(RESEARCH ARTICLE)

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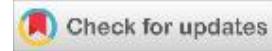
Securing U.S. AI Leadership: A policy guide for regulation, standards and interoperability frameworks

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Abstract

The rapid proliferation of Artificial Intelligence (AI) systems across diverse sectors—including healthcare, critical infrastructure, and digital experiences—has unveiled critical interoperability challenges that poses a challenge to the ongoing innovation, safety, equitable access, and the global competitiveness of U.S. AI technologies. This paper presents a comprehensive analysis of the current AI interoperability landscape, examining technical standards, regulatory frameworks, and governance models across major economic regions. By studying current developments we identify significant fragmentation in AI development ecosystems, with divergent approaches emerging between the United States, European Union, China, and other key players, highlighting strategic implications and proposals for maintaining U.S. leadership. Our research examines technical interoperability challenges in data formats, model architectures, workflow orchestration, and multi-agent frameworks, while analyzing regulatory divergence in AI governance approaches, including the EU's risk-based AI Act and the U.S.'s sectoral strategies. The cooperation for standardization AI protocols, data and models between various countries, organization, companies, domains and technologies have been discussed. We synthesize emerging standards and risk management methodologies from leading international bodies such as ISO/IEC JTC 1/SC 42, IEEE, and NIST, including ISO/IEC 42001 for AI management systems and the NIST AI RMF, and explore the role of model cards and data specifications in achieving technical interoperability. We also put forward looking scenarios for the next five years in this subject. By integrating insights from industry whitepapers, government publications, and academic research, we propose a holistic framework for global AI interoperability that addresses both technical standardization and regulatory harmonization keeping US AI landscape in mind. This framework provides policymakers, industry leaders, and standards organizations with actionable pathways to ensure AI systems are not only powerful, safe, and trustworthy but also strategically positioned to reinforce U.S. AI leadership while enabling seamless collaboration across borders and domains in alignment with regional regulatory requirements and cultural contexts.

Keywords: US Workforce; Artificial Intelligence; AI Interoperability; AI Standards; Regulatory Compliance; AI Governance; ISO/IEC 42001; NIST AI RMF; Model Cards; Multi-Agent Systems

1. Introduction

The transformative potential of Artificial Intelligence (AI) is increasingly constrained not by computational limits of energy and data centers but by systemic fragmentation and lack of standardization. As noted by [1], "Regulatory fragmentation is a threat to innovation, safety, and equitable access to AI." This fragmentation manifests in two primary forms: a lack of *technical interoperability and standardization* between AI systems, tools, and data formats, and a lack of *regulatory interoperability (government or otherwise)* across different legal jurisdictions. Without concerted effort, this

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