred to here as *AI actors* – with approaches that increase the trustworthiness of AI systems, and to help foster the responsible design, development, deployment, and use of AI systems over time. AI actors are defined by the Organisation for Economic Co-operation and Development (OECD) as "those who play an active role in the AI system lifecycle, including organizations and individuals that deploy or operate AI" [OECD (2019) Artificial Intelligence in Society—OECD iLibrary] (See Appendix A).

The AI RMF is intended to be practical, to adapt to the AI landscape as AI technologies continue to develop, and to be operationalized by organizations in varying degrees and capacities so society can benefit from AI while also being protected from its potential harms.

The Framework and supporting resources will be updated, expanded, and improved based on evolving technology, the standards landscape around the world, and AI community experience and feedback. NIST will continue to align the AI RMF and related guidance with applicable international standards, guidelines, and practices. As the AI RMF is put into use, additional lessons will be learned to inform future updates and additional resources.

The Framework is divided into two parts. Part 1 discusses how organizations can frame the risks related to AI and describes the intended audience. Next, AI risks and trustworthiness are analyzed, outlining the characteristics of trustworthy AI systems, which include

社会责任可以指组织"通过透明和道德的行为对其决策和活动对社会和环境的影响"的责任(ISO 26000:2010)。可持续性是指"全球系统(包括环境、社会和经济方面)的状态，在这种状态下，满足当代人的需求而不损害后代人满足其自身需求的能力"(ISO / IEC TR 24368:2022)。负责任的 AI 旨在产生公平且可问责的技术。期望组织实践按照"专业责任"进行，ISO 将其定义为一种方法，"旨在确保设计、开发或部署 AI 系统和应用或基于 AI 的产品或系统的专业人员认识到他们在影响人、社会和 AI 未来方面的独特地位"(ISO / IEC TR 24368:2022)。

根据2020年《国家人工智能倡议法案》(P.L.116-283)的指示，AI RMF的目标是为设计、开发、部署或使用人工智能系统的组织提供一种资源，以帮助管理人工智能的诸多风险，并促进可信且负责任的人工智能系统开发与使用。该框架旨在成为**自愿性**、权利保护性、非特定行业且与用例无关的框架，为所有规模、所有行业以及全社会中的组织提供灵活性，以实施框架中的方法。

该框架旨在为组织和个人--此处称为人工智能参与者--提供增强人工智能系统可信度的方法，并帮助促进人工智能系统在长期内的负责任设计、开发、部署和使用。人工智能参与者被经济合作与发展组织(OECD)定义为"在人工智能系统生命周期中发挥积极作用的各方，包括部署或运营人工智能的组织和个人"[OECD(2019) Artificial Intelligence in Society-OECD iLibrary](见附录A)。

AI RMF旨在具有实用性，随着人工智能技术的持续发展而适应人工智能格局，并由组织以不同程度的实施和能力加以操作化，使社会既能从人工智能中受益，又能免受其潜在危害。

框架及支持资源将根据不断发展的技术、世界各地的标准格局以及人工智能社区的经验和反馈进行更新、扩展和改进。NIST将继续使AI RMF及相关指南与适用的国际标准、指南和实践保持一致。随着AI RMF的投入使用，将汲取更多经验教训，为未来的更新和额外资源提供参考。

框架分为两部分。第1部分讨论组织如何构建与人工智能相关的风险框架，并描述目标受众。接下来，分析人工智能风险和可信性，概述可信人工智能系统的特征，包括

valid and reliable, safe, secure and resilient, accountable and transparent, explainable and interpretable, privacy enhanced, and fair with their harmful biases managed.

Part 2 comprises the "Core" of the Framework. It describes four specific functions to help organizations address the risks of AI systems in practice. These functions – **GOVERN**, **MAP**, **MEASURE**, and **MANAGE** – are broken down further into categories and subcategories. While **GOVERN** applies to all stages of organizations' AI risk management processes and procedures, the **MAP**, **MEASURE**, and **MANAGE** functions can be applied in AI system-specific contexts and at specific stages of the AI lifecycle.

Additional resources related to the Framework are included in the AI RMF Playbook, which is available via the NIST AI RMF website:
https://www.nist.gov/itl/ai-risk-management-framework.

Development of the AI RMF by NIST in collaboration with the private and public sectors is directed and consistent with its broader AI efforts called for by the National AI Initiative Act of 2020, the National Security Commission on Artificial Intelligence recommendations, and the Plan for Federal Engagement in Developing Technical Standards and Related Tools. Engagement with the AI community during this Framework's development – via responses to a formal Request for Information, three widely attended workshops, public comments on a concept paper and two drafts of the Framework, discussions at multiple public forums, and many small group meetings – has informed development of the AI RMF 1.0 as well as AI research and development and evaluation conducted by NIST and others. Priority research and additional guidance that will enhance this Framework will be captured in an associated AI Risk Management Framework Roadmap to which NIST and the broader community can contribute.

有效且可靠、安全、安保且有韧性、可问责且透明、可解释且可理解、隐私增强，以及公平且其有害偏见得到管理。

第2部分构成本框架的"核心"。它描述了四个具体功能，以帮助组织在实践中应对人工智能系统的风险。这些功能--**治理**、**映射**、**度量**和**管理**--进一步细分为类别和子类别。虽然**治理**适用于组织人工智能风险管理流程和程序的所有阶段，但**映射**、**度量**和**管理**功能可应用于特定于人工智能系统的情境以及人工智能生命周期的特定阶段。

与框架相关的额外资源包含在AI RMF Playbook中，可通过NIST AI RMF网站获取：https://www.nist.gov/itl/ai-risk-management-framework.

NIST与私营和公共部门合作开发AI RMF，是受2020年《国家人工智能倡议法案》、国家人工智能安全委员会建议以及《联邦参与制定技术标准及相关工具计划》的指示并与其所呼吁的更广泛人工智能工作保持一致。在本框架开发过程中与人工智能社区的互动--通过对正式信息请求的回应、三次广泛参与的研讨会、对概念文件和两版框架草案的公众评论、多个公共论坛上的讨论以及许多小组会议--为AI RMF 1.0的开发以及NIST和其他方开展的人工智能研发与评估提供了信息。将增强本框架的优先研究和附加指南将被纳入相关的AI Risk Management Framework Roadmap,NIST和更广泛的社区均可为其作出贡献。

Part 1: Foundational Information

1. Framing Risk

AI risk management offers a path to minimize potential negative impacts of AI systems, such as threats to civil liberties and rights, while also providing opportunities to maximize positive impacts. Addressing, documenting, and managing AI risks and potential negative impacts effectively can lead to more trustworthy AI systems.

1.1 Understanding and Addressing Risks, Impacts, and Harms

In the context of the AI RMF, *risk* refers to the composite measure of an event's probability of occurring and the magnitude or degree of the consequences of the corresponding event. The impacts, or consequences, of AI systems can be positive, negative, or both and can result in opportunities or threats (Adapted from: ISO 31000:2018). When considering the negative impact of a potential event, risk is a function of 1) the negative impact, or magnitude of harm, that would arise if the circumstance or event occurs and 2) the likelihood of occurrence (Adapted from: OMB Circular A-130:2016). Negative impact or harm can be experienced by individuals, groups, communities, organizations, society, the environment, and the planet.

> "Risk management refers to coordinated activities to direct and control an organization with regard to risk" (Source: ISO 31000:2018).

While risk management processes generally address negative impacts, this Framework offers approaches to minimize anticipated negative impacts of AI systems *and* identify opportunities to maximize positive impacts. Effectively managing the risk of potential harms could lead to more trustworthy AI systems and unleash potential benefits to people (individuals, communities, and society), organizations, and systems/ecosystems. Risk management can enable AI developers and users to understand impacts and account for the inherent limitations and uncertainties in their models and systems, which in turn can improve overall system performance and trustworthiness and the likelihood that AI technologies will be used in ways that are beneficial.

The AI RMF is designed to address new risks as they emerge. This flexibility is particularly important where impacts are not easily foreseeable and applications are evolving. While some AI risks and benefits are well-known, it can be challenging to assess negative impacts and the degree of harms. Figure 1 provides examples of potential harms that can be related to AI systems.

AI risk management efforts should consider that humans may assume that AI systems work – and work well – in *all* settings. For example, whether correct or not, AI systems are often perceived as being more objective than humans or as offering greater capabilities than general software.

第1部分：基础信息

1. 风险界定

人工智能风险管理提供了一条途径，以最大限度地减少人工智能系统的潜在负面影响，例如对公民自由和权利的威胁，同时提供最大化积极影响的机会。有效应对、记录和管理人工智能风险及潜在负面影响，可以带来更可信的人工智能系统。

1.1 理解并应对风险、影响与危害

在AI RMF的语境中，风险是指事件发生概率与相应事件后果的严重程度或程度的综合度量。人工智能系统的影响或后果可以是积极的、消极的，或两者兼有，并可能带来机遇或威胁(改编自：ISO 31000:2018)。在考虑潜在事件的负面影响时，风险是以下两者的函数：1)如果情况或事件发生将产生的负面影响或伤害程度，以及2)发生的可能性(改编自：OMB Circular A-130:2016)。负面影响或伤害可由个人、群体、社区、组织、社会、环境和地球承受。

> "风险管理是指为针对风险指导和掌控组织而进行的协调活动"(来源：ISO 31000:2018)。

虽然风险管理流程通常针对负面影响，但本框架提供了最小化人工智能系统预期负面影响并识别最大化积极影响机会的方法。有效管理潜在危害风险可以带来更可信的人工智能系统，并释放对个人(个体、社区和社会)、组织和系统/生态系统的潜在益处。风险管理能够使人工智能开发者和用户理解影响，并对其模型和系统中固有的局限性和不确定性负责，这反过来可以提高整体系统性能和可信度，以及人工智能技术以有益方式被使用的可能性。

AI RMF旨在在新风险出现时加以应对。这种灵活性在影响不易预见且应用不断演变的情况下尤为重要。虽然某些人工智能风险和益处是众所周知的，但评估负面影响和危害程度可能具有挑战性。图1提供了可能与人工智能系统相关的潜在危害示例。

人工智能风险管理工作应考虑，人类可能假定人工智能系统在所有环境中都能工作--并且工作良好。例如，无论正确与否，人工智能系统常被认为比人类更客观，或比一般软件提供更强的能力。



Fig. 1. Examples of potential harms related to AI systems. Trustworthy AI systems and their responsible use can mitigate negative risks and contribute to benefits for people, organizations, and ecosystems.

1.2 Challenges for AI Risk Management

Several challenges are described below. They should be taken into account when managing risks in pursuit of AI trustworthiness.

1.2.1 Risk Measurement

AI risks or failures that are not well-defined or adequately understood are difficult to measure quantitatively or qualitatively. The inability to appropriately measure AI risks does not imply that an AI system necessarily poses either a high or low risk. Some risk measurement challenges include:

Risks related to third-party software, hardware, and data: Third-party data or systems can accelerate research and development and facilitate technology transition. They also may complicate risk measurement. Risk can emerge both from third-party data, software or hardware itself and how it is used. Risk metrics or methodologies used by the organization developing the AI system may not align with the risk metrics or methodologies uses by the organization *deploying or operating* the system. Also, the organization developing the AI system may not be transparent about the risk metrics or methodologies it used. Risk measurement and management can be complicated by how customers use or integrate third-party data or systems into AI products or services, particularly without sufficient internal governance structures and technical safeguards. Regardless, all parties and AI actors should manage risk in the AI systems they develop, deploy, or use as standalone or integrated components.

Tracking emergent risks: Organizations' risk management efforts will be enhanced by identifying and tracking emergent risks and considering techniques for measuring them.



图1.与人工智能系统相关的潜在危害示例。可信人工智能系统及其负责任的使用可以减轻负面风险，并有助于为人、组织和生态系统带来益处。

1.2 人工智能风险管理的挑战

下文描述了若干挑战。在管理风险以追求人工智能可信性时，应将这些挑战纳入考虑。

1.2.1 风险度量

未明确定义或未充分理解的人工智能风险或故障难以定量或定性度量。无法适当度量人工智能风险并不意味着人工智能系统必然构成高风险或低风险。一些风险度量挑战包括：

与第三方软件、硬件和数据相关的风险：第三方数据或系统可以加速研发并促进技术转化。它们也可能使风险度量复杂化。风险可能来自第三方数据、软件或硬件本身及其使用方式。开发人工智能系统的组织所使用的风险指标或方法可能与部署或运营该系统的组织所使用的风险指标或方法不一致。此外，开发人工智能系统的组织可能对其使用的风险指标或方法不够透明。客户如何将第三方数据或系统使用或集成到人工智能产品或服务中，尤其是在缺乏足够的内部治理结构和技术保障措施的情况下，可能使风险度量和管理复杂化。无论如何，各方和人工智能参与者应管理其作为独立或集成组件开发、部署或使用的人工智能系统中的风险。

跟踪新兴风险：通过识别和跟踪新兴风险并考虑度量这些风险的技术，组织的风险管理工作将得到加强。

AI system impact assessment approaches can help AI actors understand potential impacts or harms within specific contexts.

Availability of reliable metrics: The current lack of consensus on robust and verifiable measurement methods for risk and trustworthiness, and applicability to different AI use cases, is an AI risk measurement challenge. Potential pitfalls when seeking to measure negative risk or harms include the reality that development of metrics is often an institutional endeavor and may inadvertently reflect factors unrelated to the underlying impact. In addition, measurement approaches can be oversimplified, gamed, lack critical nuance, become relied upon in unexpected ways, or fail to account for differences in affected groups and contexts.

Approaches for measuring impacts on a population work best if they recognize that contexts matter, that harms may affect varied groups or sub-groups differently, and that communities or other sub-groups who may be harmed are not always direct users of a system.

Risk at different stages of the AI lifecycle: Measuring risk at an earlier stage in the AI lifecycle may yield different results than measuring risk at a later stage; some risks may be latent at a given point in time and may increase as AI systems adapt and evolve. Furthermore, different AI actors across the AI lifecycle can have different risk perspectives. For example, an AI developer who makes AI software available, such as pre-trained models, can have a different risk perspective than an AI actor who is responsible for deploying that pre-trained model in a specific use case. Such deployers may not recognize that their particular uses could entail risks which differ from those perceived by the initial developer. All involved AI actors share responsibilities for designing, developing, and deploying a trustworthy AI system that is fit for purpose.

Risk in real-world settings: While measuring AI risks in a laboratory or a controlled environment may yield important insights pre-deployment, these measurements may differ from risks that emerge in operational, real-world settings.

Inscrutability: Inscrutable AI systems can complicate risk measurement. Inscrutability can be a result of the opaque nature of AI systems (limited explainability or interpretability), lack of transparency or documentation in AI system development or deployment, or inherent uncertainties in AI systems.

Human baseline: Risk management of AI systems that are intended to augment or replace human activity, for example decision making, requires some form of baseline metrics for comparison. This is difficult to systematize since AI systems carry out different tasks – and perform tasks differently – than humans.

人工智能系统影响评估方法可以帮助人工智能参与者理解特定情境中的潜在影响或危害。

可靠指标的可用性：当前对于风险和可信度的稳健且可验证的度量方法及其对不同人工智能用例的适用性缺乏共识，这是一项人工智能风险度量挑战。在寻求度量负面风险或危害时，潜在的陷阱包括：指标的开发往往是一项制度性工作，可能无意中反映与底层影响无关的因素。此外，度量方法可能被过度简化、被操纵、缺乏关键细微差别、以意想不到的方式被依赖，或未能考虑受影响群体和情境的差异。

对人群影响的度量方法，如果能够认识到情境很重要、危害可能对不同群体或子群体产生不同影响，以及可能受到伤害的社区或其他子群体并不总是系统的直接用户，则效果最佳。

人工智能生命周期不同阶段的风险：在人工智能生命周期较早阶段度量风险可能产生与较晚阶段度量风险不同的结果；某些风险在特定时间点可能是潜在的，并可能随着人工智能系统的适应和演化而增加。此外，人工智能生命周期中不同的人工智能参与者可能具有不同的风险视角。例如，提供人工智能软件(如预训练模型)的人工智能开发者可能具有与负责在特定用例中部署该预训练模型的人工智能参与者不同的风险视角。此类部署者可能未意识到其特定用途可能带来与初始开发者所感知的不同风险。所有相关的人工智能参与者共同承担设计、开发和部署适合用途的可信人工智能系统的责任。

真实环境中的风险：虽然在实验室或受控环境中度量人工智能风险可能在部署前产生重要见解，但这些度量可能与在操作性的真实环境中出现的风险不同。

不可测性：不可测的人工智能系统会使风险度量复杂化。不可测性可能是人工智能系统不透明的本质(可解释性或可理解性有限)、人工智能系统开发或部署中缺乏透明度或文档，或人工智能系统固有的不确定性所导致的结果。

人类基线：对旨在增强或替代人类活动(例如决策)的人工智能系统进行风险管理，需要某种形式的基线度量以进行比较。这难以系统化，因为人工智能系统执行的任务与人类不同--且执行任务的方式也与人类不同。

1.2.2 Risk Tolerance

While the AI RMF can be used to prioritize risk, it does not prescribe risk tolerance. *Risk tolerance* refers to the organization's or AI actor's (see Appendix A) readiness to bear the risk in order to achieve its objectives. Risk tolerance can be influenced by legal or regulatory requirements (Adapted from: ISO GUIDE 73). Risk tolerance and the level of risk that is acceptable to organizations or society are highly contextual and application and use-case specific. Risk tolerances can be influenced by policies and norms established by AI system owners, organizations, industries, communities, or policy makers. Risk tolerances are likely to change over time as AI systems, policies, and norms evolve. Different organizations may have varied risk tolerances due to their particular organizational priorities and resource considerations.

Emerging knowledge and methods to better inform harm/cost-benefit tradeoffs will continue to be developed and debated by businesses, governments, academia, and civil society. To the extent that challenges for specifying AI risk tolerances remain unresolved, there may be contexts where a risk management framework is not yet readily applicable for mitigating negative AI risks.

The Framework is intended to be flexible and to augment existing risk practices which should align with applicable laws, regulations, and norms. Organizations should follow existing regulations and guidelines for risk criteria, tolerance, and response established by organizational, domain, discipline, sector, or professional requirements. Some sectors or industries may have established definitions of harm or established documentation, reporting, and disclosure requirements. Within sectors, risk management may depend on existing guidelines for specific applications and use case settings. Where established guidelines do not exist, organizations should define reasonable risk tolerance. Once tolerance is defined, this AI RMF can be used to manage risks and to document risk management processes.

1.2.3 Risk Prioritization

Attempting to eliminate negative risk entirely can be counterproductive in practice because not all incidents and failures can be eliminated. Unrealistic expectations about risk may lead organizations to allocate resources in a manner that makes risk triage inefficient or impractical or wastes scarce resources. A risk management culture can help organizations recognize that not all AI risks are the same, and resources can be allocated purposefully. Actionable risk management efforts lay out clear guidelines for assessing trustworthiness of each AI system an organization develops or deploys. Policies and resources should be prioritized based on the assessed risk level and potential impact of an AI system. The extent to which an AI system may be customized or tailored to the specific context of use by the AI deployer can be a contributing factor.

