Strategic Planning Process Moving Forward

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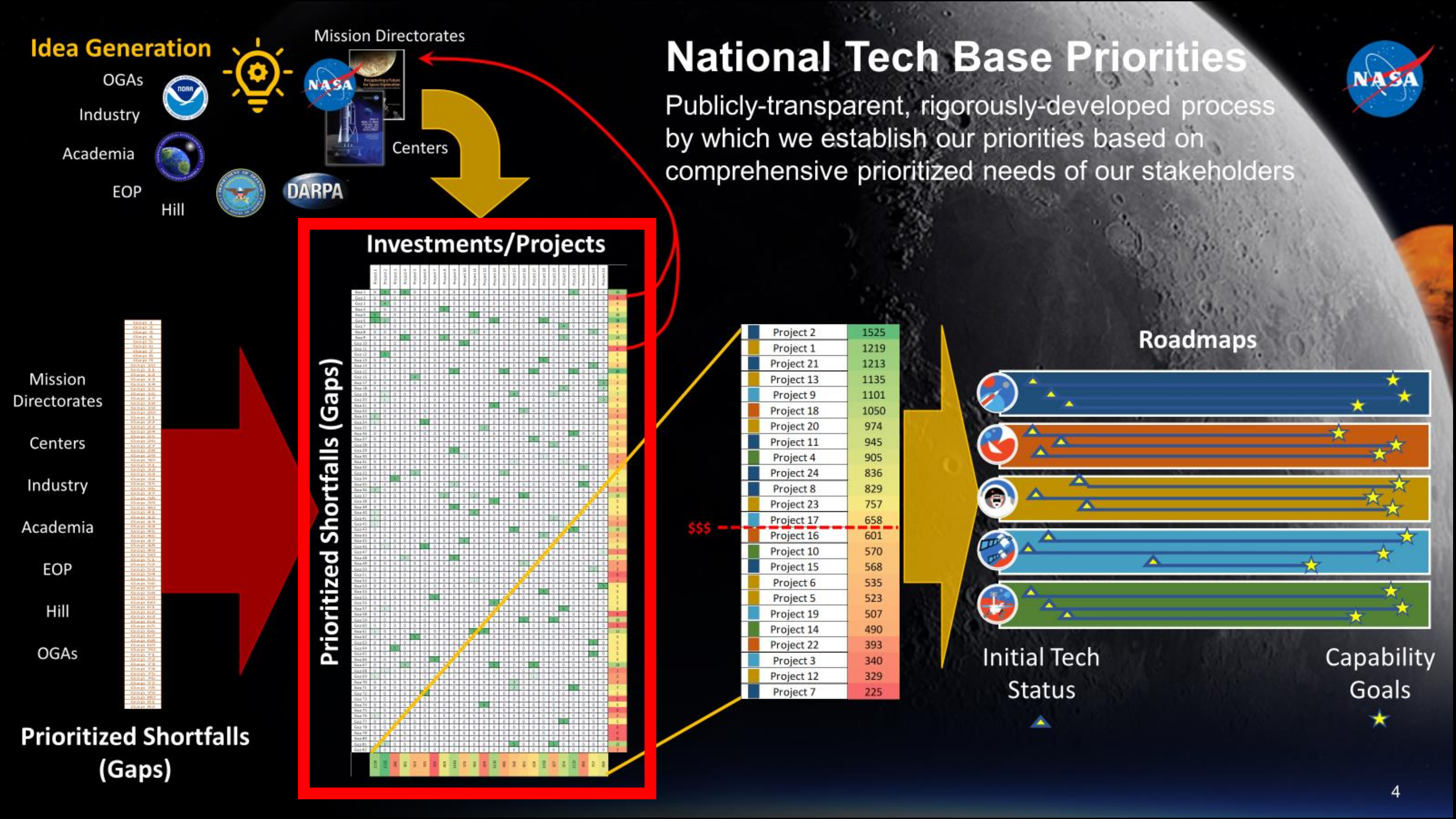
STMD Strategic Planning Process



Connection Scores Process

Assessing the relevance of projects to solving shortfalls provides a few benefits

1. Provides a value statement for projects with regard to shortfalls
2. Assess areas of heavy investment vs light investment toward each shortfall
3. Find shortfalls without any investment to be prioritized

- STMD is currently evaluating the level of connection of each project to the shortfall(s)*
- Initially using a few projects as forerunners to refine the process: HPSC, VSAT, SEP, DRACO, VERS HIAD
- Current Process:
  - Both the Subject Matter Expert and Program/Project provide score and justification
  - Final adjudication provided by STMD Front Office
  - Product will be a heatmap depicted on previous chart

