Regulatory Reform for Agentic AI: Addressing Governance Challenges in Federal AI Adoption

Satyadhar Joshi
Independent Researcher
Alumnus, International MBA, Bar-Ilan University, Israel
Alumnus, Touro College MSIT, NY, USA
ORCID: 0009-0002-6011-5080
satyadhar.joshi@gmail.com

***Abstract*—The rapid advancement of artificial intelligence (AI), particularly agentic AI systems capable of autonomous decision-making, has exposed significant gaps in existing federal regulatory frameworks. This paper examines the regulatory barriers inhibiting AI innovation and adoption identified in the Office of Science and Technology Policy's (OSTP) Request for Information (RFI) on regulatory reform. We analyze five categories of barriers—regulatory mismatches, structural incompatibility, lack of clarity, direct hindrance, and organizational factors—and propose a comprehensive governance framework integrating technical standards, risk management protocols, and policy recommendations. Drawing from extensive literature on AI governance tools and frameworks, we present actionable solutions for modernizing federal regulations to foster responsible AI innovation while maintaining public trust and safety.**

***Index Terms*—Artificial Intelligence, Agentic AI, Regulatory Reform, AI Governance, Federal Policy, Risk Management, Compliance, Interoperability**

1. Introduction

The emergence of agentic AI systems—autonomous or semi-autonomous systems capable of pursuing complex goals with limited direct supervision [1], [2]—represents a paradigm shift in artificial intelligence capabilities. These systems demonstrate unprecedented autonomy in decision-making, planning, and execution across diverse domains including healthcare, finance, transportation, and national security [3], [4]. However, as noted in the OSTP RFI [], most existing federal regulatory regimes were developed before modern AI capabilities and rest on assumptions about human-operated systems that are inappropriate for AI-enabled or AI-augmented systems.

The White House's America's AI Action Plan, issued July 23, 2025, explicitly directed OSTP to identify federal regulations that hinder AI innovation or adoption This paper responds to that directive by analyzing the specific regulatory challenges and proposing a comprehensive framework for regulatory modernization. We examine the five barrier categories identified in the RFI and integrate insights from current AI governance literature to develop practical solutions that balance innovation with necessary safeguards [5], [6].

2. Background: The Agentic AI Landscape

2.1. Defining Agentic AI Systems

Agentic AI systems represent the next evolutionary stage beyond traditional AI, characterized by their ability to:

- Operate autonomously with limited human supervision [1], [7]
- Pursue complex, multi-step goals through reasoning and planning [8], [9]
- Interface with external tools and systems [10], [11]
- Adapt and learn from environmental feedback [**?**], [12]

These capabilities enable transformative applications across sectors but also introduce novel risks and governance challenges that existing regulatory frameworks are ill-equipped to address [13], [14].

2.2. Current Regulatory Context

Most federal regulations assume human-centric operational models with characteristics that conflict with agentic AI capabilities:

- **Decision-making and explainability**: Requirements for human-traceable rationale [15]
- **Liability and accountability**: Frameworks assuming human decision points [16], [17]
- **Human oversight**: Prescriptive requirements for continuous human supervision [18], [19]
- **Data practices**: Assumptions about data collection and use that don't account for AI training dynamics [20], [21]
- **Testing and validation**: Approaches designed for static systems rather than adaptive AI [22], [23]

3. Analysis of Regulatory Barriers

Based on the OSTP RFI framework, we categorize and analyze the primary barriers to AI adoption:

3.1. Regulatory Mismatches

Regulatory mismatches occur when existing requirements based on human-centered assumptions don't align with AI capabilities. Examples include:

These mismatches often preserve valid policy objectives but require flexible implementation approaches such as waivers, pilot programs, or conditional approvals [30].

3.2. Structural Incompatibility

Structural incompatibility arises when legal constructs fundamentally cannot accommodate AI applications. Key examples include:

- Statutory requirements for human decision-makers in critical processes [31], [32]
- Prohibitions on automated data practices that prevent AI training [20], [33]
- Liability frameworks that cannot attribute responsibility for autonomous actions [16], [34]

Addressing these barriers typically requires legislative change rather than administrative flexibility [35].

3.3. Lack of Regulatory Clarity

Ambiguity in how existing regulations apply to AI creates significant adoption barriers:

This ambiguity increases compliance costs, delays adoption, and hinders innovation [44].