1.2.2 风险容忍度

虽然 AI RMF 可用于确定风险优先级，但它并不规定风险容忍度。风险容忍度是指组织或人工智能参与者(见附录 A)为实现其目标而承担风险的准备程度。风险容忍度可能受到法律或监管要求的影响(改编自：ISO GUIDE 73)。风险容忍度以及组织或社会可接受的风险水平高度依赖于情境和具体应用及用例。风险容忍度可能受到人工智能系统所有者、组织、行业、社区或政策制定者所制定的政策和规范的影响。风险容忍度可能随着人工智能系统、政策和规范的演进而随时间变化。不同组织可能因其特定的组织优先事项和资源考量而具有不同的风险容忍度。

用于更好地为危害/成本效益权衡提供信息的新兴知识和方法将继续由企业、政府、学术界和公民社会开发和辩论。在明确人工智能风险容忍度方面的挑战仍未解决的范围内，可能存在某些情境，其中风险管理框架尚不能 readily 适用于缓解负面人工智能风险。

该框架旨在保持灵活性，并增强现有的风险实践，这些实践应与适用的法律、法规和规范保持一致。组织应遵循由组织、领域、学科、行业或专业要求所确立的现有法规和指南，涉及风险标准、容忍度和响应。某些行业或产业可能已确立损害的定义或既定的文档、报告和披露要求。在行业内，风险管理可能取决于针对特定应用和用例场景的现有指南。在不存在既定指南的情况下，组织应定义合理的风险容忍度。一旦定义了容忍度，即可使用本 AI RMF 来管理风险并记录风险管理过程。

1.2.3 风险优先级排序

试图完全消除负面风险在实践中可能适得其反，因为并非所有事件和故障都能被消除。对风险的不切实际期望可能导致组织以低效或不切实际的方式进行风险分类，或浪费稀缺资源。风险管理文化可以帮助组织认识到并非所有 AI 风险都相同，从而可以有目的地分配资源。可操作的风险管理工作为评估组织开发或部署的每个人工智能系统的可信度制定了明确的指南。政策和资源应根据所评估的风险水平和人工智能系统的潜在影响来确定优先级。人工智能系统可由 AI 部署者根据特定使用情境进行定制或调整的程度，可能是一个促成因素。

When applying the AI RMF, risks which the organization determines to be highest for the AI systems within a given context of use call for the most urgent prioritization and most thorough risk management process. In cases where an AI system presents unacceptable negative risk levels – such as where significant negative impacts are imminent, severe harms are actually occurring, or catastrophic risks are present – development and deployment should cease in a safe manner until risks can be sufficiently managed. If an AI system's development, deployment, and use cases are found to be low-risk in a specific context, that may suggest potentially lower prioritization.

Risk prioritization may differ between AI systems that are designed or deployed to directly interact with humans as compared to AI systems that are not. Higher initial prioritization may be called for in settings where the AI system is trained on large datasets comprised of sensitive or protected data such as personally identifiable information, or where the outputs of the AI systems have direct or indirect impact on humans. AI systems designed to interact only with computational systems and trained on non-sensitive datasets (for example, data collected from the physical environment) may call for lower initial prioritization. Nonetheless, regularly assessing and prioritizing risk based on context remains important because non-human-facing AI systems can have downstream safety or social implications.

Residual risk – defined as risk remaining after risk treatment (Source: ISO GUIDE 73) – directly impacts end users or affected individuals and communities. Documenting residual risks will call for the system provider to fully consider the risks of deploying the AI product and will inform end users about potential negative impacts of interacting with the system.

1.2.4 Organizational Integration and Management of Risk

AI risks should not be considered in isolation. Different AI actors have different responsibilities and awareness depending on their roles in the lifecycle. For example, organizations developing an AI system often will not have information about how the system may be used. AI risk management should be integrated and incorporated into broader enterprise risk management strategies and processes. Treating AI risks along with other critical risks, such as cybersecurity and privacy, will yield a more integrated outcome and organizational efficiencies.

The AI RMF may be utilized along with related guidance and frameworks for managing AI system risks or broader enterprise risks. Some risks related to AI systems are common across other types of software development and deployment. Examples of overlapping risks include: privacy concerns related to the use of underlying data to train AI systems; the energy and environmental implications associated with resource-heavy computing demands; security concerns related to the confidentiality, integrity, and availability of the system and its training and output data; and general security of the underlying software and hardware for AI systems.

在应用 AI RMF 时，组织确定为特定使用情境下人工智能系统最高风险的风险，需要最紧迫的优先级排序和最彻底的风险管理过程。在人工智能系统呈现不可接受的负面风险水平的情况下--例如重大负面影响即将发生、严重损害正在实际发生或存在灾难性风险--应以安全方式停止开发和部署，直至风险能够得到充分管理。如果人工智能系统的开发、部署和用例在特定情境中被发现为低风险，这可能表明潜在的优先级较低。

设计或部署用于直接与人类交互的人工智能系统与不直接与人类交互的人工智能系统之间，风险优先级排序可能有所不同。在人工智能系统使用由敏感或受保护数据(如个人可识别信息)组成的大型数据集进行训练的情况下，或人工智能系统的输出对人类产生直接或间接影响的情况下，可能需要更高的初始优先级。设计为仅与计算系统交互并使用非敏感数据集(例如从物理环境收集的数据)训练的人工智能系统，可能需要较低的初始优先级。尽管如此，基于情境定期评估和优先排序风险仍然很重要，因为非面向人类的人工智能系统可能具有下游安全或社会影响。

剩余风险--定义为风险处理后剩余的风险(来源：ISO GUIDE 73)--直接影响最终用户或受影响的个人和社区。记录剩余风险将要求系统提供者充分考虑部署人工智能产品的风险，并将告知最终用户与系统交互的潜在负面影响。

1.2.4 组织整合与风险管理

AI 风险不应被孤立地考虑。不同的人工智能参与者根据其在生命周期中的角色承担不同的责任和认知。例如，开发人工智能系统的组织通常不会掌握该系统可能如何被使用的信息。AI 风险管理应被整合并纳入更广泛的企业风险管理策略和流程中。将 AI 风险与网络安全和隐私等其他关键风险一并处理，将产生更整合的成果和组织效率。

AI RMF 可与相关指南和框架一起使用，以管理人工智能系统风险或更广泛的企业风险。与人工智能系统相关的一些风险在其他类型的软件开发和部署中也很常见。重叠风险的示例包括：与使用底层数据训练人工智能系统相关的隐私问题；与资源密集型计算需求相关的能源和环境影响；与系统及其训练和输出数据的机密性、完整性和可用性相关的安全问题；以及人工智能系统底层软件和硬件的一般安全性。

Organizations need to establish and maintain the appropriate accountability mechanisms, roles and responsibilities, culture, and incentive structures for risk management to be effective. Use of the AI RMF alone will not lead to these changes or provide the appropriate incentives. Effective risk management is realized through organizational commitment at senior levels and may require cultural change within an organization or industry. In addition, small to medium-sized organizations managing AI risks or implementing the AI RMF may face different challenges than large organizations, depending on their capabilities and resources.

2. Audience

Identifying and managing AI risks and potential impacts – both positive and negative – requires a broad set of perspectives and actors across the AI lifecycle. Ideally, AI actors will represent a diversity of experience, expertise, and backgrounds and comprise demographically and disciplinarily diverse teams. The AI RMF is intended to be used by AI actors across the AI lifecycle and dimensions.

The OECD has developed a framework for classifying AI lifecycle activities according to five key socio-technical dimensions, each with properties relevant for AI policy and governance, including risk management [OECD (2022) OECD Framework for the Classification of AI systems — OECD Digital Economy Papers]. Figure 2 shows these dimensions, slightly modified by NIST for purposes of this framework. The NIST modification highlights the importance of test, evaluation, verification, and validation (TEVV) processes throughout an AI lifecycle and generalizes the operational context of an AI system.

AI dimensions displayed in Figure 2 are the Application Context, Data and Input, AI Model, and Task and Output. AI actors involved in these dimensions who perform or manage the design, development, deployment, evaluation, and use of AI systems and drive AI risk management efforts are the *primary* AI RMF audience.

Representative AI actors across the lifecycle dimensions are listed in Figure 3 and described in detail in Appendix A. Within the AI RMF, all AI actors work together to manage risks and achieve the goals of trustworthy and responsible AI. AI actors with TEVV-specific expertise are integrated throughout the AI lifecycle and are especially likely to benefit from the Framework. Performed regularly, TEVV tasks can provide insights relative to technical, societal, legal, and ethical standards or norms, and can assist with anticipating impacts and assessing and tracking emergent risks. As a regular process within an AI lifecycle, TEVV allows for both mid-course remediation and post-hoc risk management.

The People & Planet dimension at the center of Figure 2 represents human rights and the broader well-being of society and the planet. The AI actors in this dimension comprise a separate AI RMF audience who *informs* the primary audience. These AI actors may include trade associations, standards developing organizations, researchers, advocacy groups,

组织需要建立并维护适当的问责机制、角色与职责、文化以及激励结构，才能使风险管理有效。仅使用 AI RMF 不会带来这些变化，也不会提供适当的激励。有效的风险管理通过高层领导的组织承诺来实现，并且可能需要在组织或行业内部进行文化变革。此外，与大型组织相比，管理人工智能风险或实施 AI RMF 的中小型组织可能因其能力和资源不同而面临不同的挑战。

2. Audience

识别和管理人工智能风险及潜在影响--包括正面和负面--需要人工智能生命周期中广泛的视角和参与者。理想情况下，人工智能参与者应代表多样化的经验、专业知识和背景，并组成人口统计和学科多样化的团队。AI RMF 旨在供人工智能生命周期和各个维度中的人工智能参与者使用。

OECD 制定了一个框架，根据五个关键社会技术维度对人工智能生命周期活动进行分类，每个维度都具有与人工智能政策和治理(包括风险管理)相关的属性[OECD(2022) OECD Framework for the Classification of AI systems - OECD Digital Economy Papers]。图 2 显示了这些维度，NIST 为本框架的目的稍作修改。NIST 的修改强调了测试、评估、验证与确认(TEVV)过程在整个人工智能生命周期中的重要性，并概括了人工智能系统的运行背景。

图 2 中显示的人工智能维度是应用情境、数据和输入、人工智能模型，以及任务和输出。参与这些维度、执行或管理人工智能系统的设计、开发、部署、评估和使用并推动人工智能风险管理努力的人工智能参与者是主要 AI RMF 受众。

图 3 列出了生命周期维度中具有代表性的人工智能参与者，并在附录 A 中详细描述。在 AI RMF 中，所有人工智能参与者共同努力管理风险，实现可信和负责任的人工智能目标。具备 TEVV 专业知识的人工智能参与者贯穿整个人工智能生命周期，尤其可能从本框架中受益。定期执行 TEVV 任务可以提供与技术、社会、法律和伦理标准或规范相关的见解，并有助于预测影响以及评估和跟踪新兴风险。作为人工智能生命周期内的常规过程，TEVV 允许进行中途补救和事后风险管理。

图 2 中心的人与地球维度代表人权以及社会和地球更广泛的福祉。该维度中的人工智能参与者构成一个单独的 AI RMF 受众，他们告知主要受众。这些人工智能参与者可能包括行业协会、标准制定组织、研究人员、倡导团体、

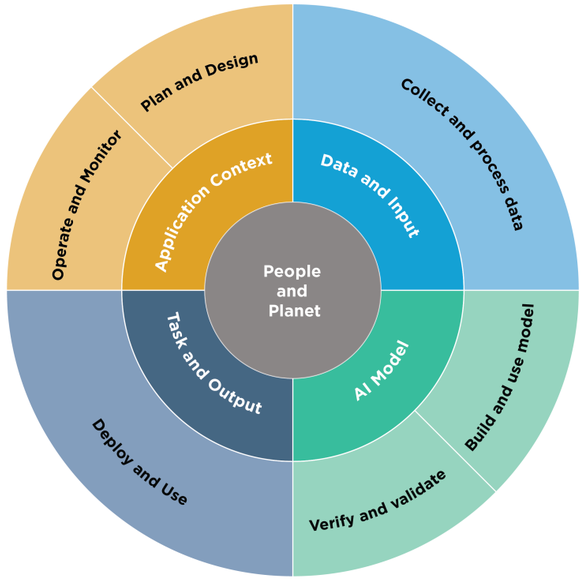


Fig. 2. Lifecycle and Key Dimensions of an AI System. Modified from OECD (2022) OECD Framework for the Classification of AI systems — OECD Digital Economy Papers. The two inner circles show AI systems' key dimensions and the outer circle shows AI lifecycle stages. Ideally, risk management efforts start with the Plan and Design function in the application context and are performed throughout the AI system lifecycle. See Figure 3 for representative AI actors.

environmental groups, civil society organizations, end users, and potentially impacted individuals and communities. These actors can:

- assist in providing context and understanding potential and actual impacts;
- be a source of formal or quasi-formal norms and guidance for AI risk management;
- designate boundaries for AI operation (technical, societal, legal, and ethical); and
- promote discussion of the tradeoffs needed to balance societal values and priorities related to civil liberties and rights, equity, the environment and the planet, and the economy.

Successful risk management depends upon a sense of collective responsibility among AI actors shown in Figure 3. The AI RMF functions, described in Section 5, require diverse perspectives, disciplines, professions, and experiences. Diverse teams contribute to more open sharing of ideas and assumptions about the purposes and functions of technology – making these implicit aspects more explicit. This broader collective perspective creates opportunities for surfacing problems and identifying existing and emergent risks.

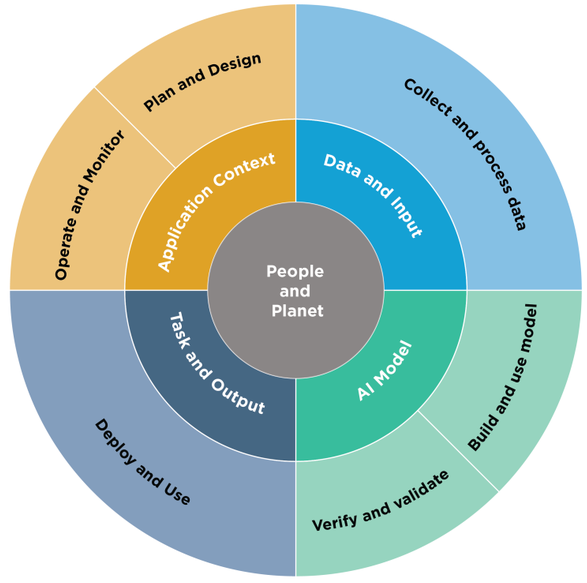


图 2.人工智能系统的生命周期和关键维度。修改自 OECD(2022)OECD 人工智能系统分类框架--OECD 数字经济论文。两个内圈显示人工智能系统的关键维度，外圈显示人工智能生命周期阶段。理想情况下，风险管理努力从应用情境中的规划和设计功能开始，并在人工智能系统生命周期中持续进行。有关代表性人工智能参与者，见图 3。

环境团体、公民社会组织、最终用户以及可能受影响的个人和社区。这些参与者可以：

- 协助提供背景信息并理解潜在和实际影响；
- 成为人工智能风险管理正式或准正式规范和指导的来源；
- 为人工智能运行指定边界(技术、社会、法律和伦理方面)；以及
- 促进关于平衡与社会价值观和优先事项(涉及公民自由和权利、公平、环境和地球以及经济)所需权衡的讨论。

成功的风险管理取决于图 3 所示人工智能参与者之间的集体责任感。第 5 节描述的 AI RMF 功能需要不同的视角、学科、专业和经验。多元化的团队有助于更开放地分享关于技术目的和功能的观点和假设--使这些隐性方面更加明确。这种更广泛的集体视角为发现问题以及识别现有和新兴风险创造了机会。

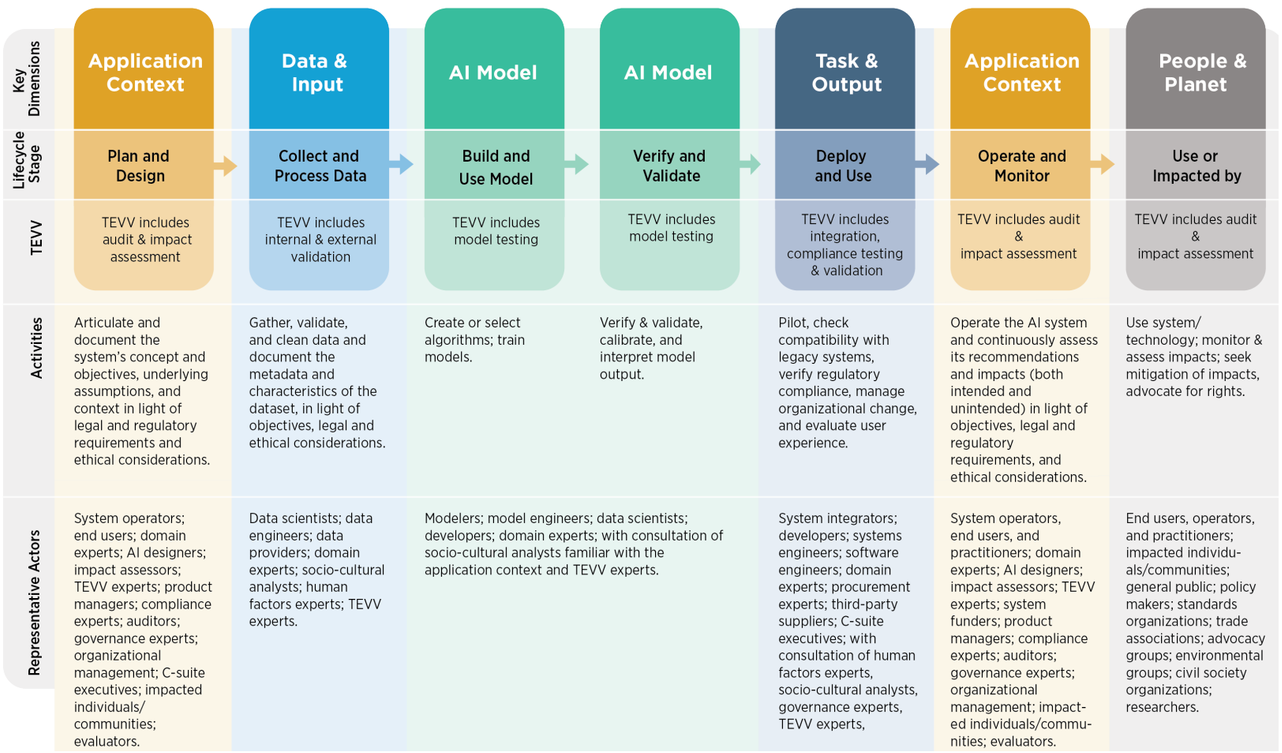


Fig. 3. AI actors across AI lifecycle stages. See Appendix A for detailed descriptions of AI actor tasks, including details about testing, evaluation, verification, and validation tasks. Note that AI actors in the AI Model dimension (Figure 2) are separated as a best practice, with those building and using the models separated from those verifying and validating the models.

