

Multi-Agency Tissue Engineering Science (MATES) Interagency Working Group

- ✓ ***organized in 1999 under the Subcommittee on Biotechnology of the National Science and Technology Council (NSTC)***
- ✓ ***means by which Federal agencies involved in tissue engineering stay informed of each other's activities and coordinate their efforts.***





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GOALS (per current 5-year plan):

Facilitate communication across departments/agencies by regular information exchanges and a common web site.

Enhance cooperation through co-sponsorship of scientific meetings and workshops, and facilitation of the development of standards.

Monitor technology by undertaking cooperative assessments of the status of the field.

Provide for support of tissue engineering research through interagency funding opportunity announcements.



Why a Strategic Plan Now?

- ✓ persistent unfulfilled promise of generating an abundant supply of tissues and organs to replace those lost to disease, aging, and trauma
- ✓ well-defined in vitro assay and screening systems could augment or substitute for less efficient animal testing
- ✓ tissue culture “factories” could produce vaccines and other complex drugs
- ✓ a mechanistic understanding and better tools will accelerate the development commercially viable products
- ✓ rapid progress will require integration across many scientific, engineering, and regulatory disciplines
- ✓ fully-functional, tissue-based products and systems will depend on accurate, reliable measurements at many scales

A revolution in our portfolios...

- ✓ ***Tissue Engineering***: the application of principles and methods of engineering and life sciences toward fundamental understanding of structure-function relationships in normal and pathological mammalian tissues and the development of biological substitutes to restore, maintain, or improve tissue functions. (Skalak and Fox, 1988)
- ✓ ***Tissue Science and Engineering***: the use of physical, chemical, biological, and engineering processes to control and direct the aggregate behavior of cells. (MATES Strategic Plan, 2007)

... leads to Evolution in our planning.

1. Introduction

- Evolution of Tissue Science and Engineering
- Commercial and International Interest
- Need for a Collaborative Federal Agency Effort

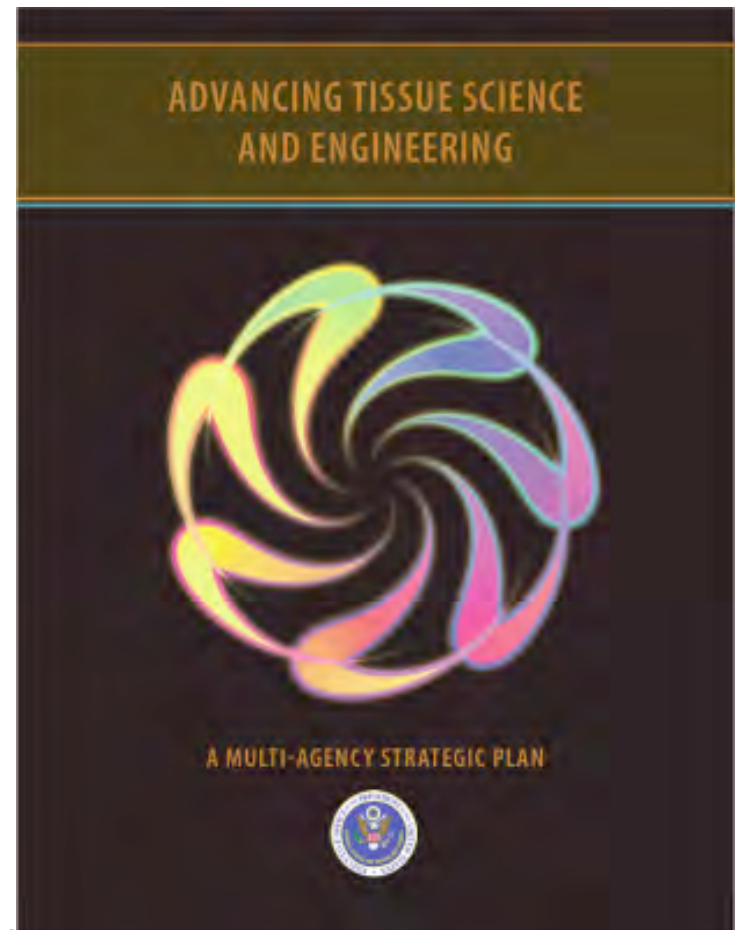
2. Overarching Goals for Tissue Science and Engineering

- Understanding and controlling the cellular response
- Formulating biomaterial scaffolds and the tissue matrix environment
- Developing enabling tools
- Promoting scale-up, translation, and commercialization

3. Strategic Priorities for Federal Government Agencies

- Establishing priorities
- Implementation strategies for Tissue Science and Engineering

4. Conclusions



The ***purpose*** of this strategic plan is to **identify the overarching goals in tissue science and engineering** that will serve as the basis for coordinated efforts among U.S. Federal Government agencies seeking to

- ✓ extend scientific knowledge,
- ✓ advance technology development,
- ✓ improve public health,
- ✓ protect the environment,
- ✓ enhance national defense, and
- ✓ support a strong U.S. economy





Table 1. Strategic Priorities for Federal Agencies

- ✓ **Understanding the Cellular Machinery**
- ✓ **Identifying and Validating Biomarkers and Assays**
- ✓ **Advancing Imaging Technologies**
- ✓ **Defining Cell/Environment Interactions**
- ✓ **Establishing Computational Modeling Systems**
- ✓ **Assembling and Maintaining Complex Tissue**
- ✓ **Improving Tissue Preservation and Storage**
- ✓ **Facilitating Effective Applications, Development, and Commercialization**

Note: Ordering does not imply priority level, but reflects an approximate flow from basic understanding to application and commercialization.

