

Appendix C: SBIR/STTR and the Space Technology Roadmaps

Research and technology topics/subtopics for the SBIR Program are identified annually by Mission Directorates and Center Programs. The Directorates identify high priority research and technology needs for respective programs and projects. Research and technology topics for the STTR Program are aligned with needs associated with the research interest and core competencies across NASA Centers. Both programs support a broad range of technologies defined by a list of topics and subtopics that vary in content within each annual solicitation.

The following table relates these SBIR/STTR topics and subtopics to the Technology Area Breakdown Structure (TABS) in the Space Technology Roadmaps (STR). The table is organized by the OCT Technology Area level one (first column) and level 2 (third column), with the related SBIR Select subtopic description (fourth column) and subtopics ID (fifth column) listed as well. The Aeronautics area is included for completeness, though this is beyond the scope of the STR.

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA01	1.0.0 Launch Propulsion Systems,	1.3.0 Air Breathing Propulsion Systems	Low Emissions/Clean Power	A3.03
		1.5.0 Unconventional/Other Propulsion Systems	Small Launch Vehicle Propulsion Technology	T1.02
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA02	2.0.0 In-Space Propulsion Technologies	2.1.0 Chemical Propulsion	In-Space Chemical Propulsion	H2.02
			Spacecraft Technology for Sample Return Missions	S4.03
		2.2.0 Non-Chemical Propulsion	High Power Electric Propulsion	H2.01
			Nuclear Thermal Propulsion (NTP)	H2.03
			Propulsion Systems for Robotic Science Missions	S3.02
			Integrated Nuclear Power & Propulsion	Z1.03
		2.3.0 Advanced (TRL < 3) Propulsion Technologies	Affordable Nano-Launcher Upper Stage Propulsion	T1.01
		2.4.0 Supporting Technologies	Nuclear Thermal Propulsion (NTP) Ground Test Technologies	H2.04

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA03	3.0.0 Space Power and Energy Storage	3.1.0 Power Generation	Space Nuclear Power Systems	H8.02
			Advanced Photovoltaic Systems	Z1.01
			Innovative Energy Harvesting Technology Development	T3.01
		3.2.0 Energy Storage	Advanced Space Battery Technology	Z1.02
		3.3.0 Power Management and Distribution	Power Electronics and Management, and Energy Storage	S3.03
		3.4.0 Cross Cutting Technology	Solid Oxide Fuel Cells and Electrolyzers	H8.01
			Power Generation and Conversion	S3.01
			Terrestrial and Planetary Balloons	S3.06
		TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description
TA04	4.0.0 Robotics, Telerobotics and Autonomous Systems	4.3.0 Manipulation	Robotic Mobility, Manipulation and Sampling	S4.02
			Regolith Resources Robotics - R3	T4.02
		4.4.0 Human-Systems Integration	Information Technologies for Intelligent and Adaptive Space Robotics	T11.01
		4.5.0 Autonomy	Real-Time Safety Assurance under Unanticipated and Hazardous Conditions	A1.03
			Spacecraft Autonomy and Space Mission Automation	H6.01
			Dynamic Servoelastic (DSE) Network Control, Modeling, and Optimization	T4.01

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA05	5.0.0 Communication and Navigation	5.1.0 Optical Comm. And Navigation	Long Range Optical Telecommunications	H9.02
			Advanced Celestial Navigation Techniques and Systems for Deep-Space Applications	H9.05
		5.2.0 Radio Frequency Communications	SCaN Testbed (CoNNeCT) Experiments	H9.01
			Long Range Space RF Telecommunications	H9.03
		5.4.0 Position, Navigation, and Timing	Flight Dynamics GNC Technologies and Software	H9.04
			Guidance, Navigation and Control	S3.05
5.5.0 Integrated Technologies	Autonomous Communications Systems	T5.01		
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA06	6.0.0 Human Health, Life Support and Habitation Systems	6.1.0 Environmental Control Life Support & Habitation Systems	Human Accommodations and Habitation Systems for Future Exploration Missions	H3.03
			Development of Treatment Technologies and Process Monitoring for Water Recovery	H3.04
			Synthetic/Engineering Biology for NASA Applications	T6.01
		6.2.0 Extravehicular Activity Systems	Space Suit Pressure Garment and Airlock Technologies	H4.01
		6.3.0 Human Health and Performance	Next Generation Oxygen Concentrator for Medical Scenarios	H12.01
			Inflight Calcium Isotope Measurement Device	H12.02
Objective Sleep Measures for	H12.03			

			Spaceflight Operations	
			Advanced Food Technology	H12.04
			Metal Organic Framework Sorbents for Spacecraft Medical Applications	T6.02
		6.5.0 Radiation	Radiation Shielding Systems	H11.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA07	7.0.0 Human Exploration Destination Systems	7.1.0 In-Situ Resource Utilization	In-Situ Resource Utilization - Mars Atmosphere/Gas Chemical Processing	H1.01
			International Space Station (ISS) Utilization	H10.02
		7.4.0 Advanced Habitat Systems	Atmosphere Revitalization and Fire Recovery for Future Exploration Missions	H3.02
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA08	8.0.0 Science Instruments, Observatories & Sensor Systems	8.1.0 Science Instruments	In Situ Sensors and Sensor Systems for Lunar and Planetary Science	S1.06
			Airborne Measurement Systems	S1.07
			Surface & Sub-surface Measurement Systems	S1.08
			Proximity Glare Suppression for Astronomical Coronagraphy	S2.01
			Precision Deployable Optical Structures and Metrology	S2.02
			Advanced Optical Systems	S2.03
			Extreme Environments Technology	S4.04
			Technologies for Planetary Compositional	T8.01