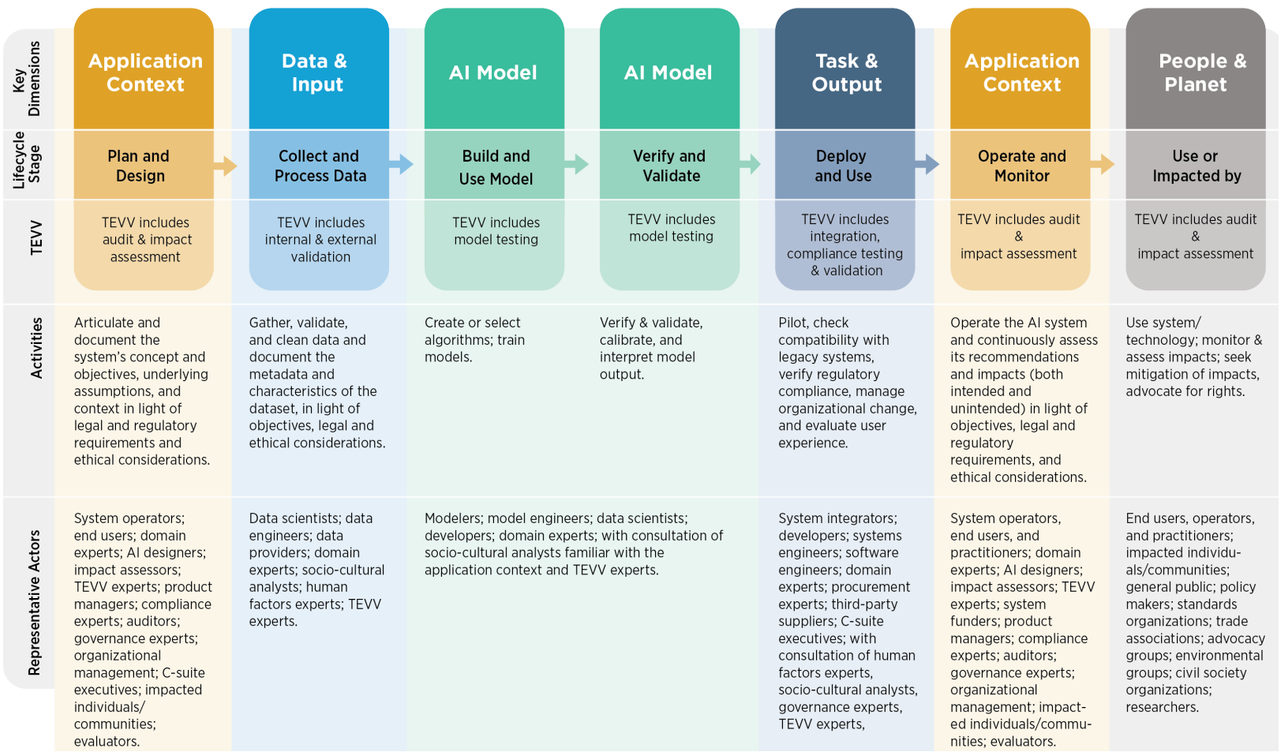


图 3.跨人工智能生命周期阶段的人工智能参与者。有关人工智能参与者任务的详细描述，包括关于测试的详细信息，见附录 A，评估、验证和确认任务。请注意，人工智能模型维度(图 2)中的人工智能参与者被分开作为最佳实践，其中构建和使用模型的人员与验证和确认模型的人员分开。

3. AI Risks and Trustworthiness

For AI systems to be trustworthy, they often need to be responsive to a multiplicity of criteria that are of value to interested parties. Approaches which enhance AI trustworthiness can reduce negative AI risks. This Framework articulates the following **characteristics** of trustworthy AI and offers guidance for addressing them. Characteristics of trustworthy AI systems include: **valid and reliable, safe, secure and resilient, accountable and transparent, explainable and interpretable, privacy-enhanced, and fair with harmful bias managed.** Creating trustworthy AI requires balancing each of these characteristics based on the AI system's context of use. While all characteristics are socio-technical system attributes, accountability and transparency also relate to the processes and activities internal to an AI system and its external setting. Neglecting these characteristics can increase the probability and magnitude of negative consequences.



Fig. 4. Characteristics of trustworthy AI systems. Valid & Reliable is a necessary condition of trustworthiness and is shown as the base for other trustworthiness characteristics. Accountable & Transparent is shown as a vertical box because it relates to all other characteristics.

Trustworthiness characteristics (shown in Figure 4) are inextricably tied to social and organizational behavior, the datasets used by AI systems, selection of AI models and algorithms and the decisions made by those who build them, and the interactions with the humans who provide insight from and oversight of such systems. Human judgment should be employed when deciding on the specific metrics related to AI trustworthiness characteristics and the precise threshold values for those metrics.

Addressing AI trustworthiness characteristics individually will not ensure AI system trustworthiness; tradeoffs are usually involved, rarely do all characteristics apply in every setting, and some will be more or less important in any given situation. Ultimately, trustworthiness is a social concept that ranges across a spectrum and is only as strong as its weakest characteristics.

When managing AI risks, organizations can face difficult decisions in balancing these characteristics. For example, in certain scenarios tradeoffs may emerge between optimizing for interpretability and achieving privacy. In other cases, organizations might face a tradeoff between predictive accuracy and interpretability. Or, under certain conditions such as data sparsity, privacy-enhancing techniques can result in a loss in accuracy, affecting decisions

3. AI 风险与可信度

为使人工智能系统可信，它们通常需要对利益相关方所重视的多重标准作出响应。增强人工智能可信性的方法可以减少负面的人工智能风险。本框架阐述了可信人工智能的以下**特性**，并提供了应对这些特性的指导。可信人工智能系统的特性包括：**有效且可靠、安全、可靠且有韧性、可问责且透明、可解释且可理解、隐私增强，以及公平且有害偏见得到管理。**创建可信人工智能需要根据人工智能系统的使用情境平衡上述每一项特性。虽然所有特性都是社会技术系统属性，但可问责性和透明度还与人工智能系统内部及其外部环境中的过程和活动相关。忽视这些特性会增加负面后果的概率和严重程度。

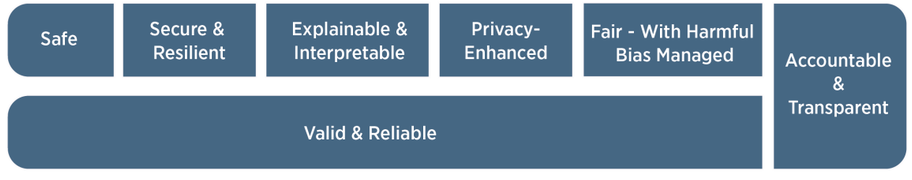


图4.可信人工智能系统的特征。有效且可靠是可信性的必要条件，并作为其他可信性特征的基础。可问责且透明被显示为一个垂直框，因为它与其他所有特征都相关。

可信性特征(如图4所示)与社会和组织行为、人工智能系统所使用的数据集、人工智能模型和算法的选择以及构建者所做的决策，以及与提供洞察和监督此类系统的人类之间的互动密不可分。在决定与人工智能可信性特征相关的具体指标以及这些指标的精确阈值时，应当运用人类判断。

单独处理人工智能可信性特征并不能确保人工智能系统的可信性；通常涉及权衡，很少所有特征都适用于每种情境，而在任何给定情况下某些特征会或多或少地重要。最终，可信性是一个社会概念，跨越一个谱系，其强度仅取决于其最弱的特征。

在管理人工智能风险时，组织在平衡这些特征方面可能面临艰难决策。例如，在某些场景中，优化可解释性与实现隐私之间可能出现权衡。在其他情况下，组织可能面临预测准确性与可解释性之间的权衡。或者，在某些条件下，如数据稀疏时，隐私增强技术可能导致准确性损失，影响决策

about fairness and other values in certain domains. Dealing with tradeoffs requires taking into account the decision-making context. These analyses can highlight the existence and extent of tradeoffs between different measures, but they do not answer questions about how to navigate the tradeoff. Those depend on the values at play in the relevant *context* and should be resolved in a manner that is both transparent and appropriately justifiable.

There are multiple approaches for enhancing contextual awareness in the AI lifecycle. For example, subject matter experts can assist in the evaluation of TEVV findings and work with product and deployment teams to align TEVV parameters to requirements and deployment conditions. When properly resourced, increasing the breadth and diversity of input from interested parties and relevant AI actors throughout the AI lifecycle can enhance opportunities for informing contextually sensitive evaluations, and for identifying AI system benefits and positive impacts. These practices can increase the likelihood that risks arising in social contexts are managed appropriately.

Understanding and treatment of trustworthiness characteristics depends on an AI actor's particular role within the AI lifecycle. For any given AI system, an AI designer or developer may have a different perception of the characteristics than the deployer.

Trustworthiness characteristics explained in this document influence each other. Highly secure but unfair systems, accurate but opaque and uninterpretable systems, and inaccurate but secure, privacy-enhanced, and transparent systems are all undesirable. A comprehensive approach to risk management calls for balancing tradeoffs among the trustworthiness characteristics. It is the joint responsibility of all AI actors to determine whether AI technology is an appropriate or necessary tool for a given context or purpose, and how to use it responsibly. The decision to commission or deploy an AI system should be based on a contextual assessment of trustworthiness characteristics and the relative risks, impacts, costs, and benefits, and informed by a broad set of interested parties.

3.1 Valid and Reliable

Validation is the "confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled" (Source: ISO 9000:2015). Deployment of AI systems which are inaccurate, unreliable, or poorly generalized to data and settings beyond their training creates and increases negative AI risks and reduces trustworthiness.

Reliability is defined in the same standard as the "ability of an item to perform as required, without failure, for a given time interval, under given conditions" (Source: ISO/IEC TS 5723:2022). Reliability is a goal for overall correctness of AI system operation under the conditions of expected use and over a given period of time, including the entire lifetime of the system.

关于某些领域中的公平性和其他价值观。处理权衡需要考虑决策背景。这些分析可以突显不同度量之间权衡的存在和程度，但它们不能回答如何驾驭权衡的问题。这些取决于相关背景中起作用的价值观，并应以既透明又适当合理的方式加以解决。

在人工智能生命周期中增强情境意识有多种方法。例如，主题专家可以协助评估TEVV发现结果，并与产品和部署团队合作，使TEVV参数与需求和部署条件保持一致。在资源充足的情况下，在整个人工智能生命周期中增加来自利益相关方和相关人工智能参与者的输入的广度和多样性，可以增加为情境敏感评估提供信息以及识别人工智能系统效益和积极影响的机会。这些做法可以提高适当管理社会情境中产生的风险的可能性。

对可信性特征的理解和处理取决于人工智能参与者在人工智能生命周期中的特定角色。对于任何给定的人工智能系统，人工智能设计者或开发者对特征的看法可能与部署者不同。

本文件中解释的可信性特性相互影响。高度安全但不公平的系统、准确但不透明且不可解释的系统，以及不准确但安全、隐私增强且透明的系统，都是不可取的。全面的风险管理方法要求平衡可信性特性之间的权衡。所有人工智能参与者共同负责确定人工智能技术对于特定情境或目的是否是适当或必要的工具，以及如何负责任地使用它。委托或部署人工智能系统的决定应基于对可信性特性以及相对风险、影响、成本和效益的情境评估，并应听取广泛利益相关方的意见。

3.1 有效且可靠

确认是"通过提供客观证据，确认特定预期用途或应用的要求已得到满足"(来源：ISO 9000:2015)。部署不准确、不可靠或对其训练数据及训练之外的环境泛化能力差的人工智能系统会创造并增加负面人工智能风险，并降低可信性。

可靠性在同一标准中定义为"项目在给定条件下、在给定时间间隔内无故障地按要求执行的能力"(来源：ISO / IEC TS 5723:2022)。可靠性是人工智能系统在预期使用条件下和给定时间段内(包括系统的整个生命周期)整体正确运行的目标。

Accuracy and robustness contribute to the validity and trustworthiness of AI systems, and can be in tension with one another in AI systems.

Accuracy is defined by ISO/IEC TS 5723:2022 as "closeness of results of observations, computations, or estimates to the true values or the values accepted as being true." Measures of accuracy should consider computational-centric measures (e.g., false positive and false negative rates), human-AI teaming, and demonstrate external validity (generalizable beyond the training conditions). Accuracy measurements should always be paired with clearly defined and realistic test sets – that are representative of conditions of expected use – and details about test methodology; these should be included in associated documentation. Accuracy measurements may include disaggregation of results for different data segments.

Robustness or *generalizability* is defined as the "ability of a system to maintain its level of performance under a variety of circumstances" (Source: ISO/IEC TS 5723:2022). Robustness is a goal for appropriate system functionality in a broad set of conditions and circumstances, including uses of AI systems not initially anticipated. Robustness requires not only that the system perform exactly as it does under expected uses, but also that it should perform in ways that minimize potential harms to people if it is operating in an unexpected setting.

Validity and reliability for deployed AI systems are often assessed by ongoing testing or monitoring that confirms a system is performing as intended. Measurement of validity, accuracy, robustness, and reliability contribute to trustworthiness and should take into consideration that certain types of failures can cause greater harm. AI risk management efforts should prioritize the minimization of potential negative impacts, and may need to include human intervention in cases where the AI system cannot detect or correct errors.

3.2 Safe

AI systems should "not under defined conditions, lead to a state in which human life, health, property, or the environment is endangered" (Source: ISO/IEC TS 5723:2022). Safe operation of AI systems is improved through:

- responsible design, development, and deployment practices;
- clear information to deployers on responsible use of the system;
- responsible decision-making by deployers and end users; and
- explanations and documentation of risks based on empirical evidence of incidents.

Different types of safety risks may require tailored AI risk management approaches based on context and the severity of potential risks presented. Safety risks that pose a potential risk of serious injury or death call for the most urgent prioritization and most thorough risk management process.

准确性和稳健性有助于人工智能系统的有效性和可信性，并且在人工智能系统中可能相互紧张。

准确性由ISO / IEC TS 5723:2022定义为"观测、计算或估计结果与真实值或被接受为真实的值之间的接近程度"。准确性度量应考虑以计算为中心的度量(例如，假阳性和假阴性率)、人机协作，并展示外部有效性(可推广到训练条件之外)。准确性测量应始终与明确定义且具有代表性的测试集(代表预期使用条件)以及测试方法细节配对；这些应包含在相关文档中。准确性测量可以包括对不同数据段的结果进行分解。

稳健性或泛化性被定义为"系统在多种情况下保持其性能水平的能力"(来源：ISO / IEC TS 5723:2022)。稳健性是在广泛条件和情况下实现适当系统功能的目标，包括对人工智能系统最初未预料到的使用。稳健性不仅要求系统在预期使用下完全按其所为运行，还要求如果系统在意外环境中运行，其运行方式应尽量减少对人的潜在伤害。

已部署人工智能系统的有效性和可靠性通常通过持续测试或监测来评估，以确认系统按预期运行。对有效性、准确性、鲁棒性和可靠性的度量有助于提升可信度，并应考虑某些类型的故障可能造成更大危害。人工智能风险管理工作应优先考虑最小化潜在负面影响，并且在人工智能系统无法检测或纠正错误的情况下，可能需要纳入人工干预。

3.2 安全

人工智能系统应"在规定的条件下，不会导致人类生命、健康、财产或环境受到危害的状态"(来源：ISO / IEC TS 5723:2022)。人工智能系统的安全运行通过以下方式得到改善：

- 负责任的设计、开发与部署实践；
- 向部署者提供关于系统负责任使用的明确信息；
- 部署方和最终用户做出负责任的决策；以及
- 基于事件经验证据的风险解释和文档记录。

不同类型的安全风险可能需要基于背景和潜在风险的严重程度采取定制的人工智能风险管理方法。构成严重伤害或死亡潜在风险的安全风险需要最紧急的优先处理和最彻底的风险管理过程。

Employing safety considerations during the lifecycle and starting as early as possible with planning and design can prevent failures or conditions that can render a system dangerous. Other practical approaches for AI safety often relate to rigorous simulation and in-domain testing, real-time monitoring, and the ability to shut down, modify, or have human intervention into systems that deviate from intended or expected functionality.

AI safety risk management approaches should take cues from efforts and guidelines for safety in fields such as transportation and healthcare, and align with existing sector- or application-specific guidelines or standards.

3.3 Secure and Resilient

AI systems, as well as the ecosystems in which they are deployed, may be said to be *resilient* if they can withstand unexpected adverse events or unexpected changes in their environment or use – or if they can maintain their functions and structure in the face of internal and external change and degrade safely and gracefully when this is necessary (Adapted from: ISO/IEC TS 5723:2022). Common security concerns relate to adversarial examples, data poisoning, and the exfiltration of models, training data, or other intellectual property through AI system endpoints. AI systems that can maintain confidentiality, integrity, and availability through protection mechanisms that prevent unauthorized access and use may be said to be *secure*. Guidelines in the NIST Cybersecurity Framework and Risk Management Framework are among those which are applicable here.

Security and resilience are related but distinct characteristics. While resilience is the ability to return to normal function after an unexpected adverse event, security includes resilience but also encompasses protocols to avoid, protect against, respond to, or recover from attacks. Resilience relates to robustness and goes beyond the provenance of the data to encompass unexpected or adversarial use (or abuse or misuse) of the model or data.

3.4 Accountable and Transparent

Trustworthy AI depends upon accountability. Accountability presupposes transparency. *Transparency* reflects the extent to which information about an AI system and its outputs is available to individuals interacting with such a system – regardless of whether they are even aware that they are doing so. Meaningful transparency provides access to appropriate levels of information based on the stage of the AI lifecycle and tailored to the role or knowledge of AI actors or individuals interacting with or using the AI system. By promoting higher levels of understanding, transparency increases confidence in the AI system.

This characteristic's scope spans from design decisions and training data to model training, the structure of the model, its intended use cases, and how and when deployment, post-deployment, or end user decisions were made and by whom. Transparency is often necessary for actionable redress related to AI system outputs that are incorrect or otherwise lead to negative impacts. Transparency should consider human-AI interaction: for exam-

在生命周期中考虑安全因素并尽早从规划和设计开始，可以防止可能导致系统危险的故障或状况。人工智能安全的其他实用方法通常涉及严格的模拟和域内测试、实时监控，以及对偏离预期或期望功能的系统进行关闭、修改或人工干预的能力。

人工智能安全风险管理方法应从交通和医疗等领域的安全工作和指南中汲取经验，并与现有的行业或应用特定指南或标准保持一致。

3.3 安全与韧性

人工智能系统及其部署所在的生态系统，如果能够承受意外的不利事件或其环境或用途的意外变化--或者如果能够在面对内部和外部变化时维持其功能和结构，并在必要时安全、平稳地降级--则可被称为韧性(改编自：ISO / IEC TS 5723:2022)。常见的安全关切涉及对抗性样本、数据投毒，以及通过人工智能系统端点泄露模型、训练数据或其他知识产权。能够通过防止未经授权访问和使用的保护机制维持机密性、完整性和可用性的人工智能系统，可被称为安全。NIST网络安全框架和风险管理框架中的指南属于此处适用的指南之列。

安全性和韧性是相关但不同的特征。韧性是在意外不利事件后恢复正常功能的能力，而安全性包括韧性，但也涵盖避免、防护、响应或从攻击中恢复的协议。韧性与稳健性相关，并超越数据来源，涵盖对模型或数据的意外或对抗性使用(或滥用或误用)。

3.4 可问责且透明

可信人工智能依赖于问责制。问责制以透明度为前提。透明度反映了关于人工智能系统及其输出的信息可供与该系统交互的个人获取的程度--无论他们是否意识到自己正在这样做。有意义的透明度根据人工智能生命周期的阶段提供适当层级的信息获取渠道，并针对人工智能参与者或与人工智能系统交互或使用该系统的个人的角色或知识进行调整。通过促进更高水平的理解，透明度增强了对人工智能系统的信心。

该特征的范围从设计决策和训练数据到模型训练、模型结构、其预期用例，以及部署、部署后或最终用户决策的方式、时间和决策者。透明度通常对于与不正确或以其他方式导致负面影响的人工智能系统输出相关的可操作补救是必要的。透明度应考虑人机互动：例如，

ple, how a human operator or user is notified when a potential or actual adverse outcome caused by an AI system is detected. A transparent system is not necessarily an accurate, privacy-enhanced, secure, or fair system. However, it is difficult to determine whether an opaque system possesses such characteristics, and to do so over time as complex systems evolve.

