



BioMADE: The Future of Bioindustrial Manufacturing Data

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- › 2024 Industrial Digital Ecosystem Summit



Credit: Novozymes

BioMADE: the Bioindustrial Manufacturing Innovation Institute

About

Us BioMADE launched in 2021 and is an independent non-profit, public-private partnership initiated by the U.S. Department of Defense. In partnership with our members, we are securing America's future through biomanufacturing innovation, education, and collaboration by:

- › Creating a dynamic member ecosystem
- › Providing funding opportunities for members
- › Increasing access to U.S. domestic scale up infrastructure



What is Bioindustrial Manufacturing?

Bioindustrial manufacturing uses living organisms such as bacteria, yeast, and algae to make new products or replacements for current products that are more sustainable and environmentally friendly than current processes

By harnessing the power of biology, bioindustrial manufacturing can make myriad products that Americans use every day

Bioindustrial manufacturing is key part of the bioeconomy, which could have an economic impact of up to \$4 trillion annually within the next 10–20 years

Applications

- › Novel and performance-driven chemicals, materials, catalysts, sensors, probiotics, and more
- › Compounds that go into footwear, ink, and engine coolant
- › Fibers that become coffee capsules, diapers, cups, and electronics
- › Skincare products
- › Growable concrete and on-site production of fuels, lubricants, and other critical materials

What Can Bioindustrial Manufacturing Create?

Applications

- › Carbon-negative chemicals that can be used for water treatment, concrete, fertilizers, and detergents
- › PFAS alternatives and bio-based fire-resistant composite materials
- › Bioplastics and durable fibers
- › Chemicals used to make compostable tote bags, coffee capsules, and food packaging
- › Growable cement and alternative natural rubber to make tires
- › Proteins, probiotics, fragrances, and skincare products

TANDEM REPEAT



CAMBIUM™



BIOMASON™



geno.