0	1	2	3	4	5
Investment does not contribute directly to overcoming the shortfall in any way	Investment minimally contributes overcoming the shortfall	Investment indirectly contributes to overcoming the shortfall	Investment contributes to overcoming the shortfall	Investment strongly contributes to overcoming the shortfall	Investment directly and significantly contributes to overcoming the shortfall

*[Early Stage Projects not included in this assessment]

Example Projects

Priority	Avg Score	Shortfall ID (blue text if top 3 in category)	Category	SEP Conn Scores	VSAT Conn Scores	VERS HIAD Conn Scores
2	7.612	1596: High Power Energy Generation on Moon and Mars Surfaces	Power		4	
8	7.168	709: Nuclear Electric Propulsion for Human Exploration	Propulsion: Nuclear	2		
19	6.804	1558: High-Rate Communications Across The Lunar Surface	Communication and Navigation		1	
28	6.592	1568: Entry Modeling and Simulation for EDL Missions	Entry Descent and Landing			5
36	6.415	610: Solar Electric Propulsion - High Specific Impulse	Propulsion: Non-Nuclear	2		
37	6.383	1563: Aerocapture for Spacecraft Deceleration and Orbit Insertion	Entry Descent and Landing			3
41	6.275	1430: Small Spacecraft Propulsion	Small Spacecraft	1		
42	6.267	1588: Protect Earth from Destructive Natural Impacts (Planetary Defense)	Miscellaneous	2		
43	6.244	1565: Assessment and Validation Capabilities for Integrated Precision Landing Systems	Entry Descent and Landing			1
47	6.220	844: Passive Dust Mitigation Technologies for Diverse Applications	Dust Mitigation		2	
56	6.136	1047: Active Dust Mitigation Technologies for Diverse Applications	Dust Mitigation		1	
69	5.932	1431: Access Beyond LEO for Small Spacecraft	Small Spacecraft	1		
71	5.922	611: Sub-kW and kW Class Electric Propulsion Systems	Propulsion: Non-Nuclear	2		
79	5.825	1583: Produce propellants and mission consumables from extracted in-situ resources	ISRU		2	
122	5.044	705: Low Power Nuclear Electric Propulsion	Propulsion: Nuclear	2		
126	5.016	544: Solar Electric Propulsion to Support Orbital Platforms	Propulsion: Non-Nuclear	5		
131	4.927	1564: Aeroshell In-Situ Flight Performance Data During EDL	Entry Descent and Landing			5
132	4.916	767: Advanced designs for lightweight inflatable surface elements	Advanced Materials and Structures			2
146	4.676	1567: Entry Capabilities for Small-Scale and Commercial Spacecraft	Entry Descent and Landing			5
148	4.651	617: On-surface robotic assembly of vertical structures	Excavation Construction and Outfitting		2	
150	4.635	1408: Advanced deployable load-bearing structures	Advanced Materials and Structures		5	1
153	4.544	513: Robotic Assembly and Construction of Modular Systems for Sustained In-Space Infrastructure	ISAM and RPOC		2	
173	4.142	612: In-Space Diagnostics for Electric Propulsion	Propulsion: Non-Nuclear	4		
181	3.881	1572: Performance-Optimized Low-Cost Aeroshells for EDL Missions	Entry Descent and Landing			3

Example Connection Score

Project: ULA Vulcan Engine Reuse Scale (VERS) HIAD Technology Demonstration

Project Description

The company will continue to evolve a proven Hypersonic Inflatable Aerodynamic Decelerator (HIAD) technology design. ULA will develop a larger 10-meter HIAD that leverages a two-piece structure to enable effective load distribution for even larger inflatable decelerators.

Anticipated Benefits

VERS will provide large scale HIAD risk reduction and maturation for flight applications.