The role of AI actors should be considered when seeking accountability for the outcomes of AI systems. The relationship between risk and accountability associated with AI and technological systems more broadly differs across cultural, legal, sectoral, and societal contexts. When consequences are severe, such as when life and liberty are at stake, AI developers and deployers should consider proportionally and proactively adjusting their transparency and accountability practices. Maintaining organizational practices and governing structures for harm reduction, like risk management, can help lead to more accountable systems.

Measures to enhance transparency and accountability should also consider the impact of these efforts on the implementing entity, including the level of necessary resources and the need to safeguard proprietary information.

Maintaining the provenance of training data and supporting attribution of the AI system's decisions to subsets of training data can assist with both transparency and accountability. Training data may also be subject to copyright and should follow applicable intellectual property rights laws.

As transparency tools for AI systems and related documentation continue to evolve, developers of AI systems are encouraged to test different types of transparency tools in cooperation with AI deployers to ensure that AI systems are used as intended.

3.5 Explainable and Interpretable

Explainability refers to a representation of the mechanisms underlying AI systems' operation, whereas *interpretability* refers to the meaning of AI systems' output in the context of their designed functional purposes. Together, explainability and interpretability assist those operating or overseeing an AI system, as well as users of an AI system, to gain deeper insights into the functionality and trustworthiness of the system, including its outputs. The underlying assumption is that perceptions of negative risk stem from a lack of ability to make sense of, or contextualize, system output appropriately. Explainable and interpretable AI systems offer information that will help end users understand the purposes and potential impact of an AI system.

Risk from lack of explainability may be managed by describing how AI systems function, with descriptions tailored to individual differences such as the user's role, knowledge, and skill level. Explainable systems can be debugged and monitored more easily, and they lend themselves to more thorough documentation, audit, and governance.

当检测到由人工智能系统引起的潜在或实际不利结果时，如何通知人类操作员或用户。透明的系统不一定是准确的、隐私增强的、安全的或公平的系统。然而，很难确定一个不透明的系统是否具备这些特征，并且随着复杂系统的演变而长期确定这一点也很困难。

在寻求人工智能系统结果的问责时，应考虑人工智能参与者的角色。与人工智能及更广泛的技术系统相关的风险与问责之间的关系因文化、法律、行业和社会背景而异。当后果严重时，例如当生命和自由受到威胁时，人工智能开发者和部署者应考虑按比例且主动地调整其透明度和问责实践。维持减少危害的组织实践和治理结构(如风险管理)有助于形成更负责任的系统。

增强透明度和可问责性的措施还应考虑这些努力对实施实体的影响，包括所需资源水平和保护专有信息的需要。

维护训练数据的来源并支持将人工智能系统的决策归因于训练数据子集，可以同时有助于透明度和可问责性。训练数据也可能受版权约束，并应遵循适用的知识产权法律。

随着人工智能系统透明度工具和相关文档的持续发展，鼓励人工智能系统的开发者与人工智能部署者合作测试不同类型的透明度工具，以确保人工智能系统按预期使用。

3.5 可解释性与可理解性

可解释性指的是对人工智能系统运行背后机制的表示，而可解读性指的是人工智能系统输出在其设计功能目的背景下的含义。可解释性和可解读性共同帮助操作或监督人工智能系统的人员以及人工智能系统的用户更深入地了解系统的功能性和可信度，包括其输出。其基本假设是，对负面风险的感知源于缺乏适当理解或情境化系统输出的能力。可解释和可解读的人工智能系统提供的信息将帮助最终用户理解人工智能系统的目的和潜在影响。

缺乏可解释性带来的风险可以通过描述人工智能系统如何运作来管理，描述应针对个体差异(如用户的角色、知识和技能水平)进行定制。可解释的系统可以更容易地调试和监控，并且有助于更彻底的文档记录、审计和治理。

Risks to interpretability often can be addressed by communicating a description of why an AI system made a particular prediction or recommendation. (See "Four Principles of Explainable Artificial Intelligence" and "Psychological Foundations of Explainability and Interpretability in Artificial Intelligence" found here.)

Transparency, explainability, and interpretability are distinct characteristics that support each other. Transparency can answer the question of "what happened" in the system. Explainability can answer the question of "how" a decision was made in the system. Interpretability can answer the question of "why" a decision was made by the system and its meaning or context to the user.

3.6 Privacy-Enhanced

Privacy refers generally to the norms and practices that help to safeguard human autonomy, identity, and dignity. These norms and practices typically address freedom from intrusion, limiting observation, or individuals' agency to consent to disclosure or control of facets of their identities (e.g., body, data, reputation). (See The NIST Privacy Framework: A Tool for Improving Privacy through Enterprise Risk Management.)

Privacy values such as anonymity, confidentiality, and control generally should guide choices for AI system design, development, and deployment. Privacy-related risks may influence security, bias, and transparency and come with tradeoffs with these other characteristics. Like safety and security, specific technical features of an AI system may promote or reduce privacy. AI systems can also present new risks to privacy by allowing inference to identify individuals or previously private information about individuals.

Privacy-enhancing technologies ("PETs") for AI, as well as data minimizing methods such as de-identification and aggregation for certain model outputs, can support design for privacy-enhanced AI systems. Under certain conditions such as data sparsity, privacy-enhancing techniques can result in a loss in accuracy, affecting decisions about fairness and other values in certain domains.

3.7 Fair – with Harmful Bias Managed

Fairness in AI includes concerns for equality and equity by addressing issues such as harmful bias and discrimination. Standards of fairness can be complex and difficult to define because perceptions of fairness differ among cultures and may shift depending on application. Organizations' risk management efforts will be enhanced by recognizing and considering these differences. Systems in which harmful biases are mitigated are not necessarily fair. For example, systems in which predictions are somewhat balanced across demographic groups may still be inaccessible to individuals with disabilities or affected by the digital divide or may exacerbate existing disparities or systemic biases.

可解释性风险通常可以通过传达关于人工智能系统为何做出特定预测或建议的描述来解决。(参见"可解释人工智能的四项原则"和"人工智能中可解释性和可理解性的心理学基础"，见此处。)

透明度、可解释性和可理解性是相互支持的 distinct 特征。透明度可以回答系统中"发生了什么"的问题。可解释性可以回答系统中决策是"如何"做出的问题。可理解性可以回答系统为何做出决策及其对用户的意义或背景的问题。

3.6 隐私增强

隐私通常指有助于保障人类自主性、身份和尊严的规范和做法。这些规范和做法通常涉及免受侵扰、限制观察，或个人同意披露或控制其身份各方面(如身体、数据、声誉)的自主权。(参见NIST隐私框架：通过企业风险管理改善隐私的工具。)

隐私价值观，如匿名性、机密性和控制权，通常应指导人工智能系统设计、开发和部署的选择。与隐私相关的风险可能影响安全性、偏见和透明度，并与这些其他特性存在权衡。与安全性和保障性一样，人工智能系统的特定技术特征可能促进或降低隐私。人工智能系统还可能通过允许推断识别个人或个人的先前私密信息，对隐私构成新的风险。

面向人工智能的隐私增强技术("PETs")，以及针对某些模型输出的数据最小化方法(如去标识化和聚合)，可以支持隐私增强人工智能系统的设计。在某些条件下，如数据稀疏时，隐私增强技术可能导致准确性损失，影响关于某些领域中公平性和其他价值观的决策。

3.7 公平--有害偏差受控

公平性在人工智能中包括对平等和公正的关注，通过解决有害偏见和歧视等问题。公平的标准可能复杂且难以定义，因为对公平的认知因文化而异，并可能因应用而发生变化。组织的风险管理工作将通过认识和考虑这些差异而得到加强。有害偏见得到缓解的系统不一定公平。例如，在人口统计群体之间预测 somewhat 平衡的系统可能仍然无法为残疾人所访问，或受到数字鸿沟的影响，或可能加剧现有的差距或系统性偏见。

Bias is broader than demographic balance and data representativeness. NIST has identified three major categories of AI bias to be considered and managed: systemic, computational and statistical, and human-cognitive. Each of these can occur in the absence of prejudice, partiality, or discriminatory intent. Systemic bias can be present in AI datasets, the organizational norms, practices, and processes across the AI lifecycle, and the broader society that uses AI systems. Computational and statistical biases can be present in AI datasets and algorithmic processes, and often stem from systematic errors due to non-representative samples. Human-cognitive biases relate to how an individual or group perceives AI system information to make a decision or fill in missing information, or how humans think about purposes and functions of an AI system. Human-cognitive biases are omnipresent in decision-making processes across the AI lifecycle and system use, including the design, implementation, operation, and maintenance of AI.

Bias exists in many forms and can become ingrained in the automated systems that help make decisions about our lives. While bias is not always a negative phenomenon, AI systems can potentially increase the speed and scale of biases and perpetuate and amplify harms to individuals, groups, communities, organizations, and society. Bias is tightly associated with the concepts of transparency as well as fairness in society. (For more information about bias, including the three categories, see NIST Special Publication 1270, Towards a Standard for Identifying and Managing Bias in Artificial Intelligence.)

偏见比人口统计平衡和数据代表性更广泛。NIST 已识别出三类主要的人工智能偏见，需要考虑和管理：系统性、计算和统计性以及人类认知性。这些偏见中的每一种都可能在不存在偏见、偏袒或歧视意图的情况下发生。系统性偏见可能存在于人工智能数据集、人工智能生命周期中的组织规范、实践和流程，以及使用人工智能系统的更广泛社会中。计算和统计偏见可能存在于人工智能数据集和算法过程中，并且通常源于由于非代表性样本导致的系统性错误。人类认知偏见涉及个人或群体如何感知人工智能系统信息以做出决策或填补缺失信息，或人类如何思考人工智能系统的目的和功能。人类认知偏见在人工智能生命周期和系统使用的决策过程中无处不在，包括人工智能的设计、实施、操作和维护。

偏见以多种形式存在，并可能根植于帮助做出关于我们生活的决策的自动化系统中。虽然偏见并不总是负面现象，但人工智能系统可能潜在地增加偏见的速度和规模，并延续和放大对个人、群体、社区、组织和社会的影响。偏见与社会中的透明度以及公平性概念密切相关。(有关偏见(包括三个类别)的更多信息，请参见 NIST 特别出版物 1270,迈向识别和管理人工智能偏见的标准。)

4. Effectiveness of the AI RMF

Evaluations of AI RMF effectiveness – including ways to measure bottom-line improvements in the trustworthiness of AI systems – will be part of future NIST activities, in conjunction with the AI community.

Organizations and other users of the Framework are encouraged to periodically evaluate whether the AI RMF has improved their ability to manage AI risks, including but not limited to their policies, processes, practices, implementation plans, indicators, measurements, and expected outcomes. NIST intends to work collaboratively with others to develop metrics, methodologies, and goals for evaluating the AI RMF's effectiveness, and to broadly share results and supporting information. Framework users are expected to benefit from:

- enhanced processes for governing, mapping, measuring, and managing AI risk, and clearly documenting outcomes;
- improved awareness of the relationships and tradeoffs among trustworthiness characteristics, socio-technical approaches, and AI risks;
- explicit processes for making go/no-go system commissioning and deployment decisions;
- established policies, processes, practices, and procedures for improving organizational accountability efforts related to AI system risks;
- enhanced organizational culture which prioritizes the identification and management of AI system risks and potential impacts to individuals, communities, organizations, and society;
- better information sharing within and across organizations about risks, decision-making processes, responsibilities, common pitfalls, TEVV practices, and approaches for continuous improvement;
- greater contextual knowledge for increased awareness of downstream risks;
- strengthened engagement with interested parties and relevant AI actors; and
- augmented capacity for TEVV of AI systems and associated risks.

4. AI RMF的有效性

对AI RMF有效性的评估--包括衡量人工智能系统可信性底线改进的方法--将与人工智能社区合作，成为NIST未来活动的一部分。

鼓励组织和其他框架用户定期评估 AI RMF 是否提高了他们管理人工智能风险的能力，包括但不限于他们的政策、流程、实践、实施计划、指标、测量和预期成果。NIST 打算与其他人合作开发评估 AI RMF 有效性的指标、方法和目标，并广泛分享结果和支持信息。框架用户预期将受益于：

- 增强治理、映射、度量和管理人工智能风险的流程，并清晰记录结果；
- 提高对可信性特征、社会技术方法和人工智能风险之间关系和权衡的认识；
- 明确的系统调试和部署进行/不进行决策流程；
- 建立政策、流程、实践和程序，以改善与人工智能系统风险相关的组织可问责性工作；
- 增强的组织文化，优先识别和管理人工智能系统风险及其对个人、社区、组织和社会的影响；
- 在组织内部和跨组织之间更好地共享关于风险、决策过程、责任、常见陷阱、TEVV(测试、评估、验证与确认)实践以及持续改进方法的信息；
- 更丰富的上下文知识，以提高对下游风险的认识；
- 加强与利益相关方及相关人工智能参与者的互动；以及
- 增强人工智能系统及相关风险的TEVV能力。

Part 2: Core and Profiles

5. AI RMF Core

The AI RMF Core provides outcomes and actions that enable dialogue, understanding, and activities to manage AI risks and responsibly develop trustworthy AI systems. As illustrated in Figure 5, the Core is composed of four functions: **GOVERN, MAP, MEASURE,** and **MANAGE**. Each of these high-level functions is broken down into categories and subcategories. Categories and subcategories are subdivided into specific actions and outcomes. Actions do not constitute a checklist, nor are they necessarily an ordered set of steps.

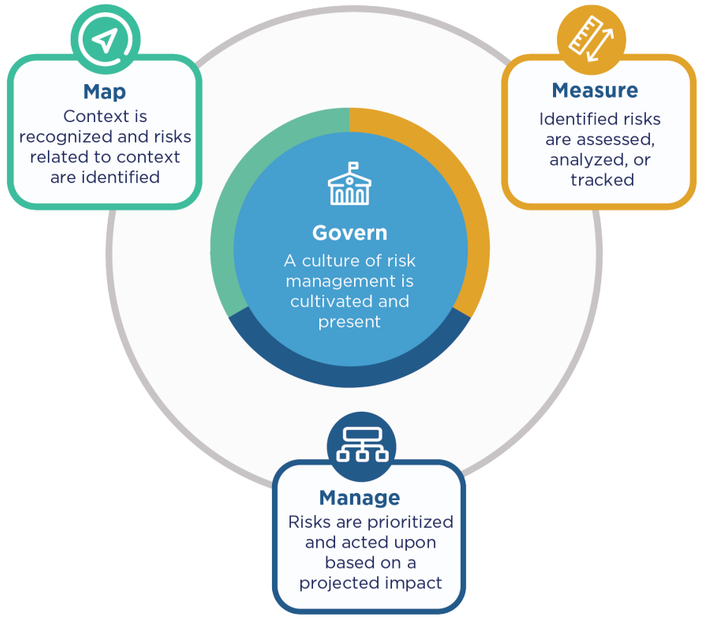


Fig. 5. Functions organize AI risk management activities at their highest level to govern, map, measure, and manage AI risks. Governance is designed to be a cross-cutting function to inform and be infused throughout the other three functions.

Risk management should be continuous, timely, and performed throughout the AI system lifecycle dimensions. AI RMF Core functions should be carried out in a way that reflects diverse and multidisciplinary perspectives, potentially including the views of AI actors outside the organization. Having a diverse team contributes to more open sharing of ideas and assumptions about purposes and functions of the technology being designed, developed,

第2部分：核心与概要

5. AI RMF 核心

AI RMF 核心提供了成果和行动，使对话、理解和活动能够管理 AI 风险并负责任地开发可信人工智能系统。如图 5 所示，核心由四个功能组成：**治理、映射、度量、**和**管理**。每个高层级功能被分解为类别和子类别。类别和子类别被细分为具体行动和成果。行动不构成检查清单，也不一定是按顺序排列的步骤集。

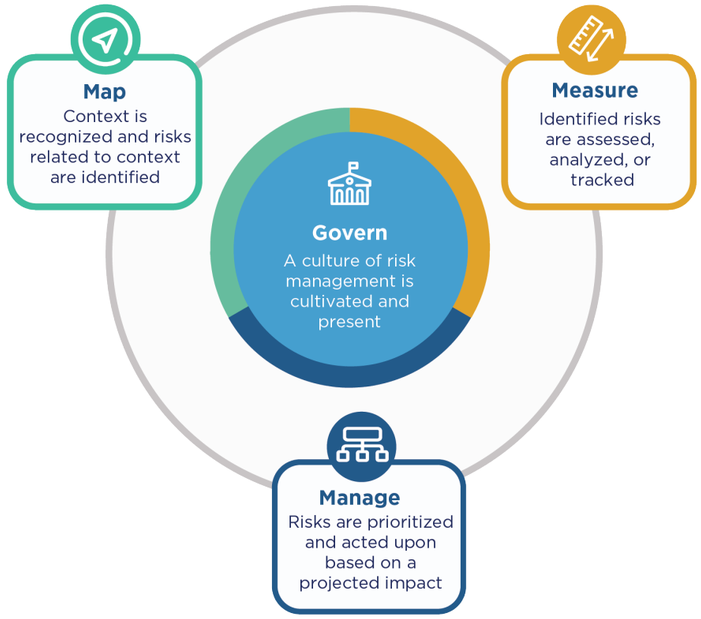


图 5.功能在最高层面组织人工智能风险管理活动，以治理、映射、度量和管理人工智能风险。治理被设计为一项跨领域功能，为其他三项功能提供信息并贯穿其中。

风险管理应当是持续的、及时的，并在人工智能系统生命周期的各个维度中贯穿执行。AI RMF 核心功能应以反映多元化和多学科视角的方式实施，可能包括组织外部人工智能参与者的观点。拥有多元化团队有助于更开放地分享关于所设计、开发、

deployed, or evaluated – which can create opportunities to surface problems and identify existing and emergent risks.

An online companion resource to the AI RMF, the NIST AI RMF Playbook, is available to help organizations navigate the AI RMF and achieve its outcomes through suggested tactical actions they can apply within their own contexts. Like the AI RMF, the Playbook is voluntary and organizations can utilize the suggestions according to their needs and interests. Playbook users can create tailored guidance selected from suggested material for their own use and contribute their suggestions for sharing with the broader community. Along with the AI RMF, the Playbook is part of the NIST Trustworthy and Responsible AI Resource Center.