Table 2. Roles of Agencies in Strategic Priorities

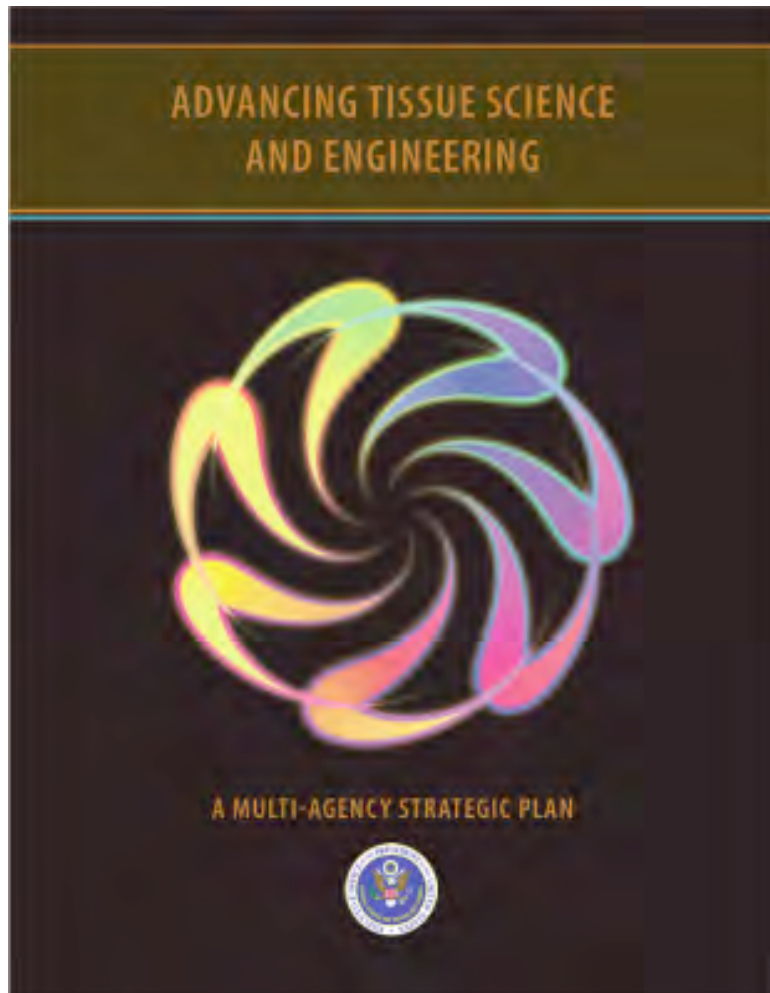
Strategic Priorities (c=contributor of tissue science and engineering; u=user of tissue science and engineering)								
Agency <i>Mission relevance</i>	1 Understanding the Cellular Machinery	2 Identifying and Validating Biomarkers and Assays	3 Advancing Imaging Technologies	4 Defining Cell/Matrix Interactions	5 Establishing Computational Modeling Systems	6 Assembling and Maintaining Complex Tissue	7 Improving Tissue Preservation and Storage	8 Facilitating Effective Applications Development and Commercialization
DOD <i>Engineering, battlefield applications</i>	u/c	u/c	u/c	u/c	u	u/c	u/c	u
DOE <i>Imaging technologies, in vivo gene assays</i>	u/c	u/c	u/c	u/c	u/c			
EPA <i>Molecular, cellular, computational approaches for chemical toxicity screening and prioritizing</i>	u/c	u/c	u/c	u/c	u/c			
FDA <i>Regulation of diagnostic and therapeutic products</i>	u/c	u/c	u	u/c	u	u/c	u	u/c
NASA <i>Engineering, in-space technologies</i>						c		
NIH <i>Biomedical applications</i>	u/c	u/c	u/c	u/c	u/c	u/c	u/c	u/c
NIST <i>Measurement science, standards, and technology</i>	c	c	c	c	c			
NSF <i>Fundamental science and engineering</i>	c	c	c	c	c	c	c	c
CMS <i>Health care payer</i>		u	u	u		u	u	u



Implementation Strategies for Federal Agencies

- ✓ **Convene “State-of-the-Science” workshops targeted toward bringing new investigators with diverse backgrounds to the field**
- ✓ **Issue agency-specific and interagency Funding Opportunity Announcements (FOAs)**
- ✓ **Promote interagency personnel “exchanges”-- research collaborations, postdoctoral programs, details and sabbaticals, cross training**
- ✓ **Foster technology transfer and translation via SBIR/STTR, centers of excellence, engineering research centers, joint R&D ventures, etc.**
- ✓ **Coordinate policy development, especially participation in development/adoption of industry-wide standards**
- ✓ **Exchange knowledge via a living database of funded projects and tissue science and engineering advances**
- ✓ **Track commercialization activity worldwide**

Conclusions



- ✓ **Tissue engineering has evolved beyond including regenerative medicine onto a broader canvas encompassing TISSUE SCIENCE AND ENGINEERING.**
- ✓ **Each Federal agency has a unique and critical role in advancing the field.**
- ✓ **A coordinated Federal effort helps leverage agency contributions and rapidly identify addressable gaps.**
- ✓ **A track record in effective collaboration lays the groundwork for future expansive investments.**

MATES info:

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**Comments on the Implementation
Strategies of the Plan:**

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