3.4. Direct Hindrance

Some regulations directly target and hinder AI development and deployment:

- Restrictions on federal workers using AI for reasonable use cases [45]
- Overly broad prohibitions on automated decision systems [46], [47]
- Bans on specific AI techniques without risk-based justification [18], [48]

3.5. Organizational Factors

Non-regulatory barriers significantly impact AI adoption:

- Workforce readiness gaps for AI implementation [44], [49]
- Institutional capacity limitations [50], [51]
- Cultural resistance to AI adoption [45], [52]
- Underutilization of existing administrative flexibilities [53]

4. Proposed Regulatory Framework: Visual Overview

This section presents a comprehensive visual overview of the proposed regulatory framework for agentic AI, illustrating the key components, relationships, and implementation pathways through detailed diagrams.

4.1. Comprehensive AI Governance Architecture

4.2. Risk-Based Categorization Framework

4.3. Technical Standards Ecosystem

4.4. Implementation Timeline

4.5. Cross-Agency Coordination Structure

4.6. Administrative Flexibility Mechanisms

4.7. Compliance and Enforcement Framework

4.8. Sector-Specific Implementation Pathways

These diagrams collectively illustrate the comprehensive regulatory reform framework proposed for agentic AI systems. Each component addresses specific barriers identified in the OSTP RFI while maintaining flexibility for future technological developments. The visual representations help clarify the relationships between different elements of the framework and provide a roadmap for implementation across various sectors and timeframes.

5. Comprehensive AI Governance Framework

To address barriers to responsible AI adoption, we propose a comprehensive AI governance framework integrating technical standards, risk-based regulation, and administrative flexibility mechanisms.

5.1. Technical Standards and Interoperability

Establishing robust technical standards is fundamental for regulatory clarity and interoperability across sectors:

Additional interoperability measures include:

- Standardized model cards and datasheets for AI documentation
- Common API specifications for AI system integration
- Unified testing and validation protocols across agencies

5.2. Risk-Based Regulatory Architecture

Implementing a risk-based approach aligned with international frameworks ensures proportional oversight:

TABLE 1. EXAMPLES OF REGULATORY MISMATCHES IN AI DEPLOYMENT

Sector	Regulatory Mismatch	Impact
Healthcare	FDA regulations requiring human oversight for continuous AI diagnostics [24], [25]	Delays adoption of adaptive diagnostic tools
Transportation	Safety standards assuming human drivers for autonomous vehicles [26], [27]	Hinders testing and deployment
Finance	Requirements for human loan officers in automated lending systems [28], [29]	Limits efficiency gains

TABLE 2. AREAS REQUIRING REGULATORY CLARITY FOR AI SYSTEMS

Area	Clarity Needed
Compliance	Interpretation of existing rules for AI activities [36], [37]
Risk Management	Standards for AI-specific risk assessment [38], [39]
Enforcement	Criteria for regulatory actions involving AI systems [40], [41]
Certification	Processes for AI system approval and monitoring [42], [43]

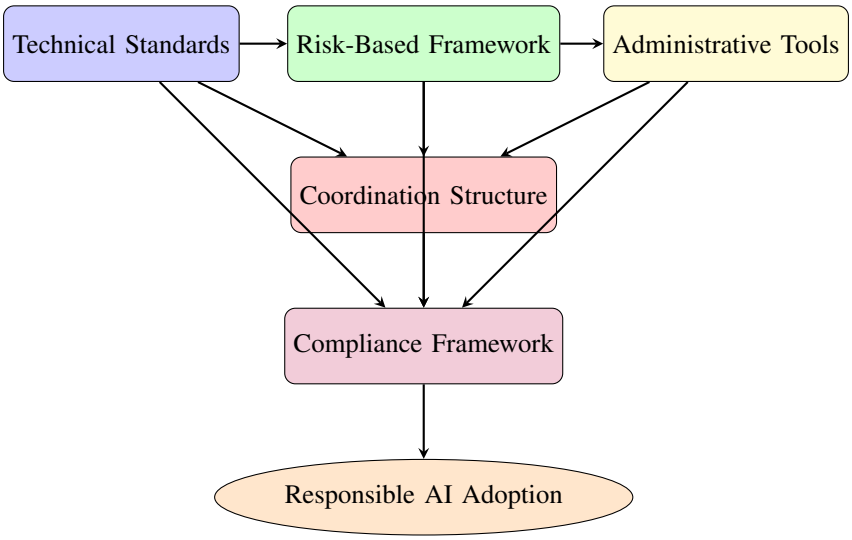

Figure 1. Comprehensive AI Governance Architecture showing the five core components and their relationships