			Analysis and Mapping	
		8.2.0 Observations	Next Generation Total Lightning Detection Sensor	T8.02
		8.3.0 Sensor Systems	Aviation External Hazard Sensor Technologies	A1.01
			Lidar Remote Sensing Technologies	S1.01
			Microwave Technologies for Remote Sensing	S1.02
			Sensor and Detector Technology for Visible, IR, Far IR and Submillimeter	S1.03
			Detector Technologies for UV, X-Ray, Gamma-Ray and Cosmic-Ray Instruments	S1.04
			Particles and Field Sensors and Instrument Enabling Technologies	S1.05
			Atomic Interferometry	S1.09
			Unmanned Aircraft and Sounding Rocket Technologies	S3.04
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA09	9.0.0 Entry, Descent and Landing Systems	9.1.0 Aeroassist & Entry	Advanced Thermal Protection Systems Technologies	H7.01
		9.4.0 Vehicle Systems Technology	Planetary Entry, Descent and Landing Technology	S4.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA10	10.0.0 Nanotechnology	10.1.0 Engineered Materials and Structures	Lightweight Structural Nanomaterial Concepts	T10.01
			Smart Structural Composites for Space	T10.02

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA11	11.0.0 Modeling, Simulation, Information Technology and Processing	11.1.0 Computing	Technologies for Large-Scale Numerical Simulation	S5.01
			Computational Simulation and Engineering	T11.02
		11.2.0 Modeling	Quiet Performance	A3.02
			Physics-Based Conceptual Design Tools	A3.05
			Integrated Science Mission Modeling	S5.04
			Fault Management Technologies	S5.05
			Modeling and Measurements for Propulsion and Power	Z1.04
		11.3.0 Simulation	High Fidelity Predictions for Spacecraft and Launch Vehicle Vibroacoustic Environments and Coupling	T12.01
		11.4.0 Information Processing	Prognostics and Decision Making	A1.04
			Identification of Sequences of Atypical Occurrences in Massive Heterogeneous Datasets Representing the Operation of a System of Systems	A1.05
			Earth Science Applied Research and Decision Support	S5.02
			Algorithms and Tools for Science Data Processing, Discovery and Analysis, in State-of-the-Art Data Environments	S5.03

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA12	12.0.0 Materials, Structures, Mechanical Systems and Manufacturing	12.1.0 Materials	Hot Structures	H5.04
			Cross Cutting advanced manufacturing process for large scale bulk metallic glass systems for aerospace applications	Z2.01
		12.2.0 Structures	Structural Efficiency-Aeroservoelasticity	A3.01
			Deployable Structures	H5.02
			Advanced Structural Health Monitoring	H13.02
			Additive Manufacturing of metal Plus Insulator Structures with sub-mm Features	T12.03
		12.3.0 Mechanical Systems	Aerodynamic Efficiency	A3.04
			Rotorcraft	A3.06
		12.4.0 Manufacturing	Additive Manufacturing of Lightweight Metallic Structures	H5.01
			Recycling/Reclamation of 3D Printer Plastic for Reuse	H10.01
			Experimental and Analytical Technologies for Additive Manufacturing	T12.04
		12.5.0 Cross-Cutting	Propulsion Efficiency-Propulsion Materials and Structures	A3.07
			Advanced Fabrication and Manufacturing of Polymer Matrix Composite (PMC) Structures	H5.03
			Advanced NDE Techniques for Complex Built Up Structures	H13.01
			Optics Manufacturing and	S2.04

			Metrology for Telescope Optical Surfaces		
			High Temperature Materials and Sensors for Propulsion Systems	T12.02	
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic	
TA14	14.0.0 Thermal Management Systems	14.2.0 Thermal Control Systems	Thermal Control for Future Human Exploration Vehicles	H3.01	
			Thermal Control Systems	S3.07	
		Topic Title	Subtopic Title	Subtopic	
Aviation Research (ARMD)	Aviation Safety		Aviation External Hazard Sensor Technologies	A1.01	
			Inflight Icing Hazard Mitigation Technology	A1.02	
			Real-Time Safety Assurance under Unanticipated and Hazardous Conditions	A1.03	
			Prognostics and Decision Making	A1.04	
			Identification of Sequences of Atypical Occurrences in Massive Heterogeneous Datasets Representing the Operation of a System of Systems	A1.05	
	Unmanned Aircraft Systems			Unmanned Aircraft Systems (UAS) Integration in the National Airspace System (NAS) Research	A2.01
				Air Vehicle Technology	
	Quiet Performance	A3.02			
	Low Emissions/Clean Power	A3.03			
	Aerodynamic Efficiency	A3.04			
	Physics-Based Conceptual Design	A3.05			

		Tools	
		Rotorcraft	A3.06
		Propulsion Efficiency- Propulsion Materials and Structures	A3.07
	Ground and Flight Test Techniques and Measurement	Ground Test Techniques and Measurement Technologies	A4.01