Framework users may apply these functions as best suits their needs for managing AI risks based on their resources and capabilities. Some organizations may choose to select from among the categories and subcategories; others may choose and have the capacity to apply all categories and subcategories. Assuming a governance structure is in place, functions may be performed in any order across the AI lifecycle as deemed to add value by a user of the framework. After instituting the outcomes in **GOVERN**, most users of the AI RMF would start with the **MAP** function and continue to **MEASURE** or **MANAGE**. However users integrate the functions, the process should be iterative, with cross-referencing between functions as necessary. Similarly, there are categories and subcategories with elements that apply to multiple functions, or that logically should take place before certain subcategory decisions.

5.1 Govern

The **GOVERN** function:

- cultivates and implements a culture of risk management within organizations designing, developing, deploying, evaluating, or acquiring AI systems;
- outlines processes, documents, and organizational schemes that anticipate, identify, and manage the risks a system can pose, including to users and others across society – and procedures to achieve those outcomes;
- incorporates processes to assess potential impacts;
- provides a structure by which AI risk management functions can align with organizational principles, policies, and strategic priorities;
- connects technical aspects of AI system design and development to organizational values and principles, and enables organizational practices and competencies for the individuals involved in acquiring, training, deploying, and monitoring such systems; and
- addresses full product lifecycle and associated processes, including legal and other issues concerning use of third-party software or hardware systems and data.

部署或评估的技术的用途和功能的观点和假设--这可以创造机会来发现问题并识别现有和新兴风险。

NIST AI RMF Playbook 是 AI RMF 的在线配套资源，可帮助组织理解 AI RMF 并通过建议的战术行动实现其成果，这些行动可在自身情境中应用。与 AI RMF 一样，Playbook 是自愿性的，组织可根据自身需求和兴趣使用这些建议。Playbook 用户可从建议材料中创建定制指南供自己使用，并贡献建议与更广泛的社区分享。与 AI RMF 一样，Playbook 是 NIST 可信与负责任人工智能资源中心的一部分。

框架用户可根据自身资源和能力，以最适合其管理 AI 风险需求的方式应用这些功能。一些组织可能选择从类别和子类别中进行选取；其他组织可能选择并有能力应用所有类别和子类别。假设治理结构已到位，功能可在人工智能生命周期中以任何顺序执行，只要框架用户认为能增加价值。在实施**治理**中的成果后，大多数 AI RMF 用户会从**映射**功能开始，然后继续到**度量**或**管理**。无论用户如何整合这些功能，过程应是迭代的，必要时在功能之间交叉参照。同样，有些类别和子类别包含适用于多个功能的要素，或逻辑上应在某些子类别决策之前进行。

5.1 治理

治理功能：

- 在涉及设计、开发、部署、评估或获取人工智能系统的组织内培育和实施风险管理文化；
- 概述用于预测、识别和管理系统可能带来的风险(包括对用户和社会其他成员的风险)的流程、文件和组织方案--以及实现这些成果的程序；
- 纳入评估潜在影响的过程；
- 提供一种结构，使人工智能风险管理功能能够与组织原则、政策和战略优先事项保持一致；
- 将人工智能系统设计和开发的技术方面与组织价值观和原则相连接，并为参与获取、训练、部署和监控此类系统的个人提供组织实践和能力；

和

- 涵盖完整的产品生命周期及相关流程，包括与使用第三方软件或硬件系统和数据有关的法律问题及其他问题。

GOVERN is a cross-cutting function that is infused throughout AI risk management and enables the other functions of the process. Aspects of **GOVERN**, especially those related to compliance or evaluation, should be integrated into each of the other functions. Attention to governance is a continual and intrinsic requirement for effective AI risk management over an AI system's lifespan and the organization's hierarchy.

Strong governance can drive and enhance internal practices and norms to facilitate organizational risk culture. Governing authorities can determine the overarching policies that direct an organization's mission, goals, values, culture, and risk tolerance. Senior leadership sets the tone for risk management within an organization, and with it, organizational culture. Management aligns the technical aspects of AI risk management to policies and operations. Documentation can enhance transparency, improve human review processes, and bolster accountability in AI system teams.

After putting in place the structures, systems, processes, and teams described in the **GOVERN** function, organizations should benefit from a purpose-driven culture focused on risk understanding and management. It is incumbent on Framework users to continue to execute the **GOVERN** function as knowledge, cultures, and needs or expectations from AI actors evolve over time.

Practices related to governing AI risks are described in the NIST AI RMF Playbook. Table 1 lists the **GOVERN** function's categories and subcategories.

Table 1: Categories and subcategories for the **GOVERN** function.

Categories	Subcategories
GOVERN 1: Policies, processes, procedures, and practices across the organization related to the mapping, measuring, and managing of AI risks are in place, transparent, and implemented effectively.	**GOVERN 1.1:** Legal and regulatory requirements involving AI are understood, managed, and documented. **GOVERN 1.2:** The characteristics of trustworthy AI are integrated into organizational policies, processes, procedures, and practices. **GOVERN 1.3:** Processes, procedures, and practices are in place to determine the needed level of risk management activities based on the organization's risk tolerance. **GOVERN 1.4:** The risk management process and its outcomes are established through transparent policies, procedures, and other controls based on organizational risk priorities.

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治理是一项跨领域功能，贯穿于整个人工智能风险管理过程，并赋能该过程中的其他功能。**治理**的各个方面，尤其是与合规或评估相关的方面，应整合到其他各项功能中。对治理的关注是人工智能系统生命周期内有效人工智能风险管理的持续且内在的要求，也贯穿于组织的层级结构。

强有力的治理可以推动和增强内部实践和规范，以促进组织风险文化。治理机构可以确定指导组织使命、目标、价值观、文化和风险容忍度的总体政策。高层领导为组织内的风险管理定下基调，并由此塑造组织文化。管理层将 AI 风险管理的技术方面与政策和运营对齐。文档可以增强透明度、改进人工审查流程，并加强 AI 系统团队的问责制。

在建立**治理**功能中所述的结构、系统、流程和团队之后，组织应受益于一种以风险理解和管理为重点的使命驱动型文化。随着知识、文化以及人工智能参与者的需求或期望随时间演变，框架用户有责任继续执行**治理**功能。

与治理人工智能风险相关的实践在 NIST AI RMF Playbook 中有所描述。表 1 列出了**治理**功能的类别和子类别。

表1:GOVERN功能的类别与子类别。

类别	子类别
GOVERN 1: 政策、流程、程序，以及实践贯穿整个与组织相关对映射而言，度量与管理人工智能已落实风险，透明且已实施有效地。	**GOVERN 1.1:**涉及人工智能的法律和监管要求已被理解、管理并记录在案。 **GOVERN 1.2:**可信人工智能的特征已整合到组织政策、流程、程序以及 实践。 **GOVERN 1.3:**已建立流程、程序和做法，以根据组织的风险容忍度确定所需的风险管理活动水平。 **GOVERN 1.4:**风险管理过程及其结果通过基于组织风险优先事项的透明政策、程序和其他控制措施予以确立。

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Table 1: Categories and subcategories for the **GOVERN** function. (Continued)

Categories	Subcategories
	GOVERN 1.5: Ongoing monitoring and periodic review of the risk management process and its outcomes are planned and organizational roles and responsibilities clearly defined, including determining the frequency of periodic review. **GOVERN 1.6:** Mechanisms are in place to inventory AI systems and are resourced according to organizational risk priorities. **GOVERN 1.7:** Processes and procedures are in place for decommissioning and phasing out AI systems safely and in a manner that does not increase risks or decrease the organization's trustworthiness.
GOVERN 2: Accountability structures are in place so that the appropriate teams and individuals are empowered, responsible, and trained for mapping, measuring, and managing AI risks.	**GOVERN 2.1:** Roles and responsibilities and lines of communication related to mapping, measuring, and managing AI risks are documented and are clear to individuals and teams throughout the organization. **GOVERN 2.2:** The organization's personnel and partners receive AI risk management training to enable them to perform their duties and responsibilities consistent with related policies, procedures, and agreements. **GOVERN 2.3:** Executive leadership of the organization takes responsibility for decisions about risks associated with AI system development and deployment.
GOVERN 3: Workforce diversity, equity, inclusion, and accessibility processes are prioritized in the mapping, measuring, and managing of AI risks throughout the lifecycle.	**GOVERN 3.1:** Decision-making related to mapping, measuring, and managing AI risks throughout the lifecycle is informed by a diverse team (e.g., diversity of demographics, disciplines, experience, expertise, and backgrounds). **GOVERN 3.2:** Policies and procedures are in place to define and differentiate roles and responsibilities for human-AI configurations and oversight of AI systems.
GOVERN 4: Organizational teams are committed to a culture	**GOVERN 4.1:** Organizational policies and practices are in place to foster a critical thinking and safety-first mindset in the design, development, deployment, and uses of AI systems to minimize potential negative impacts.

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表 1:**治理**功能的类别和子类别。(续)

类别	子类别
	GOVERN 1.5:已规划对风险管理过程及其结果的持续监控和定期审查，并明确界定组织角色和职责，包括确定定期审查的频率。 **GOVERN 1.6:**已建立机制来清点人工智能系统，并根据组织风险优先事项配置资源。**GOVERN 1.7:**已建立流程和程序，以安全的方式停用和逐步淘汰人工智能系统，且不增加风险或降低组织的
GOVERN 2: 问责制 结构在于 以便 合适的团队 并且个人是 被赋权， 负责，并且 为映射而训练， 度量与 管理人工智能风险。	可信度。 **GOVERN 2.1:**与映射、度量和管人工智能风险相关的角色、职责和沟通渠道已被记录，并向整个组织中的个人和团队明确传达。 **GOVERN 2.2:**组织的人员和合作伙伴接受人工智能风险管理培训，使其能够按照相关政策、程序和协议履行职责和责任。 **GOVERN 2.3:**组织的行政领导层对与人工智能系统开发和部署相关风险的决策承担责任。
GOVERN 3: 劳动力多样性， 公平、包容、 和可访问性 流程是 在.....中优先考虑 映射， 度量与 管理人工智能 贯穿整个 生命周期。	**GOVERN 3.1:**在整个生命周期中与映射、度量和管人工智能风险相关的决策由多元化团队(例如，人口统计特征、学科、经验、专业知识和背景的多样性)提供信息。 **GOVERN 3.2:**已建立政策和程序，以界定和区分人机配置的角色和职责以及对人工智能系统的监督。
GOVERN 4: 组织 团队已承诺 一种文化	**GOVERN 4.1:**组织已制定相关政策和实践，在人工智能系统的设计、开发、部署和使用中培养批判性思维和安全优先的心态，以最大限度减少潜在的负面影响。

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Table 1: Categories and subcategories for the **GOVERN** function. (Continued)

Categories	Subcategories
that considers and communicates AI risk.	**GOVERN 4.2:** Organizational teams document the risks and potential impacts of the AI technology they design, develop, deploy, evaluate, and use, and they communicate about the impacts more broadly. **GOVERN 4.3:** Organizational practices are in place to enable AI testing, identification of incidents, and information sharing.
GOVERN 5: Processes are in place for robust engagement with relevant AI actors.	**GOVERN 5.1:** Organizational policies and practices are in place to collect, consider, prioritize, and integrate feedback from those external to the team that developed or deployed the AI system regarding the potential individual and societal impacts related to AI risks. **GOVERN 5.2:** Mechanisms are established to enable the team that developed or deployed AI systems to regularly incorporate adjudicated feedback from relevant AI actors into system design and implementation.
GOVERN 6: Policies and procedures are in place to address AI risks and benefits arising from third-party software and data and other supply chain issues.	**GOVERN 6.1:** Policies and procedures are in place that address AI risks associated with third-party entities, including risks of infringement of a third-party's intellectual property or other rights. **GOVERN 6.2:** Contingency processes are in place to handle failures or incidents in third-party data or AI systems deemed to be high-risk.

5.2 Map

The **MAP** function establishes the context to frame risks related to an AI system. The AI lifecycle consists of many interdependent activities involving a diverse set of actors (See Figure 3). In practice, AI actors in charge of one part of the process often do not have full visibility or control over other parts and their associated contexts. The interdependencies between these activities, and among the relevant AI actors, can make it difficult to reliably anticipate impacts of AI systems. For example, early decisions in identifying purposes and objectives of an AI system can alter its behavior and capabilities, and the dynamics of deployment setting (such as end users or impacted individuals) can shape the impacts of AI system decisions. As a result, the best intentions within one dimension of the AI lifecycle can be undermined via interactions with decisions and conditions in other, later activities.

表 1:**治理**功能的类别和子类别。(续)

类别	子类别
考虑并 传达人工智能 风险。	**GOVERN 4.2:**组织团队记录其设计、开发、部署、评估和使用的人工智能技术的风险和潜在影响，并就影响进行更多沟通 广泛地。 **GOVERN 4.3:**组织已制定相关实践，以支持人工智能测试、事件识别和信息共享。**GOVERN 5.1:**组织已制定相关政策和实践，以收
GOVERN 5: 流程处于 稳健之地 与.....的接触 相关的人工智能行为体。	集、考虑、优先排序并整合来自开发或部署人工智能系统的团队之外的人员关于潜在个人和社会影响的反馈 人工智能风险 。 **GOVERN 5.2:**已建立相关机制，使开发或部署人工智能系统的团队能够定期将相关人工智能参与者经裁定的反馈纳入系统设计和实施。
治理 6:政策 和程序是 已到位以应对 AI 风险与收益 源于 第三方软件 以及数据和其他供应链问题。	**GOVERN 6.1:**已制定相关政策和程序，处理与第三方实体相关的人工智能风险，包括侵犯第三方知识产权或其他权利的风险。 **GOVERN 6.2:**已制定应急流程，以处理第三方数据或人工智能系统的故障或事件 属于高风险。

5.2 Map

映射功能建立背景，以框定与人工智能系统相关的风险。人工智能生命周期由许多相互依赖的活动组成，涉及多样化的参与者(见图 3)。在实践中，负责流程某一部分的 AI 参与者往往对其他部分及其相关背景没有完全的可见性或控制权。这些活动之间以及相关 AI 参与者之间的相互依赖关系，可能使可靠预测人工智能系统的影响变得困难。例如，识别人工智能系统目的和目标的早期决策可以改变其行为和能力，而部署环境的动态(如最终用户或受影响个人)可以塑造人工智能系统决策的影响。因此，人工智能生命周期某一维度内的最佳意图可能因与其他后续活动中的决策和条件的交互而受到削弱。

This complexity and varying levels of visibility can introduce uncertainty into risk management practices. Anticipating, assessing, and otherwise addressing potential sources of negative risk can mitigate this uncertainty and enhance the integrity of the decision process.

The information gathered while carrying out the **MAP** function enables negative risk prevention and informs decisions for processes such as model management, as well as an initial decision about appropriateness or the need for an AI solution. Outcomes in the **MAP** function are the basis for the **MEASURE** and **MANAGE** functions. Without contextual knowledge, and awareness of risks within the identified contexts, risk management is difficult to perform. The **MAP** function is intended to enhance an organization's ability to identify risks and broader contributing factors.

Implementation of this function is enhanced by incorporating perspectives from a diverse internal team and engagement with those external to the team that developed or deployed the AI system. Engagement with external collaborators, end users, potentially impacted communities, and others may vary based on the risk level of a particular AI system, the makeup of the internal team, and organizational policies. Gathering such broad perspectives can help organizations proactively prevent negative risks and develop more trustworthy AI systems by:

- improving their capacity for understanding contexts;
- checking their assumptions about context of use;
- enabling recognition of when systems are not functional within or out of their intended context;
- identifying positive and beneficial uses of their existing AI systems;
- improving understanding of limitations in AI and ML processes;
- identifying constraints in real-world applications that may lead to negative impacts;
- identifying known and foreseeable negative impacts related to intended use of AI systems; and
- anticipating risks of the use of AI systems beyond intended use.

After completing the **MAP** function, Framework users should have sufficient contextual knowledge about AI system impacts to inform an initial go/no-go decision about whether to design, develop, or deploy an AI system. If a decision is made to proceed, organizations should utilize the **MEASURE** and **MANAGE** functions along with policies and procedures put into place in the **GOVERN** function to assist in AI risk management efforts. It is incumbent on Framework users to continue applying the **MAP** function to AI systems as context, capabilities, risks, benefits, and potential impacts evolve over time.

Practices related to mapping AI risks are described in the NIST AI RMF Playbook. Table 2 lists the **MAP** function's categories and subcategories.

这种复杂性以及不同程度的可见性可能给风险管理实践带来不确定性。预判、评估并以其他方式应对潜在的负面风险来源，可以减轻这种不确定性并增强决策过程的完整性。

在执行**映射**功能时收集的信息有助于预防负面风险，并为模型管理等流程的决策提供依据，同时也有助于就人工智能解决方案的适当性或必要性做出初步决定。**映射**功能的成果是**度量**和**管理**功能的基础。如果缺乏上下文知识以及对已识别情境中风险的认识，风险管理将难以实施。**映射**功能旨在增强组织识别风险和更广泛影响因素的能力。

通过纳入多元化内部团队的视角，以及与开发或部署该人工智能系统团队之外的人员进行接触，可以增强本功能的实施效果。与外部合作者、最终用户、可能受影响的社区及其他方的接触方式，可能因特定人工智能系统的风险水平、内部团队的构成以及组织政策而有所不同。汇集如此广泛的视角有助于组织主动预防负面风险，并通过以下方式开发更可信的人工智能系统：

- 提高其理解上下文的能力；
- 检查其关于使用情境的假设；
- 使人们能够识别系统在其预期情境之内或之外何时无法正常运作；
- 识别其现有AI系统的积极和有益用途；
- 增进对 AI 和 ML 流程局限性的理解；
- 识别现实应用中可能导致负面影响的约束条件；
- 识别与人工智能系统预期用途相关的已知和可预见的负面影响；以及
- 预见人工智能系统超出预期用途使用时的风险。

完成**映射**功能后，框架使用者应已对人工智能系统的影响具备充分的上下文知识，从而就是否设计、开发或部署人工智能系统做出初步的继续/停止决定。如果决定继续推进，组织应利用**度量**和**管理**功能，以及**治理**功能中建立的政策和程序，来协助人工智能风险管理工作。框架使用者有责任随着情境、能力、风险、收益和潜在影响随时间演变，持续对人工智能系统应用**映射**功能。

与映射人工智能风险相关的实践在 NIST AI RMF Playbook 中有所描述。表 2 列出了**MAP**功能的类别和子类别。

Table 2: Categories and subcategories for the **MAP** function.

Categories	Subcategories
MAP 1: Context is established and understood.	**MAP 1.1:** Intended purposes, potentially beneficial uses, context-specific laws, norms and expectations, and prospective settings in which the AI system will be deployed are understood and documented. Considerations include: the specific set or types of users along with their expectations; potential positive and negative impacts of system uses to individuals, communities, organizations, society, and the planet; assumptions and related limitations about AI system purposes, uses, and risks across the development or product AI lifecycle; and related TEVV and system metrics. **MAP 1.2:** Interdisciplinary AI actors, competencies, skills, and capacities for establishing context reflect demographic diversity and broad domain and user experience expertise, and their participation is documented. Opportunities for interdisciplinary collaboration are prioritized. **MAP 1.3:** The organization's mission and relevant goals for AI technology are understood and documented. **MAP 1.4:** The business value or context of business use has been clearly defined or – in the case of assessing existing AI systems – re-evaluated. **MAP 1.5:** Organizational risk tolerances are determined and documented. **MAP 1.6:** System requirements (e.g., "the system shall respect the privacy of its users") are elicited from and understood by relevant AI actors. Design decisions take socio-technical implications into account to address AI risks.
MAP 2: Categorization of the AI system is performed.	**MAP 2.1:** The specific tasks and methods used to implement the tasks that the AI system will support are defined (e.g., classifiers, generative models, recommenders). **MAP 2.2:** Information about the AI system's knowledge limits and how system output may be utilized and overseen by humans is documented. Documentation provides sufficient information to assist relevant AI actors when making decisions and taking subsequent actions.