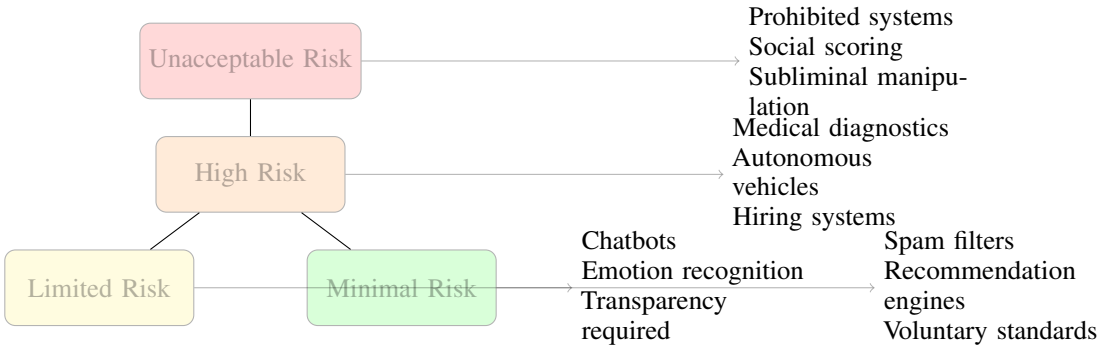

Figure 2. Risk-Based AI Categorization Framework with four-tier classification system (transparent nodes for visual clarity)

TABLE 3. ESSENTIAL AI STANDARDS FOR REGULATORY MODERNIZATION

Standard	Organization	Application
ISO/IEC 42001 [42], [54]	ISO/IEC	AI management systems; mandatory for federal AI procurement and high-risk systems
NIST AI RMF [38], [55]	NIST	AI risk management; required framework for all federal AI risk management
IEEE 7000 [56], [57]	IEEE	Ethical AI design and transparency
Model Cards [58], [59]	Community	Standardized AI model documentation
FHIR for AI [**?**], [60]	HL7	Healthcare AI interoperability

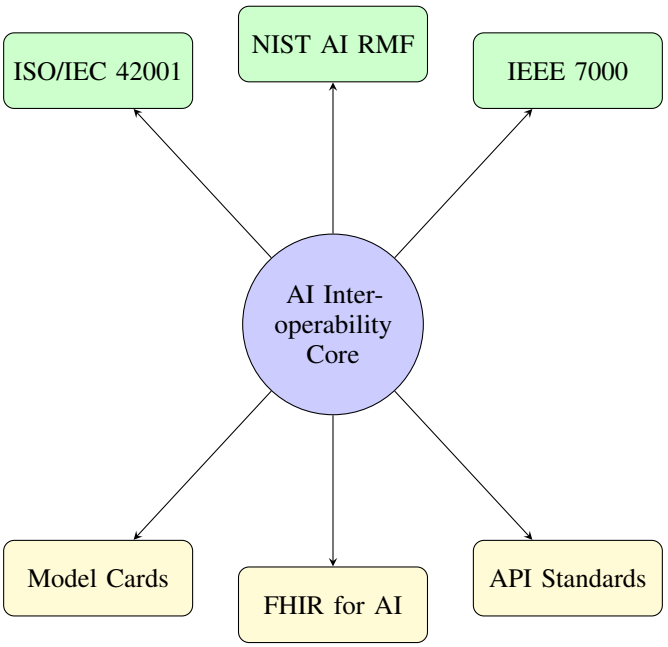

Figure 3. Technical Standards Ecosystem showing core interoperability and supporting standards

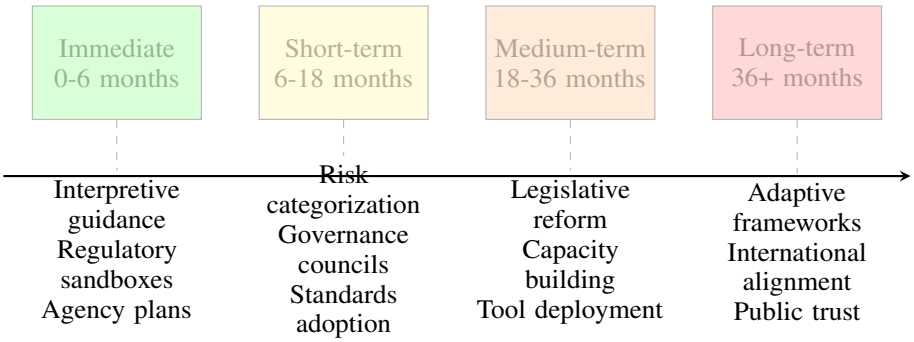

Figure 4. Implementation Timeline showing phased approach to regulatory reform with transparent nodes for clarity

