

The Transformational Food Manufacturing Innovation Institute (TFMII)

A public – private partnership facilitated by:

The University of Nebraska – Lincoln | Georgia Institute of Technology | University of California – Davis

The Vision

- **Establish a Manufacturing Innovation Institute (MII)**, a public-private partnership, through the National Network of Manufacturing Innovation (NNMI) focused on Advanced Manufacturing in the US Food industry.
- The MII opportunity:
 - **\$70M** from the U.S. Dept. of Commerce over 5 years
 - **Minimum 1:1** match from industry, academia, state and local governments (past winners have demonstrated >2:1)
 - This is an open topic competition; **2 MIIs will be awarded**
 - Proposal deadline: **22 July 2016**

The National/ Global Context

- The growing global population (**~9 billion people by 2050**) can be destabilized by a lack of healthy and plentiful food supply.
- **50%** of the world's food supply is lost to waste.
- In the US, the **\$300B food manufacturing industry** is in a state of crisis.
- **Energy and water intensive production methods** have changed little since the early/mid 20th century.
- Much of our food is handled by **humans who transfer and introduce contaminants and pathogens** creating recent recalls.
- Low margins, activist investors, and industry inertia are drastically **reducing R&D** from the industry in favor of short returns.
- At the same time, there has been a **dramatic increase in food safety related recalls**.
- The **U.S. economy, global security and stability** depend on our ability to make more abundant, higher quality, safer, less expensive and more secure food for a growing global population.

The Solution Approach

- **Establish a pre-competitive public-private partnership** (i.e. an MII) to transform how food is made.
- **Focus primarily on food safety, security and automation** as the unifying pre-competitive themes for the partnership.
- Industry executives **identify** the following three areas as highest priorities:
 - **Traceability** – advanced sensors and big data analytics are necessary to detect and monitor transmission and growth of pathogens/allergens along the entire supply chain.
 - **Sanitation** – this is a water, time and labor intensive process representing a cost of 3% of gross revenues industry wide
 - **Raw material prep-processing (disassembly)** – these are dangerous (deboning), difficult, repetitive processes where humans can transfer contaminants across the entire production process.

Technology Roadmap

- Deploy transformational advanced manufacturing teams across four major technology areas:
 - **Automation and Control** – This will allow workers to elevate their technical skill sets and operation away from the production floor.
 - **Sensors** – State of the art sensors, both for automation and control, as well as for real-time detection of contaminants will be necessary.
 - **Big Data** – Advances in information technology are making it possible to track critical food data along the entire supply chain.
 - **Antimicrobial Materials and Coatings** – Significant cost reductions can be realized if coatings can be developed that are hostile to contaminants, or are better protect the final product.
- These efforts will be integrated into a matrix involving:
 - **Sanitation** – Savings in sanitation costs can be used to capitalize the food manufacturing transformation into the future.
 - **Raw materials Preparation** – The challenge is handling and cutting ingredients that are variable in size, shape, material properties, etc.
 - **Food Production Processes** – This is at the heart of the transformation, making the food remotely away from the production floor.

Industry/ Market Opportunities

- The **ability to automate and control food production** opens tremendous opportunities to tailor foods to individual customer tastes and preferences.
- This will create opportunities for:
 - **Ultra-Customization** – Like cars and consumer goods, food in the future can be customized for different personal, cultural tastes.
 - **Reduced Waste** – Smaller lots with targeted ingredients will lead to significant reduction in the amount of food discarded in western societies.
 - **Sustainability** – Production methodologies will be far more efficient, reducing the demand for ingredients, preservatives, energy and water.
 - **Safer, Wholesome Food Supply** – will drastically reduce the change of external microbial contamination and the risk of expensive food recalls.

Key Impacts/ Challenges

- Successful transformation of the food manufacturing industry will require solutions to/result in a number of additional critical:
 - **Standards and Certifications** – Current codes and standards in the industry are often confusing (multiple agencies), antiquated, and impediments to positive change.
 - **Workforce Development** – This transformation will create the need for a highly skilled technical workforce.
 - **Consumer Education/Public Policy** – Success of the transformation will ultimately depend of a well informed consumer who understands precisely what constitutes ‘high quality food’, how to keep it safe and protect the consumers.