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表 2:**MAP**功能的类别与子类别。

类别	子类别
映射 1:上下文是已建立并被理解。	**MAP 1.1:**预期目的、潜在有益用途、背景--特定的法律、规范和期望，以及前瞻性的环境人工智能系统将被部署的情境已被理解并记录在案。考虑因素包括：特定的用户群体或用户类型及其期望；系统使用对个人、社区、组织、社会和地球的潜在正面和负面影响；关于人工智能系统在开发或产品人工智能生命周期中的目的、用途和风险的假设及相关局限性；以及相关的TEVV和系统度量指标。**MAP 1.2:**用于确立情境的跨学科人工智能参与者、能力、技能和才干体现了人口多样性以及广泛的领域和用户体验专业知识，并且他们的参与已被记录。跨学科合作的机会被优先考虑。 **MAP 1.3:**组织对人工智能技术的使命和相关目标已被理解并记录在案。 **MAP 1.4:**商业价值或商业用途背景已被明确定义，或在评估现有人工智能系统的情况下已被重新评估。 **MAP 1.5:**组织风险容忍度已确定，并且被记录。 **映射 1.6:**系统需求(例如"系统应尊重用户的隐私")由相关人工智能参与者引出并理解。设计决策考虑社会技术影响，以应对人工智能风险。
MAP 2: 分类AI系统是被执行。	**映射 2.1:**用于实施该任务的具体任务和方法AI系统将支持的任务已定义(例如，分类器，生成模型、推荐系统)。 **映射 2.2:**关于人工智能系统知识局限以及系统输出如何被人类利用和监督的信息被记录在案。文档提供充分信息，以协助相关人工智能参与者在做出决策和采取后续行动时参考。

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Table 2: Categories and subcategories for the **MAP** function. (Continued)

Categories	Subcategories
	MAP 2.3: Scientific integrity and TEVV considerations are identified and documented, including those related to experimental design, data collection and selection (e.g., availability, representativeness, suitability), system trustworthiness, and construct validation.
MAP 3: AI capabilities, targeted usage, goals, and expected benefits and costs compared with appropriate benchmarks are understood.	**MAP 3.1:** Potential benefits of intended AI system functionality and performance are examined and documented. **MAP 3.2:** Potential costs, including non-monetary costs, which result from expected or realized AI errors or system functionality and trustworthiness – as connected to organizational risk tolerance – are examined and documented. **MAP 3.3:** Targeted application scope is specified and documented based on the system's capability, established context, and AI system categorization. **MAP 3.4:** Processes for operator and practitioner proficiency with AI system performance and trustworthiness – and relevant technical standards and certifications – are defined, assessed, and documented. **MAP 3.5:** Processes for human oversight are defined, assessed, and documented in accordance with organizational policies from the **GOVERN** function.
MAP 4: Risks and benefits are mapped for all components of the AI system including third-party software and data.	**MAP 4.1:** Approaches for mapping AI technology and legal risks of its components – including the use of third-party data or software – are in place, followed, and documented, as are risks of infringement of a third party's intellectual property or other rights. **MAP 4.2:** Internal risk controls for components of the AI system, including third-party AI technologies, are identified and documented.
MAP 5: Impacts to individuals, groups, communities, organizations, and society are characterized.	**MAP 5.1:** Likelihood and magnitude of each identified impact (both potentially beneficial and harmful) based on expected use, past uses of AI systems in similar contexts, public incident reports, feedback from those external to the team that developed or deployed the AI system, or other data are identified and documented.

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表 2:**MAP**功能的类别与子类别。(续)

类别	子类别
	映射 2.3:科学诚信和TEVV(测试、评估、验证与确认)考量被识别并记录，包括与实验设计、数据收集与选择(例如可用性、代表性、适用性)、系统可信度以及构念相关的考量。 验证。
映射 3: AI能力，有针对性的使用、目标和预期收益与成本相比与适当的基准是被理解。	**映射 3.1:**预期人工智能系统功能和性能的潜在效益被审查并记录。 **映射 3.2:**由预期或已实现的人工智能错误或系统功能与可信度所导致的潜在成本(包括非货币成本)--与组织风险容忍度相关联--被审查并记录。 **映射 3.3:**基于系统能力、既定背景和人工智能系统分类，明确并记录目标应用范围。 **映射 3.4:**操作人员和从业者在人工智能系统性能和可信度方面的熟练程度--以及相关技术标准和认证--的流程被定义、评估并记录。 被记录。 **映射 3.5:**人类监督流程按照**治理**功能的组织政策被定义、评估并记录。
映射 4:风险与收益已映射对于所有组件人工智能系统包括第三方软件和数据。	**映射 4.1:**映射人工智能技术及其组件法律风险的方法--包括第三方数据或软件的使用--已到位、被遵循并记录，侵犯第三方知识产权或其他权利的风险亦然。**映射 4.2:**人工智能系统组件(包括第三方人工智能技术)的内部风险控制被识别并记录。 被记录。
映射 5:对以下方面的影响个人、群体、社区，组织和社会是被描述。	**映射 5.1:**基于预期用途、人工智能系统在类似情境中的过往使用、公开事件报告、开发或部署人工智能系统的团队外部人员的反馈或其他数据，每个已识别影响(包括潜在有益和有害影响)的可能性和严重程度被识别并记录。 被记录。

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Table 2: Categories and subcategories for the **MAP** function. (Continued)

Categories	Subcategories
	MAP 5.2: Practices and personnel for supporting regular engagement with relevant AI actors and integrating feedback about positive, negative, and unanticipated impacts are in place and documented.

5.3 Measure

The **MEASURE** function employs quantitative, qualitative, or mixed-method tools, techniques, and methodologies to analyze, assess, benchmark, and monitor AI risk and related impacts. It uses knowledge relevant to AI risks identified in the **MAP** function and informs the **MANAGE** function. AI systems should be tested before their deployment and regularly while in operation. AI risk measurements include documenting aspects of systems' functionality and trustworthiness.

Measuring AI risks includes tracking metrics for trustworthy characteristics, social impact, and human-AI configurations. Processes developed or adopted in the **MEASURE** function should include rigorous software testing and performance assessment methodologies with associated measures of uncertainty, comparisons to performance benchmarks, and formalized reporting and documentation of results. Processes for independent review can improve the effectiveness of testing and can mitigate internal biases and potential conflicts of interest.

Where tradeoffs among the trustworthy characteristics arise, measurement provides a traceable basis to inform management decisions. Options may include recalibration, impact mitigation, or removal of the system from design, development, production, or use, as well as a range of compensating, detective, deterrent, directive, and recovery controls.

After completing the **MEASURE** function, objective, repeatable, or scalable test, evaluation, verification, and validation (TEVV) processes including metrics, methods, and methodologies are in place, followed, and documented. Metrics and measurement methodologies should adhere to scientific, legal, and ethical norms and be carried out in an open and transparent process. New types of measurement, qualitative and quantitative, may need to be developed. The degree to which each measurement type provides unique and meaningful information to the assessment of AI risks should be considered. Framework users will enhance their capacity to comprehensively evaluate system trustworthiness, identify and track existing and emergent risks, and verify efficacy of the metrics. Measurement outcomes will be utilized in the **MANAGE** function to assist risk monitoring and response efforts. It is incumbent on Framework users to continue applying the **MEASURE** function to AI systems as knowledge, methodologies, risks, and impacts evolve over time.

表 2:**MAP**功能的类别与子类别。(续)

类别	子类别
	映射 5.2:支持与相关人工智能参与者定期互动并整合关于正面、负面和意外影响的反馈的实践和人员已到位，并且 被记录。

5.3 Measure

度量功能采用定量、定性或混合方法的工具、技术和方法论来分析、评估、基准测试和监测人工智能风险及相关影响。它使用在**映射**功能中识别的与人工智能风险相关的知识，并为**管理**功能提供信息。人工智能系统应在部署前进行测试，并在运行期间定期测试。人工智能风险度量包括记录系统功能性和可信度的各个方面。

度量人工智能风险包括跟踪可信特征、社会影响和人机配置的指标。在**度量**功能中开发或采用的流程应包括严格的软件测试和性能评估方法，并附有相关的不确定性度量、与性能基准的比较，以及结果的正式报告和记录。独立审查流程可以提高测试的有效性，并可以减少内部偏见和潜在的利益冲突。

建立。

当可信特征之间出现权衡时，度量提供可追溯的基础以支持管理决策。选项可能包括重新校准、影响缓解或将系统从设计、开发、生产或使用中移除，以及一系列补偿性、检测性、威慑性、指导性和恢复性控制措施。

完成**度量**功能后，客观、可重复或可扩展的测试、评估、验证与确认(TEVV)流程(包括指标、方法和方法论)已到位、得到遵循并记录在案。指标和测量方法应遵循科学、法律和伦理规范，并在公开透明的过程中进行。可能需要开发新型测量方法，包括定性和定量方法。应考虑每种测量类型为人工智能风险评估提供独特且有价值信息的程度。框架用户将增强其全面评估系统可信度、识别和跟踪现有及新兴风险以及验证指标有效性的能力。测量结果将在**管理**功能中用于协助风险监测和响应工作。框架用户有责任随着知识、方法论、风险和影响随时间演变，继续对人工智能系统应用**度量**功能。

Practices related to measuring AI risks are described in the NIST AI RMF Playbook. Table 3 lists the **MEASURE** function's categories and subcategories.

Table 3: Categories and subcategories for the **MEASURE** function.

Categories	Subcategories
MEASURE 1: Appropriate methods and metrics are identified and applied.	**MEASURE 1.1:** Approaches and metrics for measurement of AI risks enumerated during the **MAP** function are selected for implementation starting with the most significant AI risks. The risks or trustworthiness characteristics that will not – or cannot – be measured are properly documented. **MEASURE 1.2:** Appropriateness of AI metrics and effectiveness of existing controls are regularly assessed and updated, including reports of errors and potential impacts on affected communities. **MEASURE 1.3:** Internal experts who did not serve as front-line developers for the system and/or independent assessors are involved in regular assessments and updates. Domain experts, users, AI actors external to the team that developed or deployed the AI system, and affected communities are consulted in support of assessments as necessary per organizational risk tolerance.
MEASURE 2: AI systems are evaluated for trustworthy characteristics.	**MEASURE 2.1:** Test sets, metrics, and details about the tools used during TEVV are documented. **MEASURE 2.2:** Evaluations involving human subjects meet applicable requirements (including human subject protection) and are representative of the relevant population. **MEASURE 2.3:** AI system performance or assurance criteria are measured qualitatively or quantitatively and demonstrated for conditions similar to deployment setting(s). Measures are documented. **MEASURE 2.4:** The functionality and behavior of the AI system and its components – as identified in the **MAP** function – are monitored when in production. **MEASURE 2.5:** The AI system to be deployed is demonstrated to be valid and reliable. Limitations of the generalizability beyond the conditions under which the technology was developed are documented.

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与度量人工智能风险相关的实践在NIST AI RMF Playbook中描述。表3列出了**度量**功能的类别和子类别。

表3:**MEASURE**功能的类别与子类别。

类别	子类别
MEASURE 1: 适当的 方法和指标 被识别并 应用。	**度量 1.1:**在**映射**功能中列举的用于度量人工智能风险的方法和指标被选择用于实施，从最重要的人工智能风险开始。将不会--或无法--度量的风险或可信特征被适当记录。 **度量 1.2:**定期评估和更新人工智能指标的适当性和现有控制措施的有效性，包括错误报告和对受影响社区的潜在影响。**度量 1.3:**未担任该系统一线开发人员的内部专家和/或独立评估人员参与定期评估和更新。根据组织风险容忍度，酌情咨询领域专家、用户、开发或部署人工智能系统团队之外的人工智能参与者以及受影响社区以支持评估。**度量 2.1:**记录测试集、指标以及TEVV期间所用工具的详细信息。
度量 2: AI 系统是 评估 可信 特征。	**度量 2.2:**涉及人类受试者的评估满足适用要求(包括人类受试者保护)，并且代表相关人群。 **度量 2.3:**人工智能系统性能或保证标准被定性或定量度量，并在与部署环境相似的条件下得到证明。度量是 被记录。 **度量 2.4:**人工智能系统及其组件的功能和行为--如**映射**功能中所识别--在生产中进行监测。 **度量 2.5:**待部署的人工智能系统被证明是有效和可靠的。超出技术开发条件的泛化局限性被记录。

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Table 3: Categories and subcategories for the **MEASURE** function. (Continued)

Categories	Subcategories
	MEASURE 2.6: The AI system is evaluated regularly for safety risks – as identified in the **MAP** function. The AI system to be deployed is demonstrated to be safe, its residual negative risk does not exceed the risk tolerance, and it can fail safely, particularly if made to operate beyond its knowledge limits. Safety metrics reflect system reliability and robustness, real-time monitoring, and response times for AI system failures.
	MEASURE 2.7: AI system security and resilience – as identified in the **MAP** function – are evaluated and documented.
	MEASURE 2.8: Risks associated with transparency and accountability – as identified in the **MAP** function – are examined and documented.
	MEASURE 2.9: The AI model is explained, validated, and documented, and AI system output is interpreted within its context – as identified in the **MAP** function – to inform responsible use and governance.
	MEASURE 2.10: Privacy risk of the AI system – as identified in the **MAP** function – is examined and documented.
	MEASURE 2.11: Fairness and bias – as identified in the **MAP** function – are evaluated and results are documented.
	MEASURE 2.12: Environmental impact and sustainability of AI model training and management activities – as identified in the **MAP** function – are assessed and documented.
	MEASURE 2.13: Effectiveness of the employed TEVV metrics and processes in the **MEASURE** function are evaluated and documented.
MEASURE 3: Mechanisms for tracking identified AI risks over time are in place.	**MEASURE 3.1:** Approaches, personnel, and documentation are in place to regularly identify and track existing, unanticipated, and emergent AI risks based on factors such as intended and actual performance in deployed contexts.
	MEASURE 3.2: Risk tracking approaches are considered for settings where AI risks are difficult to assess using currently available measurement techniques or where metrics are not yet available.

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表3:**度量**功能的类别和子类别。(续)

类别	子类别
	度量 2.6:人工智能系统定期评估安全风险--如**映射**功能中所识别。待部署的人工智能系统被证明是安全的，其残余负面风险不超过风险容忍度，并且能够安全失败，特别是在被迫超出其知识限制运行的情况下。安全指标反映系统可靠性和稳健性、实时监测以及人工智能系统故障的响应时间。
	度量 2.7:人工智能系统安全性和韧性--如**映射**功能中所识别--被评估和记录。
	度量 2.8:与透明度和问责制相关的风险--如**映射**功能中所识别--被审查并 被记录。
	度量 2.9:人工智能模型被解释、验证和记录，人工智能系统输出在其上下文中被解释--如**映射**功能中所识别--以支持负责任的使用和 治理。
	度量 2.10:人工智能系统的隐私风险--如**映射**功能中所识别--被审查和记录。
	度量 2.11:公平性和偏见--如**映射**功能中所识别--被评估，结果被记录。
	度量 2.12:人工智能模型训练和管理活动的环境影响和可持续性--如**映射**功能中所识别--被评估和记录。
	度量 2.13:所采用的TEVV(测试、评估、验证与确认)指标和流程在度量功能中的有效性被评估并 被记录。
MEASURE 3: 机制，用于 跟踪已识别的 人工智能风险随时间演变 已就位。	**度量 3.1:**方法、人员和文档已 已建立机制，定期识别和跟踪现有的、未预料到的、 以及基于预期用途等因素的新兴人工智能风险，以及 部署环境中的实际性能。
	度量 3.2:对于使用当前可用度量技术难以评估人工智能风险或指标尚不可用的环境，考虑风险跟踪方法 可用。

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Table 3: Categories and subcategories for the **MEASURE** function. (Continued)

Categories	Subcategories
	MEASURE 3.3: Feedback processes for end users and impacted communities to report problems and appeal system outcomes are established and integrated into AI system evaluation metrics.
MEASURE 4: Feedback about efficacy of measurement is gathered and assessed.	**MEASURE 4.1:** Measurement approaches for identifying AI risks are connected to deployment context(s) and informed through consultation with domain experts and other end users. Approaches are documented. **MEASURE 4.2:** Measurement results regarding AI system trustworthiness in deployment context(s) and across the AI lifecycle are informed by input from domain experts and relevant AI actors to validate whether the system is performing consistently as intended. Results are documented. **MEASURE 4.3:** Measurable performance improvements or declines based on consultations with relevant AI actors, including affected communities, and field data about context-relevant risks and trustworthiness characteristics are identified and documented.

5.4 Manage

The **MANAGE** function entails allocating risk resources to mapped and measured risks on a regular basis and as defined by the **GOVERN** function. Risk treatment comprises plans to respond to, recover from, and communicate about incidents or events.

Contextual information gleaned from expert consultation and input from relevant AI actors – established in **GOVERN** and carried out in **MAP** – is utilized in this function to decrease the likelihood of system failures and negative impacts. Systematic documentation practices established in **GOVERN** and utilized in **MAP** and **MEASURE** bolster AI risk management efforts and increase transparency and accountability. Processes for assessing emergent risks are in place, along with mechanisms for continual improvement.

After completing the **MANAGE** function, plans for prioritizing risk and regular monitoring and improvement will be in place. Framework users will have enhanced capacity to manage the risks of deployed AI systems and to allocate risk management resources based on assessed and prioritized risks. It is incumbent on Framework users to continue to apply the **MANAGE** function to deployed AI systems as methods, contexts, risks, and needs or expectations from relevant AI actors evolve over time.

表3:**度量**功能的类别和子类别。(续)

类别	子类别
	度量 3.3:最终用户和受影响社区报告问题和申诉系统结果的反馈流程被建立并整合到人工智能系统评估指标中。**度量 4.1:**用于识别人工智能风险的度量方法与部署环境相关联，并通过与领域专家和其他最终用户的咨询获得信息。方法被记录。 **度量 4.2:**关于人工智能系统在部署环境中以及跨人工智能生命周期的可信度的度量结果，通过领域专家和相关人工智能参与者的输入获得信息，以验证系统是否按预期一致运行。结果被记录。 **度量 4.3:**基于与相关人工智能参与者(包括受影响社区)的咨询以及关于情境相关风险和可信特征的现场数据，可测量的性能改进或下降被识别和记录。
MEASURE 4: 关于.....的反馈效力测量是收集并评估。	

5.4 Manage

管理功能需要定期并按照**治理**功能的定义，为已映射和已度量的风险分配风险资源。风险处理包括应对、恢复和沟通事件或事故的计划。

从专家咨询中获得的背景信息以及来自相关人工智能参与者的输入--在**治理**中确立并在**映射**中执行--在此功能中用于降低系统故障和负面影响的可能。在**治理**中确立并在**映射**和**度量**中使用的系统化记录实践，可加强人工智能风险管理工作并提高透明度和问责制。评估新兴风险的流程已到位，并配有持续改进机制。

完成**管理**功能后，将制定风险优先级排序以及定期监测和改进的计划。框架用户将增强管理已部署人工智能系统风险的能力，并根据评估和优先级排序的风险分配风险管理资源。框架用户有责任随着方法、情境、风险以及相关人工智能参与者的需求或期望随时间演变，继续对已部署的人工智能系统应用**管理**功能。

Practices related to managing AI risks are described in the NIST AI RMF Playbook. Table 4 lists the **MANAGE** function's categories and subcategories.