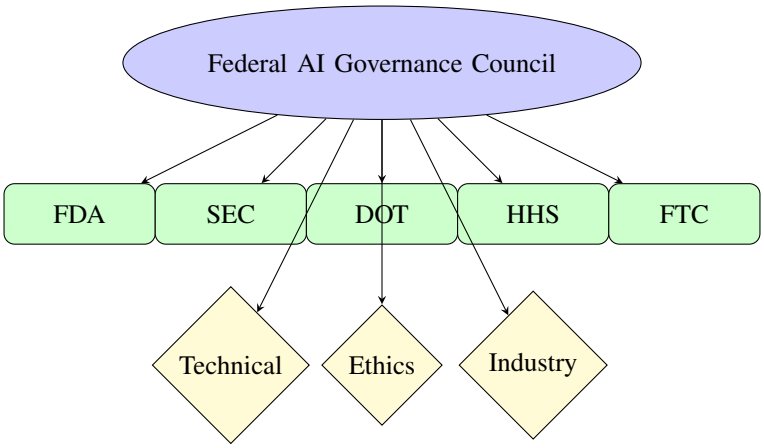

Figure 5. Cross-Agency Coordination Structure showing governance council and advisory committees

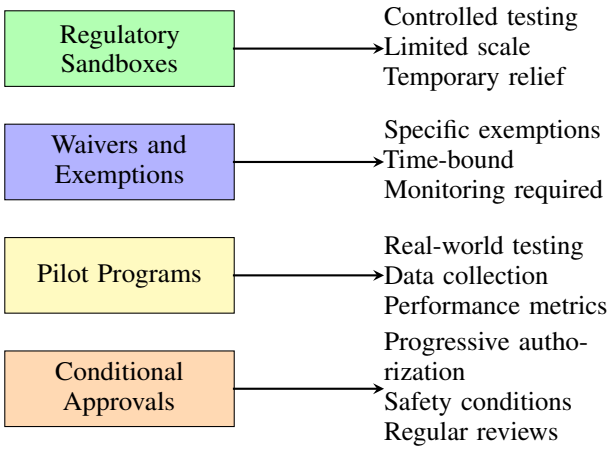

Figure 6. Administrative Flexibility Mechanisms and their applications

TABLE 4. RISK-BASED AI CATEGORIZATION FRAMEWORK

Risk Level	Definition	Examples	Regulatory Approach
Unacceptable Risk	AI systems posing severe threats to safety, rights, or democratic processes	Social scoring, subliminal manipulation	Prohibited with limited exceptions
High Risk	Systems affecting critical infrastructure, healthcare, education, employment	Medical diagnostics, autonomous vehicles, hiring systems	Conformity assessment, mandatory certification
Limited Risk	Systems with transparency requirements for user awareness	Chatbots, emotion recognition, deepfakes	Transparency obligations, user notifications
Minimal Risk	All other AI systems not falling into above categories	Spam filters, recommendation engines	Voluntary standards, codes of conduct

5.2.1. Risk Management Integration. Integrating the NIST AI RMF [38], [61] into regulatory compliance:

- **Governance**: Mapping to organizational policies [62], [63]
- **Measure**: Aligning with technical standards [55], [64]
- **Manage**: Continuous monitoring [65], [65]
- **Map**: Mapping to specific regulatory requirements [36], [66]

5.3. Administrative Flexibility Mechanisms

5.3.1. Regulatory Sandboxes.

- **Purpose**: Test innovative AI applications in controlled environments
- **Duration**: 12-24 months with possible extensions
- **Oversight**: Independent monitoring and reporting requirements
- **Success metrics**: Clear criteria for graduation to full deployment

5.3.2. Adaptive Licensing.

- Progressive authorization based on demonstrated performance
- Conditional approvals with specific safety requirements
- Regular compliance reviews and performance assessments

