

# CONTENTS

<b>I.</b>	<b>EXECUTIVE SUMMARY.....</b>	<b>I-1</b>
A.	DEFENSE BASIC RESEARCH VISION.....	I-3
B.	DEFENSE BASIC RESEARCH MISSION.....	I-3
C.	UNDERSTANDING WARFIGHTER NEEDS.....	I-3
1.	Information Assurance.....	I-4
2.	Battlespace Awareness.....	I-4
3.	Force Protection.....	I-4
4.	Reduced Cost of Ownership.....	I-4
5.	Maintaining a Balanced Basic Research Portfolio.....	I-4
D.	OBJECTIVES OF DEFENSE BASIC RESEARCH.....	I-5
E.	TRANSFORMATION INITIATIVES.....	I-6
F.	THE PAYOFF.....	I-7
1.	Global Positioning System.....	I-7
2.	Night Vision Technology.....	I-8
3.	Airborne Laser.....	I-8
4.	Internet and World Wide Web.....	I-8
5.	Satellite Technology.....	I-8
6.	Stealth Technology.....	I-9
<b>II.</b>	<b>THE PLANNING PROCESS.....</b>	<b>II-1</b>
A.	ROLE OF SERVICES AND AGENCIES IN BASIC RESEARCH PROGRAM.....	II-1
B.	BASIC RESEARCH AND THE RELIANCE PROCESS.....	II-1
C.	A FLEXIBLE AND BALANCED INVESTMENT PORTFOLIO.....	II-2
D.	QUALITY AND RELEVANCE OF BASIC RESEARCH PROGRAM.....	II-3
1.	Scientific Planning Groups.....	II-3
2.	Strategic Research Area Coordinating Groups.....	II-3
3.	Basic Research Panel.....	II-3
4.	Defense Basic Research Advisory Group.....	II-3
5.	Defense Basic Research Review Panel.....	II-3
6.	Non-DoD Government Scientific Planning Group Review Panel.....	II-4
7.	Office of Management and Budget Program Performance Assessment.....	II-4
8.	Deputy Under Secretary of Defense for Laboratories and Basic Sciences.....	II-5

<b>III.</b>	<b>DEFENSE BASIC RESEARCH PROGRAM OVERVIEW .....</b>	<b>III-1</b>
A.	CHARACTER AND MANAGEMENT OF PROGRAM.....	III-1
1.	Character of Defense Basic Research .....	III-1
2.	Management of Defense Basic Research.....	III-1
3.	Strategic Research Areas.....	III-1
4.	International Strategy.....	III-1
B.	COMPOSITION OF PROGRAM.....	III-2
1.	Defense Research Sciences .....	III-2
2.	University Research Initiative.....	III-2
3.	Other Programs .....	III-3
C.	SCIENCE EDUCATION AND INFRASTRUCTURE SUPPORT .....	III-9
D.	TRANSITIONS FROM BASIC RESEARCH TO APPLICATIONS .....	III-10
<b>IV.</b>	<b>DEFENSE BASIC RESEARCH FUNDING .....</b>	<b>IV-1</b>
A.	FUNDING COMPARISONS.....	IV-1
1.	DoD and Other Federal Agency Basic Research Funding.....	IV-1
2.	FY05 Appropriations for DoD Science and Technology.....	IV-1
3.	Funding for Performers of Defense Basic Research .....	IV-2
4.	Funding Comparisons by Disciplinary Areas .....	IV-3
B.	TOTAL FY00-05 FUNDING FOR DEFENSE BASIC RESEARCH.....	IV-3
<b>V.</b>	<b>BASIC RESEARCH AREAS.....</b>	<b>V-1</b>
A.	ATMOSPHERIC AND SPACE SCIENCES .....	V-1
1.	Meteorology .....	V-2
2.	Space Science.....	V-2
3.	Remote Sensing.....	V-3
B.	BIOLOGICAL SCIENCES.....	V-5
1.	Molecular/Cellular .....	V-5
2.	Systems/Organisms .....	V-6
C.	CHEMISTRY .....	V-7
1.	Materials Chemistry.....	V-8
2.	Chemical Processes.....	V-8
D.	COGNITIVE AND NEURAL SCIENCE.....	V-9
1.	Human Performance .....	V-9
2.	Reverse Engineering .....	V-10