Table 4: Categories and subcategories for the **MANAGE** function.

Categories	Subcategories
MANAGE 1: AI risks based on assessments and other analytical output from the **MAP** and **MEASURE** functions are prioritized, responded to, and managed.	**MANAGE 1.1:** A determination is made as to whether the AI system achieves its intended purposes and stated objectives and whether its development or deployment should proceed. **MANAGE 1.2:** Treatment of documented AI risks is prioritized based on impact, likelihood, and available resources or methods. **MANAGE 1.3:** Responses to the AI risks deemed high priority, as identified by the **MAP** function, are developed, planned, and documented. Risk response options can include mitigating, transferring, avoiding, or accepting. **MANAGE 1.4:** Negative residual risks (defined as the sum of all unmitigated risks) to both downstream acquirers of AI systems and end users are documented.
MANAGE 2: Strategies to maximize AI benefits and minimize negative impacts are planned, prepared, implemented, documented, and informed by input from relevant AI actors.	**MANAGE 2.1:** Resources required to manage AI risks are taken into account – along with viable non-AI alternative systems, approaches, or methods – to reduce the magnitude or likelihood of potential impacts. **MANAGE 2.2:** Mechanisms are in place and applied to sustain the value of deployed AI systems. **MANAGE 2.3:** Procedures are followed to respond to and recover from a previously unknown risk when it is identified. **MANAGE 2.4:** Mechanisms are in place and applied, and responsibilities are assigned and understood, to supersede, disengage, or deactivate AI systems that demonstrate performance or outcomes inconsistent with intended use.
MANAGE 3: AI risks and benefits from third-party entities are managed.	**MANAGE 3.1:** AI risks and benefits from third-party resources are regularly monitored, and risk controls are applied and documented. **MANAGE 3.2:** Pre-trained models which are used for development are monitored as part of AI system regular monitoring and maintenance.

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与管理人工智能风险相关的实践在NIST AI RMF Playbook中描述。表4列出了**管理**功能的类别和子类别。

表 4:**管理**功能的类别与子类别。

类别	子类别
管理 1: AI 基于风险评估和其他分析性来自**映射**和**度量**功能包括优先排序，已回应，并且管理。	**管理 1.1:**确定人工智能系统是否实现其预期目的和既定目标，以及其开发或部署是否应继续进行。 **管理 1.2:**对已记录的人工智能风险的处理基于影响、可能性和可用资源或方法进行优先排序。**管理 1.3:**对**映射**功能所识别的被视为高优先级的人工智能风险的响应被制定、规划和记录。风险响应选项可包括缓解、转移、避免或接受。 **管理 1.4:**对人工智能系统下游获取者和最终用户的负面残余风险(定义为所有未缓解风险的总和)被记录。
MANAGE 2: 制定策略以最大化人工智能益处和尽量减少负面影响影响是经过规划的，准备，实施，已记录，且基于输入信息来自相关的AI行为者。	**管理 2.1:**管理人工智能风险所需的资源--连同可行的非人工智能替代系统、方法或途径--被纳入考虑，以减少潜在影响的严重程度或可能性。 **管理 2.2:**已建立并应用相关机制，以维持已部署人工智能系统的价值。 **管理 2.3:**遵循相关程序，以在识别出先前未知风险时进行响应和恢复。 **管理 2.4:**已建立并应用相关机制，且已分配并理解相关责任，以取代、脱离或停用表现出与预期用途不一致的性能或结果的人工智能系统。
管理 3: AI 风险和收益来自第三方实体是管理。	**管理 3.1:**定期监测来自第三方资源的人工智能风险和收益，并应用风险控制措施，且被记录。 **管理 3.2:**用于开发的预训练模型作为人工智能系统定期监测的一部分进行监测，且维护。

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Table 4: Categories and subcategories for the **MANAGE** function. (Continued)

Categories	Subcategories
MANAGE 4: Risk treatments, including response and recovery, and communication plans for the identified and measured AI risks are documented and monitored regularly.	**MANAGE 4.1:** Post-deployment AI system monitoring plans are implemented, including mechanisms for capturing and evaluating input from users and other relevant AI actors, appeal and override, decommissioning, incident response, recovery, and change management. **MANAGE 4.2:** Measurable activities for continual improvements are integrated into AI system updates and include regular engagement with interested parties, including relevant AI actors. **MANAGE 4.3:** Incidents and errors are communicated to relevant AI actors, including affected communities. Processes for tracking, responding to, and recovering from incidents and errors are followed and documented.

6. AI RMF Profiles

AI RMF *use-case profiles* are implementations of the AI RMF functions, categories, and subcategories for a specific setting or application based on the requirements, risk tolerance, and resources of the Framework user: for example, an AI RMF *hiring profile* or an AI RMF *fair housing profile*. Profiles may illustrate and offer insights into how risk can be managed at various stages of the AI lifecycle or in specific sector, technology, or end-use applications. AI RMF profiles assist organizations in deciding how they might best manage AI risk that is well-aligned with their goals, considers legal/regulatory requirements and best practices, and reflects risk management priorities.

AI RMF *temporal profiles* are descriptions of either the current state or the desired, target state of specific AI risk management activities within a given sector, industry, organization, or application context. An AI RMF Current Profile indicates how AI is currently being managed and the related risks in terms of current outcomes. A Target Profile indicates the outcomes needed to achieve the desired or target AI risk management goals.

Comparing Current and Target Profiles likely reveals gaps to be addressed to meet AI risk management objectives. Action plans can be developed to address these gaps to fulfill outcomes in a given category or subcategory. Prioritization of gap mitigation is driven by the user's needs and risk management processes. This risk-based approach also enables Framework users to compare their approaches with other approaches and to gauge the resources needed (e.g., staffing, funding) to achieve AI risk management goals in a cost-effective, prioritized manner.

表 4:**管理**功能的类别和子类别。(续)

类别	子类别
管理 4:风险治疗，包括响应以及恢复，并且沟通针对.....的计划已识别并已度量的 AI 风险已记录并定期监测。	**管理 4.1:**实施部署后人工智能系统监测计划，包括用于捕获和评估来自用户及其他相关人工智能参与者的输入、申诉与推翻、退役、事件响应、恢复和变更管理的机制。 **管理 4.2:**将持续改进的可衡量活动整合到人工智能系统更新中，并包括与利益相关方(包括相关人工智能参与者)的定期互动。 **管理 4.3:**将事件和错误传达给相关人工智能参与者，包括受影响的社区。遵循并记录用于跟踪、响应和从事件和错误中恢复的流程。

6. AI RMF 概况

AI RMF 用例配置文件是AI RMF功能、类别和子类别的实现，针对特定设置或应用，基于框架用户的需求、风险容忍度和资源：例如，AI RMF 招聘配置文件或AI RMF 公平住房配置文件。配置文件可以说明并提供见解，关于如何在人工智能生命周期的各个阶段或特定部门、技术或最终用途应用中管理风险。AI RMF配置文件帮助组织决定如何最佳管理AI风险，与其目标良好对齐，考虑法律/监管要求和最佳实践，并反映风险管理优先级。

AI RMF 时间轮廓描述特定部门、行业、组织或应用背景下特定人工智能风险管理活动的当前状态或期望的目标状态。AI RMF 当前轮廓指示人工智能当前如何被管理以及就当前结果而言的相关风险。目标轮廓指示实现期望或目标人工智能风险管理目标所需的结果。

比较当前配置文件和目标配置文件可能揭示需要解决的差距，以满足AI风险管理目标。可以制定行动计划来解决这些差距，以实现给定类别或子类别中的成果。差距缓解的优先级由用户的需求和风险管理过程驱动。这种基于风险的方法还使框架用户能够将他们的方法与其他方法进行比较，并评估实现AI风险管理目标所需的资源(例如，人员配备、资金)，以成本有效、优先化的方式。

AI RMF *cross-sectoral profiles* cover risks of models or applications that can be used across use cases or sectors. Cross-sectoral profiles can also cover how to govern, map, measure, and manage risks for activities or business processes common across sectors such as the use of large language models, cloud-based services or acquisition.

This Framework does not prescribe profile templates, allowing for flexibility in implementation.

AI RMF 跨部门轮廓涵盖可跨用例或部门使用的模型或应用的风险。跨部门轮廓还可涵盖如何治理、映射、度量和管理跨部门常见活动或业务流程的风险，例如使用大型语言模型、基于云的服务或采购。

本框架不规定轮廓模板，允许实施中的灵活性。

Appendix A:
Descriptions of AI Actor Tasks from Figures 2 and 3

AI Design tasks are performed during the Application Context and Data and Input phases of the AI lifecycle in Figure 2. AI Design actors create the concept and objectives of AI systems and are responsible for the planning, design, and data collection and processing tasks of the AI system so that the AI system is lawful and fit-for-purpose. Tasks include articulating and documenting the system's concept and objectives, underlying assumptions, context, and requirements; gathering and cleaning data; and documenting the metadata and characteristics of the dataset. AI actors in this category include data scientists, domain experts, socio-cultural analysts, experts in the field of diversity, equity, inclusion, and accessibility, members of impacted communities, human factors experts (e.g., UX/UI design), governance experts, data engineers, data providers, system funders, product managers, third-party entities, evaluators, and legal and privacy governance.

AI Development tasks are performed during the AI Model phase of the lifecycle in Figure 2. AI Development actors provide the initial infrastructure of AI systems and are responsible for model building and interpretation tasks, which involve the creation, selection, calibration, training, and/or testing of models or algorithms. AI actors in this category include machine learning experts, data scientists, developers, third-party entities, legal and privacy governance experts, and experts in the socio-cultural and contextual factors associated with the deployment setting.

AI Deployment tasks are performed during the Task and Output phase of the lifecycle in Figure 2. AI Deployment actors are responsible for contextual decisions relating to how the AI system is used to assure deployment of the system into production. Related tasks include piloting the system, checking compatibility with legacy systems, ensuring regulatory compliance, managing organizational change, and evaluating user experience. AI actors in this category include system integrators, software developers, end users, operators and practitioners, evaluators, and domain experts with expertise in human factors, socio-cultural analysis, and governance.

Operation and Monitoring tasks are performed in the Application Context/Operate and Monitor phase of the lifecycle in Figure 2. These tasks are carried out by AI actors who are responsible for operating the AI system and working with others to regularly assess system output and impacts. AI actors in this category include system operators, domain experts, AI designers, users who interpret or incorporate the output of AI systems, product developers, evaluators and auditors, compliance experts, organizational management, and members of the research community.

Test, Evaluation, Verification, and Validation (TEVV) tasks are performed throughout the AI lifecycle. They are carried out by AI actors who examine the AI system or its components, or detect and remediate problems. Ideally, AI actors carrying out verification

附录 A：图 2 和图 3 中 AI 行为者任务的描述

AI设计任务在图2中的人工智能生命周期的应用上下文和数据与输入阶段执行。AI设计参与者创建AI系统的概念和目标，并负责AI系统的规划、设计和数据收集与处理任务，以使AI系统合法且适合目的。任务包括阐述和记录系统的概念和目标、基本假设、上下文和要求；收集和清理数据；以及记录数据集的元数据和特征。此类别中的AI参与者包括数据科学家、领域专家、社会文化分析师、多样性、公平、包容和可及性领域的专家、受影响社区的成员、人为因素专家(例如，UX/UI设计)、治理专家、数据工程师、数据提供者、系统资助者、产品经理、第三方实体、评估者以及法律和隐私治理。

AI开发任务在图2中生命周期的AI模型阶段执行。AI开发参与者提供AI系统的初始基础设施，并负责模型构建和解释任务，这些任务涉及模型或算法的创建、选择、校准、训练和/或测试。此类别中的AI参与者包括机器学习专家、数据科学家、开发者、第三方实体、法律和隐私治理专家，以及与部署设置相关的社会文化和上下文因素的专家。

AI部署任务在图2中生命周期的任务和输出阶段执行。AI部署参与者负责与如何使用AI系统相关的上下文决策，以确保系统部署到生产环境。相关任务包括试点系统、检查与遗留系统的兼容性、确保监管合规、管理组织变革以及评估用户体验。此类别中的AI参与者包括系统集成商、软件开发者、最终用户、操作员和从业者、评估者，以及具有人为因素、社会文化分析和治理专业知识的领域专家。

运行与监控任务在图2所示生命周期中的应用场景/运行与监控阶段执行。这些任务由负责人工智能系统运行并与其他人员合作定期评估系统输出和影响的人工智能参与者执行。此类别中的人工智能参与者包括系统操作员、领域专家、人工智能设计者、解释或采纳人工智能系统输出的用户、产品开发者、评估者和审计者、合规专家、组织管理层以及研究界成员。

测试、评估、验证与确认(TEVV)任务在整个人工智能生命周期中执行。这些任务由人工智能参与者执行，他们检查人工智能系统或其组件，或检测并修复问题。理想情况下，执行验证

and validation tasks are distinct from those who perform test and evaluation actions. Tasks can be incorporated into a phase as early as design, where tests are planned in accordance with the design requirement.

- TEVV tasks for design, planning, and data may center on internal and external validation of assumptions for system design, data collection, and measurements relative to the intended context of deployment or application.
- TEVV tasks for development (i.e., model building) include model validation and assessment.
- TEVV tasks for deployment include system validation and integration in production, with testing, and recalibration for systems and process integration, user experience, and compliance with existing legal, regulatory, and ethical specifications.
- TEVV tasks for operations involve ongoing monitoring for periodic updates, testing, and subject matter expert (SME) recalibration of models, the tracking of incidents or errors reported and their management, the detection of emergent properties and related impacts, and processes for redress and response.

Human Factors tasks and activities are found throughout the dimensions of the AI lifecycle. They include human-centered design practices and methodologies, promoting the active involvement of end users and other interested parties and relevant AI actors, incorporating context-specific norms and values in system design, evaluating and adapting end user experiences, and broad integration of humans and human dynamics in all phases of the AI lifecycle. Human factors professionals provide multidisciplinary skills and perspectives to understand context of use, inform interdisciplinary and demographic diversity, engage in consultative processes, design and evaluate user experience, perform human-centered evaluation and testing, and inform impact assessments.

Domain Expert tasks involve input from multidisciplinary practitioners or scholars who provide knowledge or expertise in – and about – an industry sector, economic sector, context, or application area where an AI system is being used. AI actors who are domain experts can provide essential guidance for AI system design and development, and interpret outputs in support of work performed by TEVV and AI impact assessment teams.

AI Impact Assessment tasks include assessing and evaluating requirements for AI system accountability, combating harmful bias, examining impacts of AI systems, product safety, liability, and security, among others. AI actors such as impact assessors and evaluators provide technical, human factor, socio-cultural, and legal expertise.

Procurement tasks are conducted by AI actors with financial, legal, or policy management authority for acquisition of AI models, products, or services from a third-party developer, vendor, or contractor.

Governance and Oversight tasks are assumed by AI actors with management, fiduciary, and legal authority and responsibility for the organization in which an AI system is de-

和确认任务的人工智能参与者与执行测试和评估行动的人员不同。任务可尽早纳入设计阶段，在该阶段根据设计要求规划测试。

- 针对设计、规划和数据的 TEVV 任务可集中于系统设计、数据收集和测量相对于预期部署或应用背景的假设的内部和外部验证。
- 针对开发(即模型构建)的 TEVV 任务包括模型验证和评估。
- 针对部署的 TEVV 任务包括生产中的系统验证和集成，以及针对系统和流程集成、用户体验以及遵守现有法律、监管和伦理规范的测试和重新校准。
- 针对运营的 TEVV 任务涉及持续监测以进行定期更新、测试和主题专家(SME)对模型的重新校准、跟踪报告的事件或错误及其管理、检测涌现属性及相关影响，以及补救和响应流程。

人为因素任务和活动贯穿人工智能生命周期的各个维度。它们包括以人为本的设计实践和方法、促进最终用户和其他利益相关方及相关人工智能参与者的积极参与、在系统设计中纳入特定情境的规范和价值观、评估和调整最终用户体验，以及在人工智能生命周期的所有阶段广泛整合人类和人类动态。人为因素专业人员提供多学科技能和视角，以理解使用情境、促进跨学科和人口多样性、参与协商过程、设计和评估用户体验、执行以人为本的评估和测试，并为影响评估提供信息。

领域专家任务涉及来自多学科从业者或学者的输入，他们提供关于人工智能系统所使用行业部门、经济部门、背景或应用领域的知识和专业知识。作为领域专家的人工智能参与者可为人工智能系统设计和开发提供重要指导，并解释输出以支持 TEVV 和人工智能影响评估团队执行的工作。

人工智能影响评估任务包括评估和评价人工智能系统问责制、打击有害偏见、审查人工智能系统影响、产品安全、责任和安全等方面的要求。影响评估者和评价者等人工智能参与者提供技术、人为因素、社会文化和法律专业知识。

采购任务由具有财务、法律或政策管理权限的人工智能参与者执行，以从第三方开发者、供应商或承包商处获取人工智能模型、产品或服务。

治理与监督任务由具有管理、受托和法律权限并对设计、开发和/或部署人工智能系统的组织负有责任的人工智能参与者承担。

signed, developed, and/or deployed. Key AI actors responsible for AI governance include organizational management, senior leadership, and the Board of Directors. These actors are parties that are concerned with the impact and sustainability of the organization as a whole.

Additional AI Actors

Third-party entities include providers, developers, vendors, and evaluators of data, algorithms, models, and/or systems and related services for another organization or the organization's customers or clients. Third-party entities are responsible for AI design and development tasks, in whole or in part. By definition, they are external to the design, development, or deployment team of the organization that acquires its technologies or services. The technologies acquired from third-party entities may be complex or opaque, and risk tolerances may not align with the deploying or operating organization.

End users of an AI system are the individuals or groups that use the system for specific purposes. These individuals or groups interact with an AI system in a specific context. End users can range in competency from AI experts to first-time technology end users.

Affected individuals/communities encompass all individuals, groups, communities, or organizations directly or indirectly affected by AI systems or decisions based on the output of AI systems. These individuals do not necessarily interact with the deployed system or application.

Other AI actors may provide formal or quasi-formal norms or guidance for specifying and managing AI risks. They can include **trade associations, standards developing organizations, advocacy groups, researchers, environmental groups, and civil society organizations**.

The general public is most likely to directly experience positive and negative impacts of AI technologies. They may provide the motivation for actions taken by the AI actors. This group can include individuals, communities, and consumers associated with the context in which an AI system is developed or deployed.