5.3.3. Other Administrative Tools.

5.4. Cross-Agency Coordination Structure

5.4.1. Federal AI Governance Council.

- **Composition**: Representatives from all major regulatory agencies
- **Responsibilities**: Coordinate AI policy, share best practices, resolve jurisdictional conflicts
- **Authority**: Issue binding interpretive guidance on AI regulations

5.4.2. Technical Advisory Committees.

- Industry experts, academics, and civil society representatives
- Focus on emerging technologies and regulatory gaps
- Regular recommendations for regulatory updates

5.5. Compliance and Enforcement Framework

5.5.1. Graduated Enforcement Approach.

- Technical assistance for first-time compliance issues
- Corrective action plans for moderate violations
- Significant penalties for willful non-compliance or safety violations

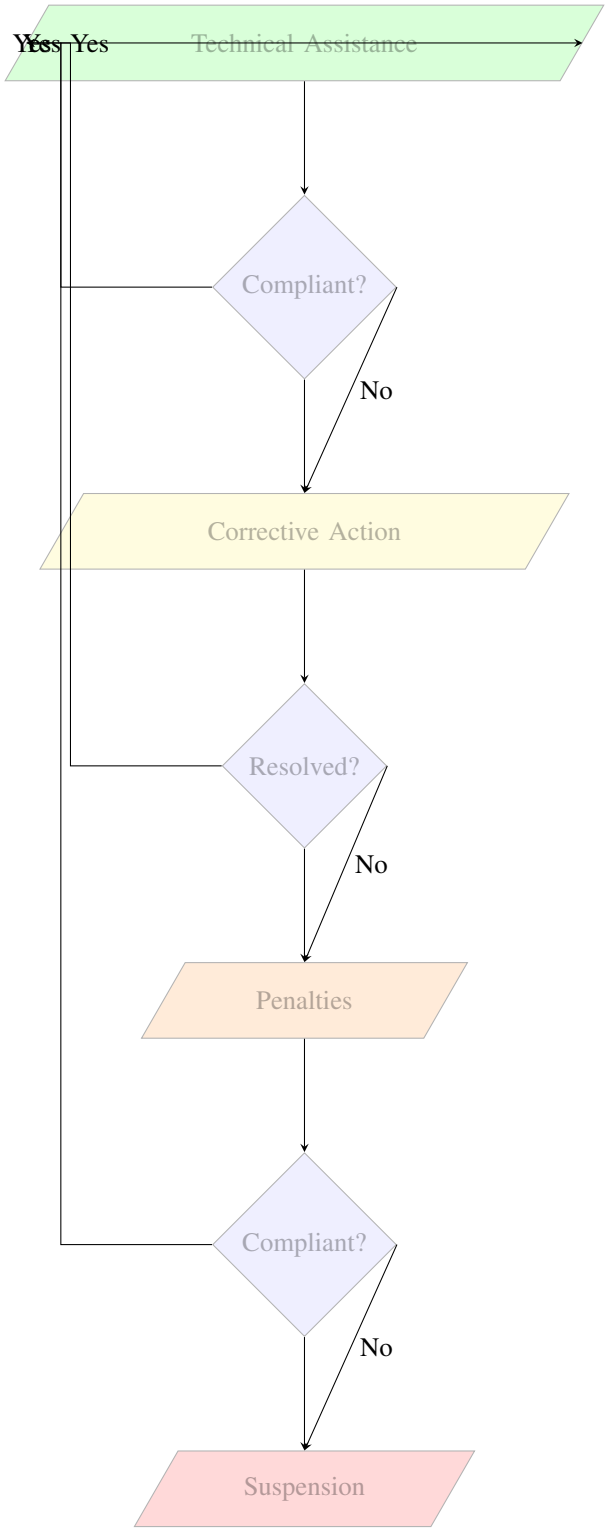

Figure 7. Graduated Compliance and Enforcement Framework (vertical layout for column-fit, translucent nodes for clarity)