KULTEVAT
natural grown quality



amyris



INDUSTRY



BioMADE
Members

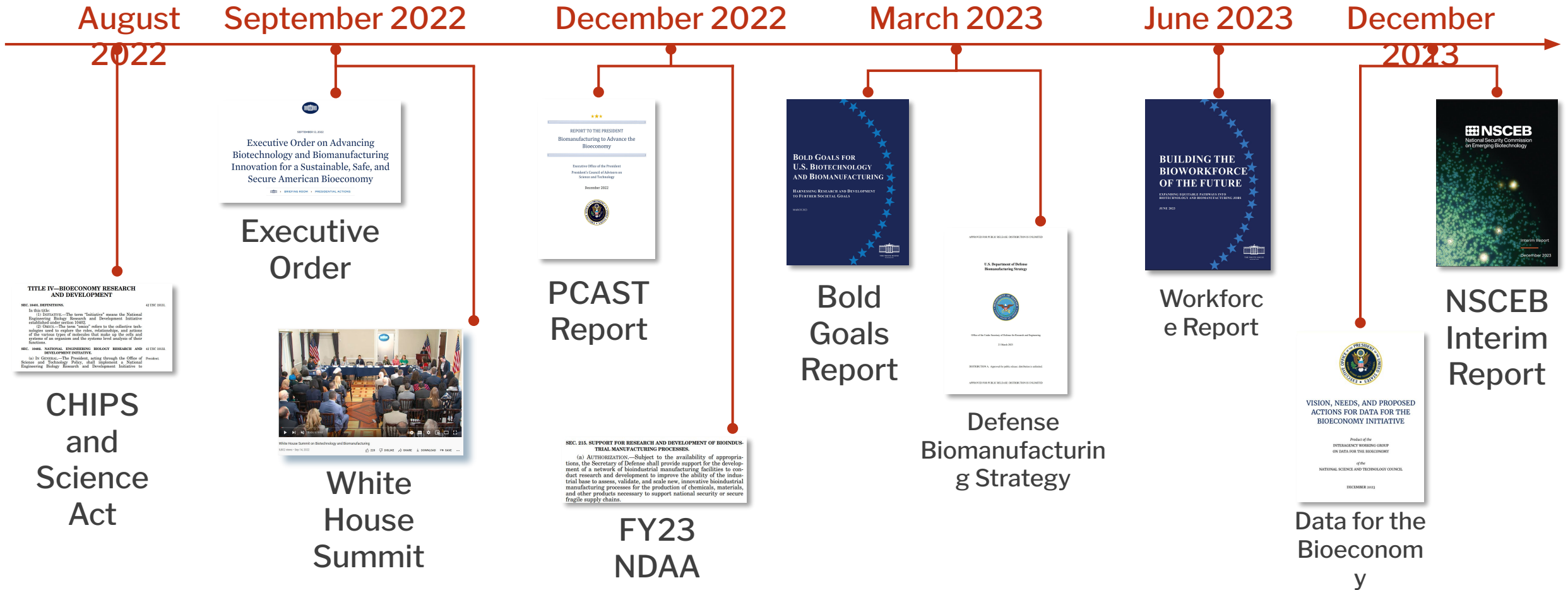
UNIVERSITIES



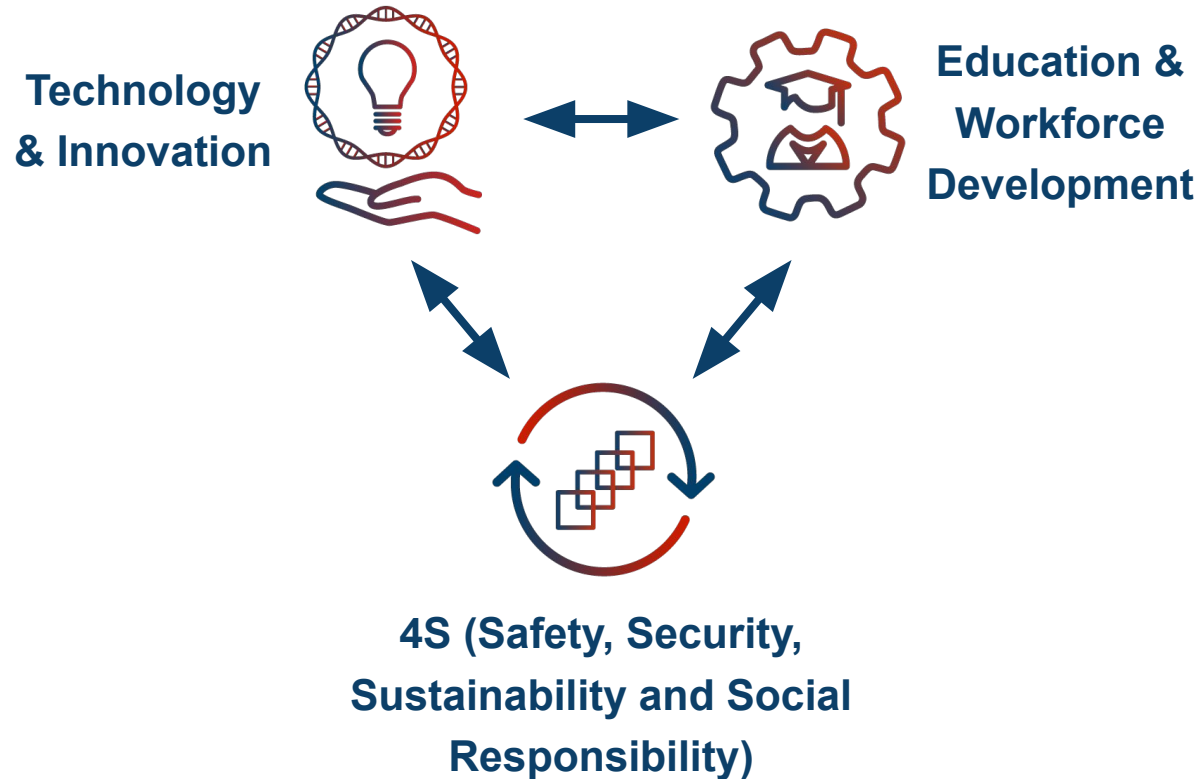
COMMUNITY & TECHNICAL COLLEGES



Biomanufacturing is a United States Priority



Program Areas and Projects



BioMADE Projects

BioMADE co-invests with its members to advance projects in each of these three interconnected areas. To date, BioMADE has:

- › 65 projects
- › 63 members engaged in projects
- › Project work in 19 states
- › Over \$150M in funded work

Selected Technology & Innovation Projects

Tandem Repeat is scaling upstream and downstream processes for producing Squitex, a sustainable high-performance fiber



Photo © Tandem Repeat

Goodyear and **Farmed Materials** are accelerating commercialization of a domestic source of natural rubber sourced from TK dandelions



