# 2024 MGI PI Meeting Breakout Discussions

## Background

As detailed in the 2021 MGI Strategic Plan, challenges will be used to help unify the Materials Innovation Infrastructure. Specific challenges will be developed in the following Topic areas:

* + Protecting and improving human health
	+ Delivering sustainable and resilient energy
	+ Thriving in extreme environments
	+ Enhancing structural performance
	+ Protecting the environment
	+ Propelling the information and communications technology revolution
	+ Advancing critical and emerging technology

Key elements of a challenge supporting an MGI Topic:

* Societal/national/global need to inspire community to participate
* Clear objectives and specific end state
	+ Concrete goals (unambiguous man on the moon-like target)
* Scientific breakthroughs required
	+ Identify the primary scientific/research needs that will need to be addressed
* Detailed steps with milestones/metrics
	+ If possible, identify steps needed to get to the final state with key metrics
* Finite timeline
	+ Not decades or vague timeframe
* Articulation of requirements for Materials Innovation Infrastructure (MII)
	+ Current capabilities and needs to accelerate and reduce cost of materials technology development, including AI-empowered MII (see MGI 2.0)

Using the template below, please identify potential MGI Challenges. (~2-page limit per challenge!)

## Template for Day 1:

**MGI Topic:** one of the seven topics above

**Challenge:** specific challenge to address under the broad topic identified

**Executive Summary**: brief description, ~2-3 sentences

**Technology Targets**: specific issue facing community

**Material Performance Gaps:** specific property/processing gaps of current materials that underlie the technology limitation

**Objectives**: the primary objectives to be met and the most important performance parameters (including reliability, sustainability, manufacturability)

**Key Activities**: steps required with aim, expected outcome, and metrics to address the performance parameters

## Template for Day 2:

Building from the Challenges identified on day 1:

**MGI Topic:** one of the seven topics above

**Challenge:** specific challenge to address under the broad topic identified

**Materials Innovation Infrastructure**: what are the physical and digital tools that will be required, from discovery through deployment, to meet the challenge and close on the material performance gaps, including the AI-empowered MII.

**Existing Efforts/Centers, etc**: where are significant tools, efforts, or capabilities that may be leveraged to address the challenge

**Relevant Programs:** Potential current/future funding mechanisms, from federal to regional, state, local, and industry