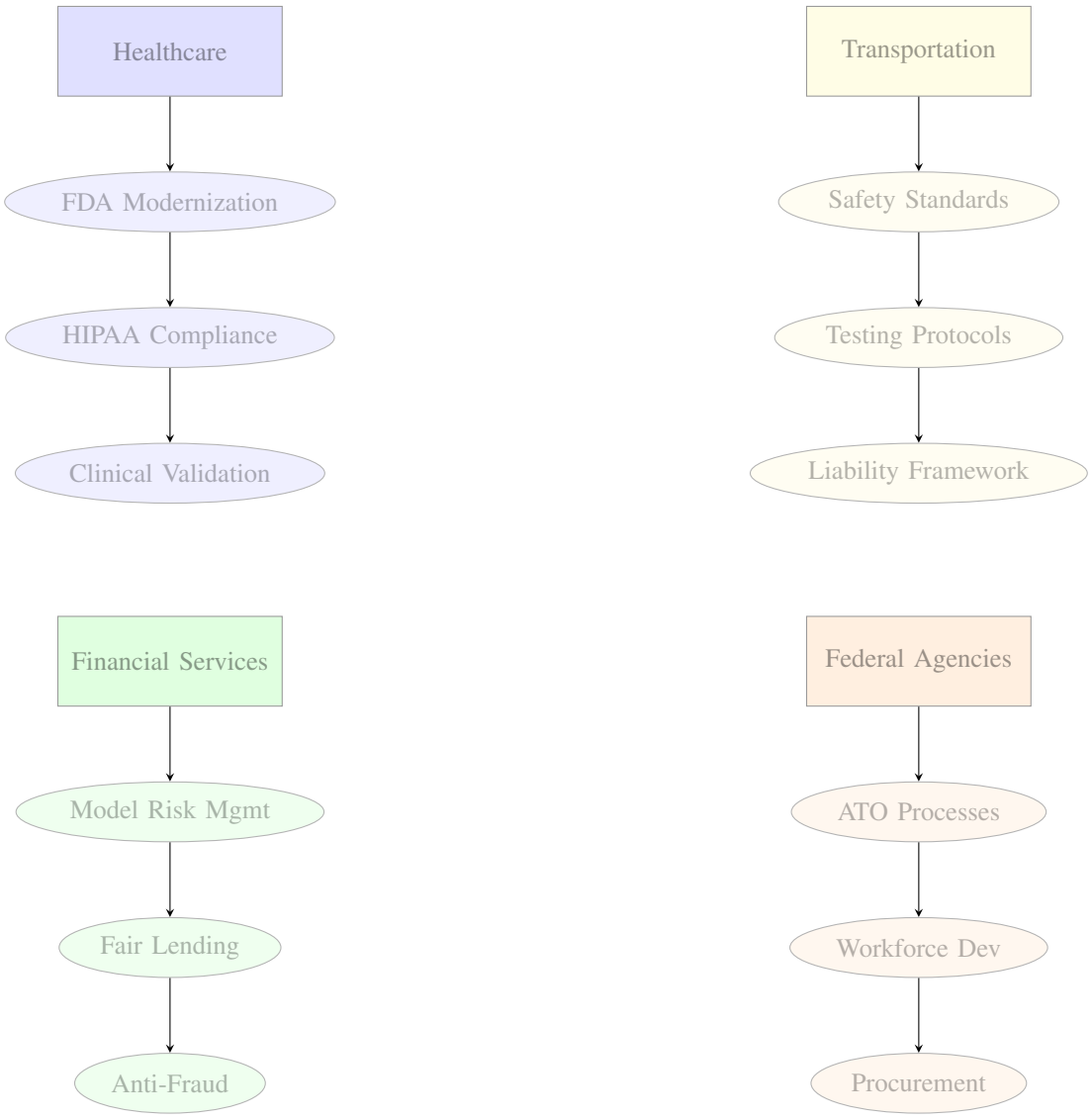

Figure 8. Sector-Specific Implementation Pathways in a two-column layout with transparent nodes for clarity

TABLE 5. ADMINISTRATIVE TOOLS FOR AI REGULATORY FLEXIBILITY

Tool	Application	Legal Basis
Waivers	Temporary relief for testing and pilot programs	Agency discretion
Pilot Programs	Limited-scale deployment with monitoring	Research authorities
Conditional Approval	Progressive authorization based on performance	Existing product approval processes
Sandboxes	Controlled environments for innovation	Multiple statutory bases
Interpretive Rules	Clarification of existing regulations	Administrative Procedure Act

5.5.2. Third-Party Certification.

- Accredited organizations for AI system certification
- Mutual recognition of certifications across agencies
- International alignment for global AI deployments

6. Implementation Framework

6.1. Technical Implementation Tools

A robust ecosystem of AI governance tools supports regulatory compliance:

