Centers for Medicare and Medicaid Services (CMS) Artificial Intelligence (AI) Playbook

Version 3

Executive Summary

Following the National Artificial Intelligence Initiative Act (NAIIA) of 2020 to accelerate AI research and application across the federal government, the Office of Information Technology (OIT) in CMS launched the AI Explorers (AIE) Program. AIE strives to broaden the understanding of AI and its uses in CMS. Built upon experience from across CMS and contributing sources across the United States federal government, this Playbook is a culminating effort to fit the world of AI into a smaller, CMS-specific "box" giving readers a one-stop shop to dive responsibly into AI development.

Chapter 1 – Introduction

The CMS AI Playbook is a guide structured to provide practical frameworks and actionable insights for the integration of AI at CMS. The Playbook consists of five chapters:

#	Title	Description
1	**Introduction**	A statement of the Playbook's purpose, contents, and audience objectives.
2	**Overview of AI Technologies**	An introduction to AI capabilities, AI usage in the government sector, and potential barriers to consider.
3	**Foundations for AI at CMS**	Insight into the state of AI in CMS and recommended guiding principles.
4	**Implementation and Operation of AI at CMS**	A stepwise approach to applying the recommended AI principles across AI projects and models.
5	**Appendices**	Supplementary materials.

The CMS AI Playbook aims to inform and guide the highest standards of care and ethical responsibility while adopting AI to enhance CMS operations and service delivery.

Chapter 2 – Overview of AI Technologies

Chapter 2 lays the groundwork for understanding AI-related capabilities, how they're being used in federal agencies, and what challenges and considerations may be faced in tandem.

AI Capabilities

This section delineates five core capabilities associated with AI – Learning Patterns, Understanding Language, Gathering and Using Knowledge, Making Decisions, and Enabling Creativity and Generating Content. Each capability is accompanied by key concepts and a use case from CMS systems to illustrate how the capabilities can be applied.

AI Reported Usage and Trends

This section analyzes federally released use case and census reports to demonstrate the prevalence of AI use in the government sector across major departments, within the Department of Health and Human Services specifically, and even moreso within CMS.

Challenges and Considerations

AI implementation is not without its challenges, and this section categorizes potential barriers into technical, societal, and organizational types to prepare those pursuing AI of the complexities of integration. These challenges span infrastructure demands, ethical concerns, and financial implications, among other examples.

Chapter 3 – Foundations for AI at CMS

Chapter 3 is a narrative which discusses the state of AI in CMS and shares principles, innovations, and frameworks to consider while building the foundations for AI at CMS.

CMS and AI: Setting the Context

This section informs the reader of how CMS hopes to align AI opportunities with CMS goals and is cultivating a culture of innovation and responsible AI through AI experimentation, workforce upskilling, and community building.

Example Guiding Principles for AI at CMS

Foundational principles can guide AI implementation and operation to ensure they align with CMS goals and balance the various needs of people, tools, data, agency integration, and ethics. This section proposes four example guiding principles shown in **Figure 1** – Human-Centered AI, Well-Grounded & Data-Driven AI, Appropriately Scaled & Interoperable AI, and Responsible AI. Each principle describes its importance in ensuring AI-based tools and systems are developed in line with CMS values, followed by navigation to further explore these principles throughout the Playbook.