E.	ELECTRONICS .....	V-11
1.	Solid-State and Optical Electronics .....	V-11
2.	Information Electronics.....	V-12
3.	Electromagnetics.....	V-12
F.	MATERIALS SCIENCE.....	V-13
1.	Structural Materials.....	V-14
2.	Functional Materials .....	V-14
G.	MATHEMATICS AND COMPUTER SCIENCES.....	V-15
1.	Mathematics .....	V-16
2.	Computer Sciences.....	V-16
H.	MECHANICS.....	V-18
1.	Solid and Structural Mechanics .....	V-19
2.	Fluid Dynamics .....	V-19
3.	Propulsion and Energy Conversion.....	V-20
I.	PHYSICS.....	V-21
1.	Energy Production and Electromagnetic Radiation.....	V-21
2.	Matter and Materials .....	V-22
3.	Sensing and Detection.....	V-22
J.	TERRESTRIAL AND OCEAN SCIENCES .....	V-23
1.	Terrestrial Sciences .....	V-23
2.	Ocean Sciences.....	V-25
K.	DISTRIBUTION OF FUNDING AMONG RESEARCH AREAS .....	V-28
<b>VI.</b>	<b>STRATEGIC RESEARCH AREAS.....</b>	<b>VI-1</b>
A.	BIOENGINEERING SCIENCES .....	VI-2
1.	Objective .....	VI-2
2.	Thrusts.....	VI-2
3.	DoD Applications .....	VI-3
B.	HUMAN PERFORMANCE SCIENCES.....	VI-5
1.	Objective .....	VI-5
2.	Thrusts.....	VI-5
3.	DoD Applications .....	VI-5
C.	INFORMATION DOMINANCE .....	VI-6
1.	Objective .....	VI-6
2.	Thrusts.....	VI-6
3.	DoD Applications .....	VI-6

D.	MULTIFUNCTION MATERIALS.....	VI-7
1.	Objective .....	VI-7
2.	Thrusts.....	VI-7
3.	DoD Applications .....	VI-7
E.	NANOSCIENCES.....	VI-8
1.	Objective .....	VI-8
2.	Thrusts.....	VI-8
3.	DoD Applications .....	VI-8
F.	PROPULSION AND ENERGETIC SCIENCES.....	VI-9
1.	Objective .....	VI-9
2.	Thrusts.....	VI-9
3.	DoD Applications .....	VI-9
G.	SUMMARY AND FUNDING.....	VI-11
<b>VII.</b>	<b>MULTIDISCIPLINARY UNIVERSITY RESEARCH INITIATIVE.....</b>	<b>VII-1</b>
A.	FY04 MURI PROGRAM.....	VII-2
B.	FY05 MURI PROGRAM.....	VII-4
<b>VIII.</b>	<b>BASIC RESEARCH SUCCESS STORIES.....</b>	<b>VIII-1</b>
	SELECTED SUCCESS STORIES FROM THE STRATEGIC RESEARCH AREAS .....	VIII-1
	SELECTED SUCCESS STORIES FROM THE STRATEGIC PLANNING GROUP DISCIPLINES .....	VIII-13
	<b>APPENDIX A: PRINCIPAL POINTS OF CONTACT.....</b>	<b>A-1</b>
	<b>APPENDIX B: GLOSSARY OF ABBREVIATIONS AND ACRONYMS.....</b>	<b>B-1</b>
	<b>APPENDIX C: REFERENCES.....</b>	<b>C-1</b>

## FIGURES

I-1	Science and Technology Planning Process.....	I-2
IV-1	FY03 Basic Research Funding Managed by Federal Agencies.....	IV-1
IV-2	FY05 DoD S&T Appropriations Budget.....	IV-2
IV-3	Distribution of DoD FY05 Basic Research Funding.....	IV-2
IV-4	Distribution of FY05 Appropriated S&T Funds Among Basic Research, Applied Research, and Advanced Technology Development.....	IV-2
IV-5	Performers of Defense Basic Research in FY03.....	IV-2

## TABLES

III-1	MRI Topics.....	III-8
III-2	FY02 MRI Selections.....	III-8
IV-1	DoD Percentage of Federal Funding to Universities.....	IV-3
IV-2	DoD Basic Research Funding by Program Element for FY00-05.....	IV-4
V-1	Service-Specific Interests and Commonality in Atmospheric and Space Sciences.....	V-4
V-2	Service-Specific Interests and Commonality in Biological Sciences.....	V-6
V-3	Service-Specific Interests and Commonality in Chemistry.....	V-9
V-4	Service-Specific Interests and Commonality in Cognitive and Neural Science.....	V-10
V-5	Service-Specific Interests and Commonality in Electronics.....	V-12
V-6	Service-Specific Interests and Commonality in Materials Science.....	V-15
V-7	Service-Specific Interests and Commonality in Mathematics and Computer Sciences.....	V-17
V-8	Service-Specific Interests and Commonality in Mechanics.....	V-20
V-9	Service-Specific Interests and Commonality in Physics.....	V-23
V-10	Service-Specific Interests in Terrestrial and Ocean Sciences.....	V-27
V-11	Basic Research Funding by Service for Each Research Area.....	V-28
VI-1	Correlation of Strategic Research Areas and Scientific Disciplines.....	VI-2
VI-2	Funding Profiles for Basic Research Supporting Strategic Research Areas.....	VI-11
VII-1	FY04 MURI Awards.....	VII-2