6.1.1. Fairness and Bias Mitigation.

- **IBM AI Fairness 360 (AIF360)** for bias detection and mitigation [67]–[69]
- **Fairlearn** for assessing and improving AI fairness [70], [71]
- **Integrated fairness metrics** in development pipelines [72], [73]

6.1.2. Observability and Monitoring.

- **Fiddler AI** for model monitoring and explainability [74]–[76]
- **TruEra** for AI model risk management [77], [78]
- **Comprehensive observability platforms** [65], [79]

6.1.3. Governance Platforms.

- **Credo AI** for responsible AI governance [80]–[82]
- **IBM Watsonx.governance** for AI lifecycle management [39], [83], [84]
- **Specialized tools** for regulated industries [85]–[87]

6.2. Policy Implementation Strategy

6.2.1. Immediate Actions (0-6 months).

- Issue interpretive guidance on existing regulations [88]
- Establish AI regulatory sandboxes for testing [50], [89]
- Develop agency-specific AI implementation plans [90], [91]

6.2.2. Short-term Actions (6-18 months).

- Implement risk-based categorization for AI systems [92], [93]
- Establish cross-agency AI governance councils [94], [95]
- Develop technical standards for AI interoperability [96], [97]

6.2.3. Long-term Actions (18+ months).

- Legislative modernization for structurally incompatible frameworks [31], [98]
- International standards alignment [99], [100]
- Continuous regulatory updates based on technological evolution [36], [101]

7. Visual Framework Summary

This section provides a comprehensive reference to all visual elements and tables presented in this paper, which collectively illustrate the proposed regulatory framework for agentic AI systems.

7.1. Visual Framework Components

The visual framework consists of seven interconnected diagrams that provide a comprehensive overview of the proposed regulatory approach:

- **Figure 1**: Comprehensive AI Governance Architecture showing the five core components (Technical Standards, Risk-Based Framework, Administrative Tools, Coordination Structure, Compliance Framework) and their relationships in achieving responsible AI adoption.
- **Figure 2**: Risk-Based AI Categorization Framework illustrating the four-tier classification system (Unacceptable Risk, High Risk, Limited Risk, Minimal Risk) with transparent nodes for visual clarity.
- **Figure 3**: Technical Standards Ecosystem showing the core AI interoperability component and supporting standards including ISO/IEC 42001, NIST AI RMF, IEEE 7000, Model Cards, FHIR for AI, and API Standards.
- **Figure 4**: Implementation Timeline depicting the phased approach to regulatory reform across immediate (0-6 months), short-term (6-18 months), medium-term (18-36 months), and long-term (36+ months) timeframes.
- **Figure 5**: Cross-Agency Coordination Structure illustrating the Federal AI Governance Council and its relationships with regulatory agencies (FDA, SEC, DOT, HHS, FTC) and advisory committees (Technical, Ethics, Industry).
- **Figure 6**: Administrative Flexibility Mechanisms detailing four key tools (Regulatory Sandboxes, Waivers and Exemptions, Pilot Programs, Conditional Approvals) and their applications.
- **Figure 7**: Graduated Compliance and Enforcement Framework showing the vertical progression from technical assistance through corrective action, penalties, and ultimately suspension for non-compliant systems.
- **Figure 8**: Sector-Specific Implementation Pathways organized in a two-column layout showing customized approaches for Healthcare, Financial Services, Transportation, and Federal Agencies with transparent nodes for clarity.

7.2. Summary Tables

The analytical framework is supported by four comprehensive tables that provide detailed categorization and specification:

- **Table 1**: Examples of Regulatory Mismatches in AI Deployment across Healthcare, Transportation, and Finance sectors, highlighting specific regulatory conflicts and their impacts.
- **Table 2**: Areas Requiring Regulatory Clarity for AI Systems, identifying key domains (Compliance, Risk Management, Enforcement, Certification) where ambiguity creates adoption barriers.
- **Table 3**: Essential AI Standards for Regulatory Modernization, cataloging critical technical standards (ISO/IEC 42001, NIST AI RMF, IEEE 7000, Model Cards, FHIR for AI) with their organizations and applications.
- **Table 4**: Risk-Based AI Categorization Framework providing detailed definitions, examples, and regulatory approaches for each risk level (Unacceptable, High, Limited, Minimal).
- **Table 5**: Administrative Tools for AI Regulatory Flexibility, describing specific mechanisms (Waivers, Pilot Programs, Conditional Approval, Sandboxes, Interpretive Rules) and their legal bases.