负责人工智能治理的关键人工智能参与者包括组织管理层、高级领导和董事会。这些参与者是关注整个组织影响和可持续性的各方。

其他人工智能行为者

第三方实体包括为另一组织或该组织的客户或顾客提供数据、算法、模型和/或系统及相关服务的提供商、开发者、供应商和评估者。第三方实体全部或部分负责人工智能设计和开发任务。根据定义，它们外在于获取其技术或服务的组织的设计、开发或部署团队。从第三方实体获取的技术可能复杂或不透明，风险容忍度可能与部署或运营组织不一致。

人工智能系统的**最终用户**是为特定目的使用系统的个人或群体。这些个人或群体在特定背景下与人工智能系统交互。最终用户的能力范围可从人工智能专家到首次使用技术的最终用户。

受影响的个人/社区涵盖直接或间接受人工智能系统或基于人工智能系统输出的决策影响的所有个人、群体、社区或组织。这些个人不一定与已部署的系统或应用交互。

其他人工智能参与者可为规定和管理人工智能风险提供正式或准正式规范或指导。他们可包括**行业协会、标准制定组织、倡导团体、研究人员、环境团体和民间社会组织。**

公众最有可能直接体验人工智能技术的积极和消极影响。他们可为人工智能参与者采取的行动提供动机。该群体可包括与人工智能系统开发或部署背景相关的个人、社区和消费者。

Appendix B:
How AI Risks Differ from Traditional Software Risks

As with traditional software, risks from AI-based technology can be bigger than an enterprise, span organizations, and lead to societal impacts. AI systems also bring a set of risks that are not comprehensively addressed by current risk frameworks and approaches. Some AI system features that present risks also can be beneficial. For example, pre-trained models and transfer learning can advance research and increase accuracy and resilience when compared to other models and approaches. Identifying contextual factors in the **MAP** function will assist AI actors in determining the level of risk and potential management efforts.

Compared to traditional software, AI-specific risks that are new or increased include the following:

- The data used for building an AI system may not be a true or appropriate representation of the context or intended use of the AI system, and the ground truth may either not exist or not be available. Additionally, harmful bias and other data quality issues can affect AI system trustworthiness, which could lead to negative impacts.
- AI system dependency and reliance on data for training tasks, combined with increased volume and complexity typically associated with such data.
- Intentional or unintentional changes during training may fundamentally alter AI system performance.
- Datasets used to train AI systems may become detached from their original and intended context or may become stale or outdated relative to deployment context.
- AI system scale and complexity (many systems contain billions or even trillions of decision points) housed within more traditional software applications.
- Use of pre-trained models that can advance research and improve performance can also increase levels of statistical uncertainty and cause issues with bias management, scientific validity, and reproducibility.
- Higher degree of difficulty in predicting failure modes for emergent properties of large-scale pre-trained models.
- Privacy risk due to enhanced data aggregation capability for AI systems.
- AI systems may require more frequent maintenance and triggers for conducting corrective maintenance due to data, model, or concept drift.
- Increased opacity and concerns about reproducibility.
- Underdeveloped software testing standards and inability to document AI-based practices to the standard expected of traditionally engineered software for all but the simplest of cases.
- Difficulty in performing regular AI-based software testing, or determining what to test, since AI systems are not subject to the same controls as traditional code development.

附录 B:AI 风险与传统软件风险有何不同

与传统软件一样，基于人工智能的技术的风险可能超出企业范围、跨越多个组织并导致社会影响。人工智能系统还带来一系列当前风险框架和方法未能全面解决的风险。一些带来风险的人工智能系统特征也可能是有益的。例如，与其他模型和方法相比，预训练模型和迁移学习可以推进研究并提高准确性和韧性。在**映射**功能中识别情境因素将有助于人工智能参与者确定风险水平和潜在的管理工作。

与传统软件相比，新增或增加的人工智能特定风险包括以下内容：

- 用于构建人工智能系统的数据可能不是人工智能系统背景或预期用途的真实或适当表示，且真实基准可能不存在或不可用。此外，有害偏见和其他数据质量问题可能影响人工智能系统的可信度，从而可能导致负面影响。
- 人工智能系统对训练任务数据的依赖，以及此类数据通常伴随的数据量和复杂性的增加。
- 训练过程中有意或无意的变化可能从根本上改变人工智能系统的性能。
- 用于训练人工智能系统的数据集可能脱离其原始和预期语境，或相对于部署语境变得陈旧或过时。
- 人工智能系统的规模和复杂性(许多系统包含数十亿甚至数万亿个决策点)嵌入在更为传统的软件应用中。
- 使用预训练模型可以推进研究并提高性能，但也可能增加统计不确定性水平，并导致偏差管理、科学有效性和可复现性方面的问题。
- 预测大规模预训练模型涌现特性的失效模式难度更高。
- 由于人工智能系统数据聚合能力增强而带来的隐私风险。
- 由于数据、模型或概念漂移，人工智能系统可能需要更频繁的维护和触发纠正性维护。
- 不透明度增加以及对可复现性的担忧。
- 软件测试标准不完善，且除最简单的情况外，无法按照传统工程化软件所期望的标准记录基于人工智能的实践。
- 难以执行定期的基于人工智能的软件测试，或确定测试内容，因为人工智能系统不受与传统代码开发相同的控制。

- Computational costs for developing AI systems and their impact on the environment and planet.
- Inability to predict or detect the side effects of AI-based systems beyond statistical measures.

Privacy and cybersecurity risk management considerations and approaches are applicable in the design, development, deployment, evaluation, and use of AI systems. Privacy and cybersecurity risks are also considered as part of broader enterprise risk management considerations, which may incorporate AI risks. As part of the effort to address AI trustworthiness characteristics such as "Secure and Resilient" and "Privacy-Enhanced," organizations may consider leveraging available standards and guidance that provide broad guidance to organizations to reduce security and privacy risks, such as, but not limited to, the NIST Cybersecurity Framework, the NIST Privacy Framework, the NIST Risk Management Framework, and the Secure Software Development Framework. These frameworks have some features in common with the AI RMF. Like most risk management approaches, they are outcome-based rather than prescriptive and are often structured around a Core set of functions, categories, and subcategories. While there are significant differences between these frameworks based on the domain addressed – and because AI risk management calls for addressing many other types of risks – frameworks like those mentioned above may inform security and privacy considerations in the **MAP**, **MEASURE**, and **MANAGE** functions of the AI RMF.

At the same time, guidance available before publication of this AI RMF does not comprehensively address many AI system risks. For example, existing frameworks and guidance are unable to:

- adequately manage the problem of harmful bias in AI systems;
- confront the challenging risks related to generative AI;
- comprehensively address security concerns related to evasion, model extraction, membership inference, availability, or other machine learning attacks;
- account for the complex attack surface of AI systems or other security abuses enabled by AI systems; and
- consider risks associated with third-party AI technologies, transfer learning, and off-label use where AI systems may be trained for decision-making outside an organization's security controls or trained in one domain and then "fine-tuned" for another.

Both AI and traditional software technologies and systems are subject to rapid innovation. Technology advances should be monitored and deployed to take advantage of those developments and work towards a future of AI that is both trustworthy and responsible.

- 开发人工智能系统的计算成本及其对环境和地球的影响。
- 无法在统计度量之外预测或检测基于人工智能的系统的副作用。

隐私和网络安全风险管理考量和方法适用于人工智能系统的设计、开发、部署、评估和使用。隐私和网络安全风险也被视为更广泛的企业风险管理考量的一部分，其中可能纳入人工智能风险。作为解决"安全与韧性"和"隐私增强"等人工智能可信特征工作的一部分，组织可考虑利用现有标准和指南，这些标准和指南为组织提供广泛指导以降低安全和隐私风险，例如包括但不限于NIST网络安全框架、NIST隐私框架、NIST风险管理框架和安全软件开发框架。这些框架与AI RMF有一些共同特征。与大多数风险管理方法一样，它们基于结果而非规定性，并且通常围绕一组核心功能、类别和子类别构建。尽管这些框架因所涉领域不同而存在显著差异--并且因为人工智能风险管理需要解决许多其他类型的风险--上述框架可为AI RMF的**映射**、**度量**和管理功能中的安全和隐私考量提供参考。

与此同时，在本 AI RMF 发布之前可获得的指南并未全面涵盖许多人工智能系统风险。例如，现有框架和指南无法：

- 充分管理人工智能系统中的有害偏见问题；
- 应对与生成式人工智能相关的挑战性风险；
- 全面解决与规避、模型提取、成员推断、可用性或其他机器学习攻击相关的安全问题；
- 考虑人工智能系统的复杂攻击面或由人工智能系统促成的其他安全滥用；以及
- 考虑与第三方人工智能技术、迁移学习和标签外使用相关的风险，即人工智能系统可能在组织安全控制之外进行决策训练，或在一个领域训练后针对另一领域进行"微调"。

人工智能和传统软件技术与系统都处于快速创新之中。应监测技术进展并加以部署，以利用这些发展，朝着既可信又负责任的人工智能未来努力。

Appendix C:
AI Risk Management and Human-AI Interaction

Organizations that design, develop, or deploy AI systems for use in operational settings may enhance their AI risk management by understanding current limitations of human-AI interaction. The AI RMF provides opportunities to clearly define and differentiate the various human roles and responsibilities when using, interacting with, or managing AI systems.

Many of the data-driven approaches that AI systems rely on attempt to convert or represent individual and social observational and decision-making practices into measurable quantities. Representing complex human phenomena with mathematical models can come at the cost of removing necessary context. This loss of context may in turn make it difficult to understand individual and societal impacts that are key to AI risk management efforts.

Issues that merit further consideration and research include:

1. **Human roles and responsibilities in decision making and overseeing AI systems need to be clearly defined and differentiated.** Human-AI configurations can span from fully autonomous to fully manual. AI systems can autonomously make decisions, defer decision making to a human expert, or be used by a human decision maker as an additional opinion. Some AI systems may not require human oversight, such as models used to improve video compression. Other systems may specifically require human oversight.

2. **Decisions that go into the design, development, deployment, evaluation, and use of AI systems reflect systemic and human cognitive biases.** AI actors bring their cognitive biases, both individual and group, into the process. Biases can stem from end-user decision-making tasks and be introduced across the AI lifecycle via human assumptions, expectations, and decisions during design and modeling tasks. These biases, which are not necessarily always harmful, may be exacerbated by AI system opacity and the resulting lack of transparency. Systemic biases at the organizational level can influence how teams are structured and who controls the decision-making processes throughout the AI lifecycle. These biases can also influence downstream decisions by end users, decision makers, and policy makers and may lead to negative impacts.

3. **Human-AI interaction results vary.** Under certain conditions – for example, in perceptual-based judgment tasks – the AI part of the human-AI interaction can amplify human biases, leading to more biased decisions than the AI or human alone. When these variations are judiciously taken into account in organizing human-AI teams, however, they can result in complementarity and improved overall performance.

附录 C:AI 风险管理与人机交互

为在运营环境中使用而设计、开发或部署人工智能系统的组织，可以通过理解人机交互的当前局限性来增强其人工智能风险管理。AI RMF 提供了机会，以明确界定和区分在使用、交互或管理人工智能系统时各种人类角色和职责。

人工智能系统所依赖的许多数据驱动方法试图将个人和社会的观察与决策实践转换或表示为可测量的量。用数学模型表示复杂的人类现象可能以去除必要语境为代价。这种语境的丧失反过来可能使理解对人工智能风险管理工作至关重要的个人和社会影响变得困难。

值得进一步考虑和研究的问题包括：

1. **在决策和监督人工智能系统方面，人类的角色和职责需要被清晰地定义和区分。**人机配置的范围可以从完全自主到完全手动。人工智能系统可以自主做出决策，将决策权交给人类专家，或者被人类决策者用作额外的意见。某些人工智能系统可能不需要人类监督，例如用于改进视频压缩的模型。其他系统则可能特别需要人类监督。

2. **人工智能系统的设计、开发、部署、评估和使用中所涉及的决策反映了系统性和人类认知偏差。**人工智能参与者将其个体和群体的认知偏差带入过程中。偏差可能源于最终用户的决策任务，并通过人类在设计 and 建模任务中的假设、期望和决策在整个人工智能生命周期中被引入。这些偏差不一定总是有害的，但可能因人工智能系统的不透明性以及由此产生的透明度缺乏而加剧。组织层面的系统性偏差可能影响团队的结构方式以及谁在整个人工智能生命周期中控制决策过程。这些偏差还可能影响最终用户、决策者和政策制定者的下游决策，并可能导致负面影响。

3. **人机交互结果各不相同。**在某些条件下--例如在基于感知的判断任务中--人机交互中的人工智能部分可能放大人类偏差，导致比单独的人工智能或人类更具偏差的决策。然而，当在组织人机团队时审慎考虑这些差异，它们可以产生互补性并改善整体性能。

4. **Presenting AI system information to humans is complex.** Humans perceive and derive meaning from AI system output and explanations in different ways, reflecting different individual preferences, traits, and skills.

The **GOVERN** function provides organizations with the opportunity to clarify and define the roles and responsibilities for the humans in the Human-AI team configurations and those who are overseeing the AI system performance. The **GOVERN** function also creates mechanisms for organizations to make their decision-making processes more explicit, to help counter systemic biases.

The **MAP** function suggests opportunities to define and document processes for operator and practitioner proficiency with AI system performance and trustworthiness concepts, and to define relevant technical standards and certifications. Implementing **MAP** function categories and subcategories may help organizations improve their internal competency for analyzing context, identifying procedural and system limitations, exploring and examining impacts of AI-based systems in the real world, and evaluating decision-making processes throughout the AI lifecycle.

The **GOVERN** and **MAP** functions describe the importance of interdisciplinarity and demographically diverse teams and utilizing feedback from potentially impacted individuals and communities. AI actors called out in the AI RMF who perform human factors tasks and activities can assist technical teams by anchoring in design and development practices to user intentions and representatives of the broader AI community, and societal values. These actors further help to incorporate context-specific norms and values in system design and evaluate end user experiences – in conjunction with AI systems.

AI risk management approaches for human-AI configurations will be augmented by ongoing research and evaluation. For example, the degree to which humans are empowered and incentivized to challenge AI system output requires further studies. Data about the frequency and rationale with which humans overrule AI system output in deployed systems may be useful to collect and analyze.

4. **向人类呈现人工智能系统信息是复杂的。**人类以不同方式感知人工智能系统输出和解释并从中得出意义，反映了不同的个人偏好、特质和技能。

治理功能为组织提供了机会，以澄清和界定人机团队配置中的人类以及监督人工智能系统性能的人员的角色和职责。**治理**功能还为组织创建了机制，使其决策过程更加明确，以帮助对抗系统性偏差。

映射功能提出了定义和记录操作员和从业者在人工智能系统性能和可信度概念方面的熟练程度流程的机会，并定义相关技术标准和认证。实施**映射**功能的类别和子类别可能有助于组织提高其内部能力，以分析上下文、识别程序和系统限制、探索和检查基于人工智能的系统在现实世界中的影响，以及评估整个人工智能生命周期中的决策过程。

治理和**映射**功能描述了跨学科性和人口多样性团队的重要性，以及利用可能受影响的个人和社区的反馈。AI RMF 中提到的执行人为因素任务和活动的人工智能参与者可以通过将设计和开发实践锚定于用户意图、更广泛的人工智能社区代表以及社会价值观来协助技术团队。这些参与者进一步帮助将特定情境的规范和价值观纳入系统设计，并与人工智能系统一起评估最终用户体验。

针对人机配置的人工智能风险管理方法将通过持续的研究和评估得到增强。例如，人类被赋权和激励去质疑人工智能系统输出的程度需要进一步研究。关于人类在已部署系统中否决人工智能系统输出的频率和理由的数据可能有助于收集和分析。

Appendix D:
Attributes of the AI RMF

NIST described several key attributes of the AI RMF when work on the Framework first began. These attributes have remained intact and were used to guide the AI RMF's development. They are provided here as a reference.

The AI RMF strives to:

1. Be risk-based, resource-efficient, pro-innovation, and voluntary.
2. Be consensus-driven and developed and regularly updated through an open, transparent process. All stakeholders should have the opportunity to contribute to the AI RMF's development.
3. Use clear and plain language that is understandable by a broad audience, including senior executives, government officials, non-governmental organization leadership, and those who are not AI professionals – while still of sufficient technical depth to be useful to practitioners. The AI RMF should allow for communication of AI risks across an organization, between organizations, with customers, and to the public at large.
4. Provide common language and understanding to manage AI risks. The AI RMF should offer taxonomy, terminology, definitions, metrics, and characterizations for AI risk.
5. Be easily usable and fit well with other aspects of risk management. Use of the Framework should be intuitive and readily adaptable as part of an organization's broader risk management strategy and processes. It should be consistent or aligned with other approaches to managing AI risks.
6. Be useful to a wide range of perspectives, sectors, and technology domains. The AI RMF should be universally applicable to any AI technology and to context-specific use cases.
7. Be outcome-focused and non-prescriptive. The Framework should provide a catalog of outcomes and approaches rather than prescribe one-size-fits-all requirements.
8. Take advantage of and foster greater awareness of existing standards, guidelines, best practices, methodologies, and tools for managing AI risks – as well as illustrate the need for additional, improved resources.
9. Be law- and regulation-agnostic. The Framework should support organizations' abilities to operate under applicable domestic and international legal or regulatory regimes.
10. Be a living document. The AI RMF should be readily updated as technology, understanding, and approaches to AI trustworthiness and uses of AI change and as stakeholders learn from implementing AI risk management generally and this framework in particular.

附录 D:AI RMF 的属性

NIST 在框架工作最初开始时描述了 AI RMF 的几个关键属性。这些属性一直保持不变，并被用于指导 AI RMF 的开发。此处提供作为参考。

AI RMF 致力于：

1. 以风险为基础、资源高效、支持创新且自愿。
2. 以共识为驱动，并通过开放、透明的过程制定和定期更新。所有利益相关方都应有机会为 AI RMF 的制定做出贡献。
3. 使用清晰平实的语言，使广泛受众能够理解，包括高级管理人员、政府官员、非政府组织领导层以及非 AI 专业人士--同时仍具备足够的技术深度以对从业者有用。AI RMF 应允许在组织内部、组织之间、与客户以及与广大公众之间沟通 AI 风险。
4. 提供管理 AI 风险的共同语言和理解。AI RMF 应提供 AI 风险的分类法、术语、定义、度量指标和特征描述。
5. 易于使用，并与风险管理的其他方面良好契合。框架的使用应直观，并易于作为组织更广泛风险管理战略和流程的一部分进行调整。它应与其他管理 AI 风险的方法保持一致或对齐。
6. 对广泛的视角、行业和技术领域有用。AI RMF 应普遍适用于任何 AI 技术和特定情境的用例。
7. 以结果为导向且非规定性。框架应提供结果和方法的目录，而不是规定一刀切的要求。
8. 利用并促进对现有管理 AI 风险的标准、指南、最佳实践、方法和工具的更大认识--同时说明需要额外、改进的资源。
9. 与法律和法规无关。框架应支持组织在适用的国内和国际法律或监管制度下运营的能力。
10. 作为一份活文件。AI RMF 应随着技术、对 AI 可信度的理解和方法的改变以及 AI 使用的变化，以及利益相关方从实施 AI 风险管理(总体上)和本框架(特别是)中学习而随时更新。

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