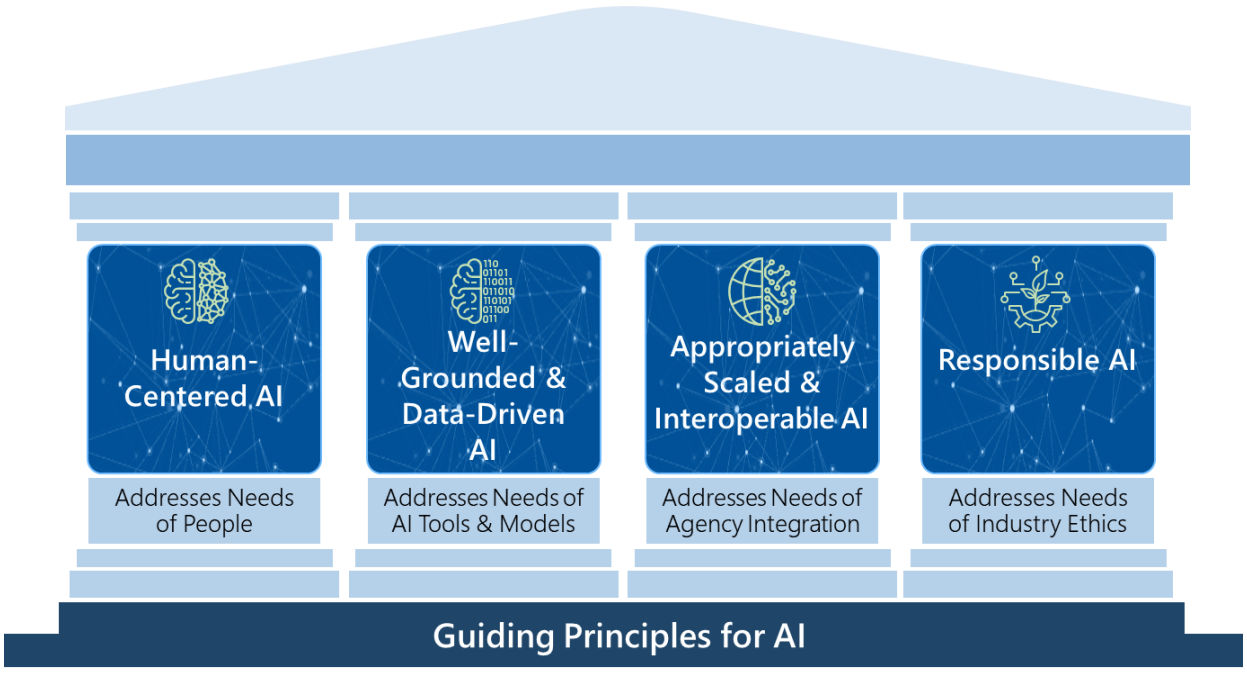

Figure 1. Example Guiding Principles for AI

Future Directions and Trends in AI

This section projects the evolving landscape of AI technology and its potential to revolutionize CMS operations. It touches upon emerging technologies and potential applications to inspire innovative thinking around hardware improvements, wearables, multi-model AI, spatial computing, digital twins, and blockchain for data provenance.

Recommended AI Design Framework for Working in CMS

This section offers a framework of Machine Learning Technology Readiness Levels (MLTRLs) to demonstrate and guide the more technical aspects of AI integration. This framework offers levels 0 through 9 to describe a grading schema for the maturity of an AI technology.

Chapter 4 – Implementation and Operation of AI at CMS

Chapter 4 serves as a comprehensive guide for CMS teams implementing and operating AI technologies, providing insights, best practices, and key action items for each of the five steps in the approach for AI Projects shown in **Figure 2**.

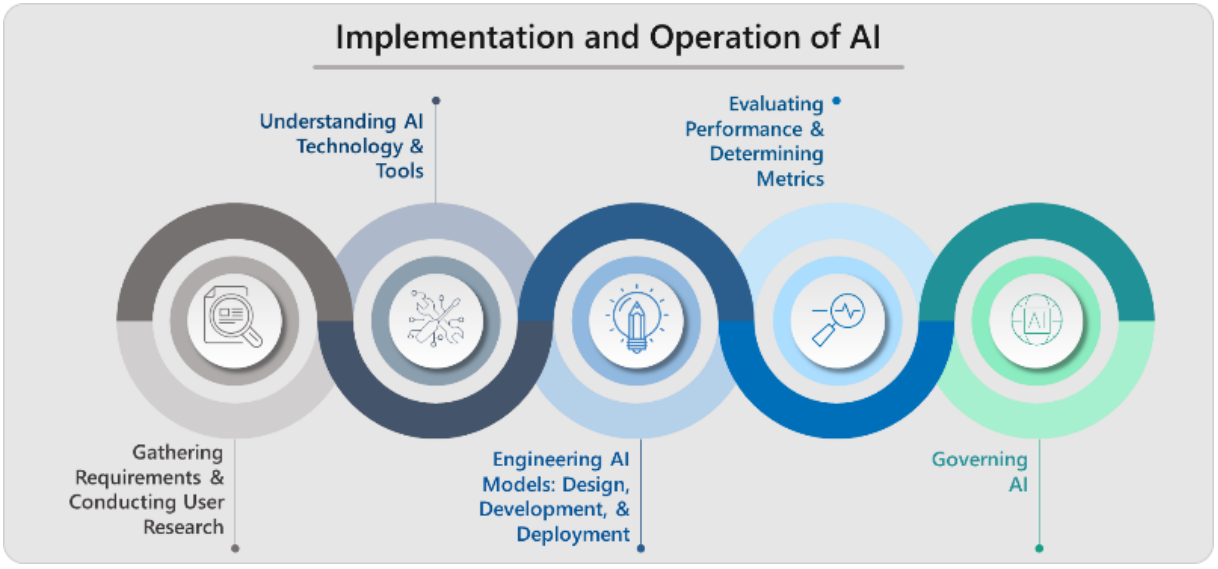

Figure 2. Approach for AI Projects

1. Gathering Requirements & Conducting User Research

The initial step for any AI project team is to understand the specific needs of their project, ideally through a rigorous requirements gathering and user research process. This section emphasizes human-centered design as it details the methods and stages of conducting effective research, from team role definitions and the creation of a detailed research plan to the practical execution of research activities.

2. Understanding AI Technology & Tools

Selecting the right technologies and tools for AI projects involves ensuring that they not only meet technical needs but also align with the organization's goals and ethical values. This section provides guidance and criteria for comparing and selecting the different technologies, tools, platforms, and infrastructure options that will enable AI projects at CMS.

3. Engineering AI Models: Design, Development & Deployment

The lifecycle for an AI project will generally step through three integral phases of engineering AI models – Model Research & Design, Model Development, and Model Deployment. This section navigates through core techniques, measures, and other considerations for each phase in this iterative process, with emphasis on an adaptive approach which can appropriately scale projects spanning small-scale pilots to full-scale deployment.

4. Evaluating Performance & Determining Metrics

You can only manage what you measure. As many aspects of AI can be difficult to quantify, this section discusses the use of key performance indicators (KPIs) and other metrics to help manage and evaluate AI projects. These KPIs are categorized across model, business, ethical, and custom, followed by a spotlight on generative AI considerations and best practices.

5. Governing AI

This section introduces a structured AI governance model that involves collaboration among various roles within the organization, adherence to responsible AI principles, and the implementation of review processes to ensure all AI activities – whether related to development, procurement, or other – are affixed to the organization's values and AI goals.

Implementing and Documenting Best Practices

To wrap up Chapter 4 and the Playbook as a whole, this section first overviews best practices for addressing common challenges faced within AI projects. Then, the section provides a template for writing AI case studies and closes out by stressing the value of collective learning and knowledge-sharing within the CMS AI Community.