These visual and tabular elements work together to provide policymakers, regulators, and industry stakeholders with a comprehensive roadmap for modernizing federal AI regulations while maintaining necessary safeguards and public trust.

8. Case Studies and Sector-Specific Applications

8.1. Healthcare AI Implementation

Healthcare presents both significant opportunities and regulatory challenges for AI adoption:

- FDA modernization for continuous learning medical devices [24], [102]
- HIPAA compliance for AI training data [25], [103]
- Clinical validation standards for diagnostic AI [23], [60]
- Interoperability requirements using FHIR standards [21], [104]

8.2. Financial Services AI

Financial regulators are developing specialized approaches for AI governance:

- Model risk management for AI systems [28], [105]
- Fair lending compliance for algorithmic underwriting [106], [107]
- Anti-fraud applications with appropriate safeguards [108], [109]
- Regulatory reporting for AI-driven decisions [29], [110]

8.3. Federal Agency Adoption

Specific considerations for federal AI implementation:

- ATO for AI processes streamlining authorization [45], [111]
- Workforce development and AI literacy [49], [112]
- Procurement standards for AI systems [91], [113]
- Mission-specific risk assessments [61], [114]

9. Challenges and Limitations

Despite the proposed framework, several challenges remain:

9.1. Technical Challenges

- Rapid technological evolution outpacing regulatory updates [36], [115]
- Difficulty in testing and validating complex AI systems [22], [116]
- Interoperability across different AI frameworks and platforms [117], [118]
- Explainability limitations for advanced AI systems [119], [120]

9.2. Policy and Organizational Challenges

- Balancing innovation with appropriate safeguards [121], [122]
- Agency resource constraints for AI expertise [44], [50]
- Coordination across multiple regulatory jurisdictions [92], [123]
- Public trust and acceptance of AI systems [124], [125]

10. Conclusion and Recommendations

The OSTP RFI correctly identifies critical regulatory barriers inhibiting AI innovation and adoption. Our analysis demonstrates that addressing these challenges requires a multifaceted approach combining technical standards, risk-based regulation, administrative flexibility, and organizational capacity building.

We recommend the following priority actions:

10.1. Immediate Priorities

1) Establish clear interpretive guidance for existing regulations applying to AI systems [36], [126]
2) Implement regulatory sandboxes and pilot programs for testing innovative AI applications [50], [89]
3) Develop agency-specific AI implementation plans with clear governance structures [94], [95]

10.2. Medium-term Priorities

1) Adopt and implement key AI standards (ISO/IEC 42001, NIST AI RMF) across federal agencies [38], [42], [127]
2) Modernize structurally incompatible statutes through targeted legislative reform [31], [35]
3) Build AI governance capacity through workforce development and technical tools [128], [129]

10.3. Long-term Vision

1) Create adaptive regulatory frameworks that evolve with technological advancements [36], [101]
2) Establish international regulatory interoperability for global AI governance [96], [99]
3) Foster public trust through transparent, accountable AI systems [124], [130]

By implementing this comprehensive approach, federal agencies can overcome existing regulatory barriers while ensuring that AI innovation proceeds responsibly, safely, and in alignment with public values and legal requirements.

Acknowledgment

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All analysis, findings, and recommendations presented in this paper are derived exclusively from publicly available sources, including:

- Federal Register notices and government publications
- Publicly accessible regulatory documents and policy frameworks
- Academic literature and peer-reviewed research
- Industry reports and open technical standards
- Legal statutes and publicly available case law

No novel findings or proprietary information are presented. The value of this research lies in the systematic synthesis and analysis of existing public knowledge regarding regulatory barriers to agentic AI adoption, organized within the framework established by the OSTP RFI.

The author acknowledges the Office of Science and Technology Policy for initiating this important dialogue on AI regulatory reform and for providing a comprehensive framework through which to analyze existing federal regulations. This research was conducted independently and voluntarily in the spirit of public contribution to the regulatory modernization process outlined in America's AI Action Plan issued July 23, 2025.

The analysis directly addresses the RFI's call for identifying regulatory barriers to AI innovation and adoption, focusing on the five categories of challenges outlined in the Federal Register notice: regulatory mismatches, structural incompatibility, lack of regulatory clarity, direct hindrance, and organizational factors. All conclusions are based on publicly verifiable information and established regulatory analysis methodologies.

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