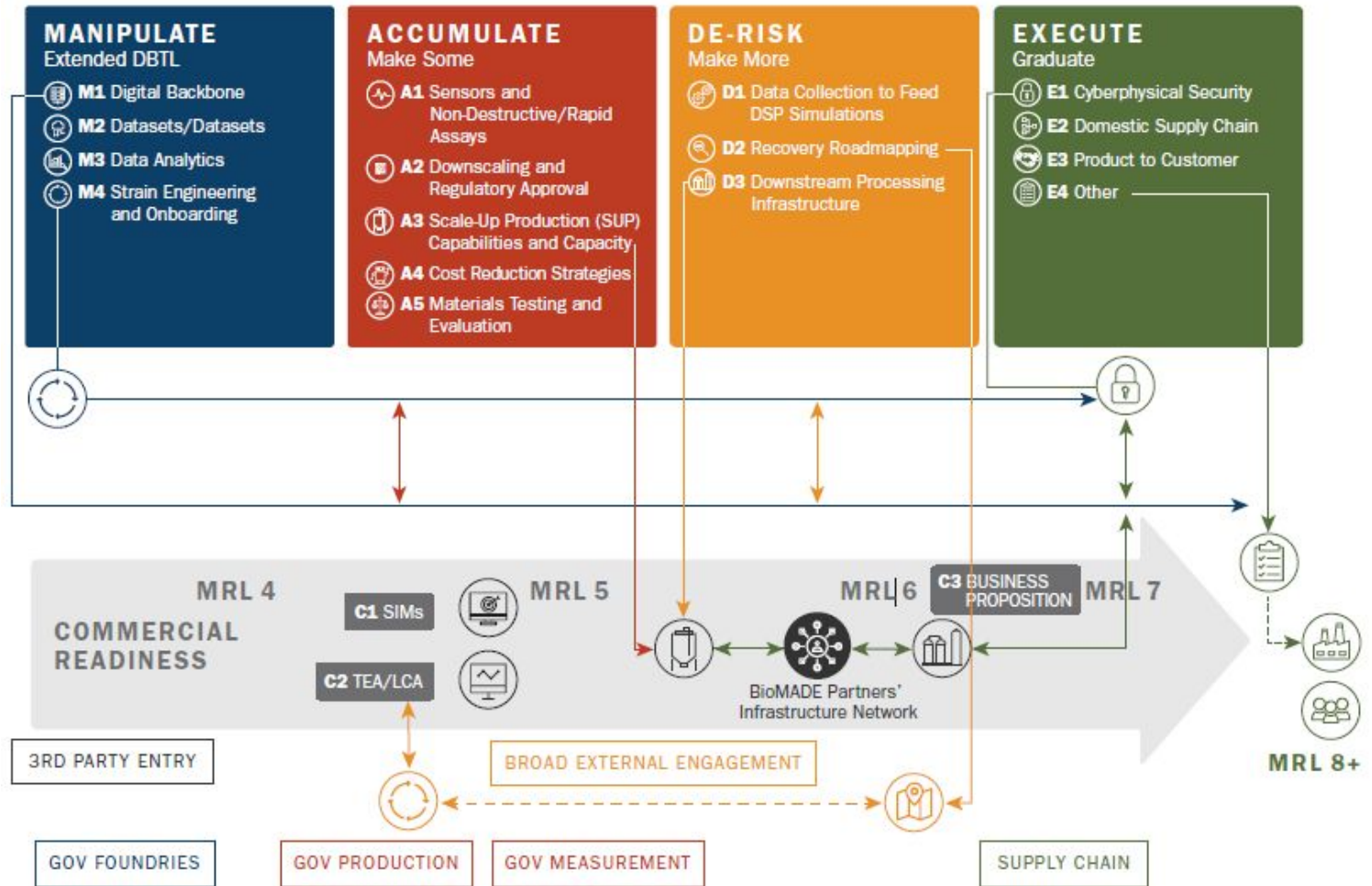
Photo © Farmed Materials



Photo © Farmed Materials

BioMADE's Digital Backbone Vision

A secure, multi-tenant data infrastructure that can collect, store, and share data across multiple bioindustrial systems while also supporting longitudinal and other system-wide metrics.



Bioindustrial Stakeholder Feedback

Systems

- › **Unified Data Structure** – Convert all my data to one format without losing context
- › **Secure Data Platform** – Keep my data safe
- › **Data Lineage** – Allow me to follow my data across the entire bioindustrial life cycle

Process

- › **Tech Transfer** – How can we transfer process to the next stage in a clean and repeatable way
- › **Data Sharing** – How can I share my data when and to whom I want
- › **Search** – How can I find people or documents on how to solve a problem

Standards

- › **Standards and Best Practices** – How do I know I am taking the best-known approach
- › **Catalogs** – Create and maintain a large database of all knowledge needed for bioindustrial manufacturing
 - e.g., Hardware, Bio/Chem properties, and Processes

Long Term Vision for Bioindustrial Data Platform

- › **Data Storage:** A single centralized and secure store for all data
- › **Data Acquisition:** Near real time data ingestion with fast availability and low overhead including automated data gathering options
- › **Data Tools:** Native shareable analytic, dashboarding, and data science tools
- › **APIs/Interfaces:** A well-documented and complete set of externally facing APIs and interfaces for integration purposes
- › **Expert Data Store:** A centralized, managed, and trusted data store of information needed when performing analysis
- › **Human Interfaces:** Multiple intuitive interfaces for ease of interacting and sharing data
- › **Templating:** Data and process standards/templates for ease of understanding and knowledge transfer

Building a Data Platform – Long-Term Goals:

When building a platform, one must think about the long-term goals:

- › What is our expected system usage and how do we **define and prioritize requirements that generate value**
- › The system must have **useful and intuitive interfaces**
- › The system must be **fully secured from day one**
- › The system must be **built in a highly scalable approach**
- › Consider the cost to operate the platform and **build with an eye to long term efficiency**
- › **Have a business model but do not focus on it at the beginning**

Contact Us

Visit biomade.org for more information and to sign up for our newsletter

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SUSTAINABLE,
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MANUFACTURING
ECOSYSTEM**