- Prove out the manufacturing process and develop a solid supply chain
- Expand current HIAD testing program to burn down risk of scaling up the HIAD diameter
- Investigate HIAD enhancements to increase load capability and L/D

Shortfall: AMSC-767: Advanced designs for lightweight inflatable surface elements

Shortfall Description

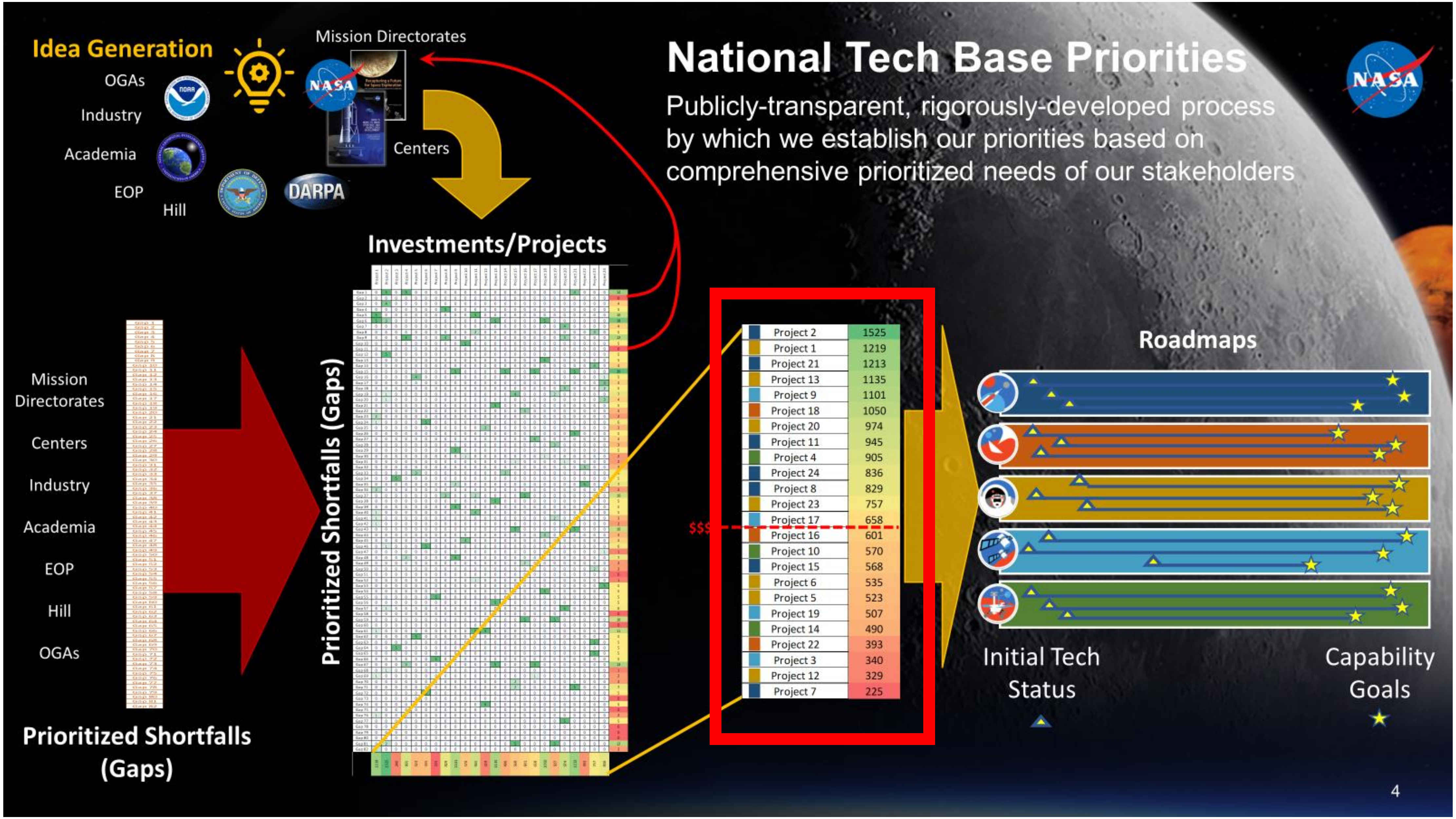
Inflatable softgoods structures can provide greatly enlarged living volumes for crews on extended exploration missions with minimal launch/landing mass and volume. Large inflatable surface elements include habitats and ISRU commodity storage tanks. Inflatable softgoods can also be used to provide small volume elements such as pressurized transfer tunnels, inflatable airlocks, suitport enclosures, flexible dust tolerant hangars, rover covers or garages, etc. This shortfall includes the design, analysis, and test of these advanced inflatable designs. This technology can be utilized to provide needed systems for light weigh habitable elements of surface habitat and be delivered in a small launch/landing package.

Shortfall Author Score: 2

Project Management Score: 3

Final Score: 2 - Investment indirectly contributes to gap closure. Justification: The packaging involved in the HIAD test will be specific to that usage. The use case for surface inflatable elements will vary greatly on the pressures, packaging, and length of usage time. The lessons learned from the HIAD will benefit this shortfall closure indirectly.

STMD Strategic Planning Process



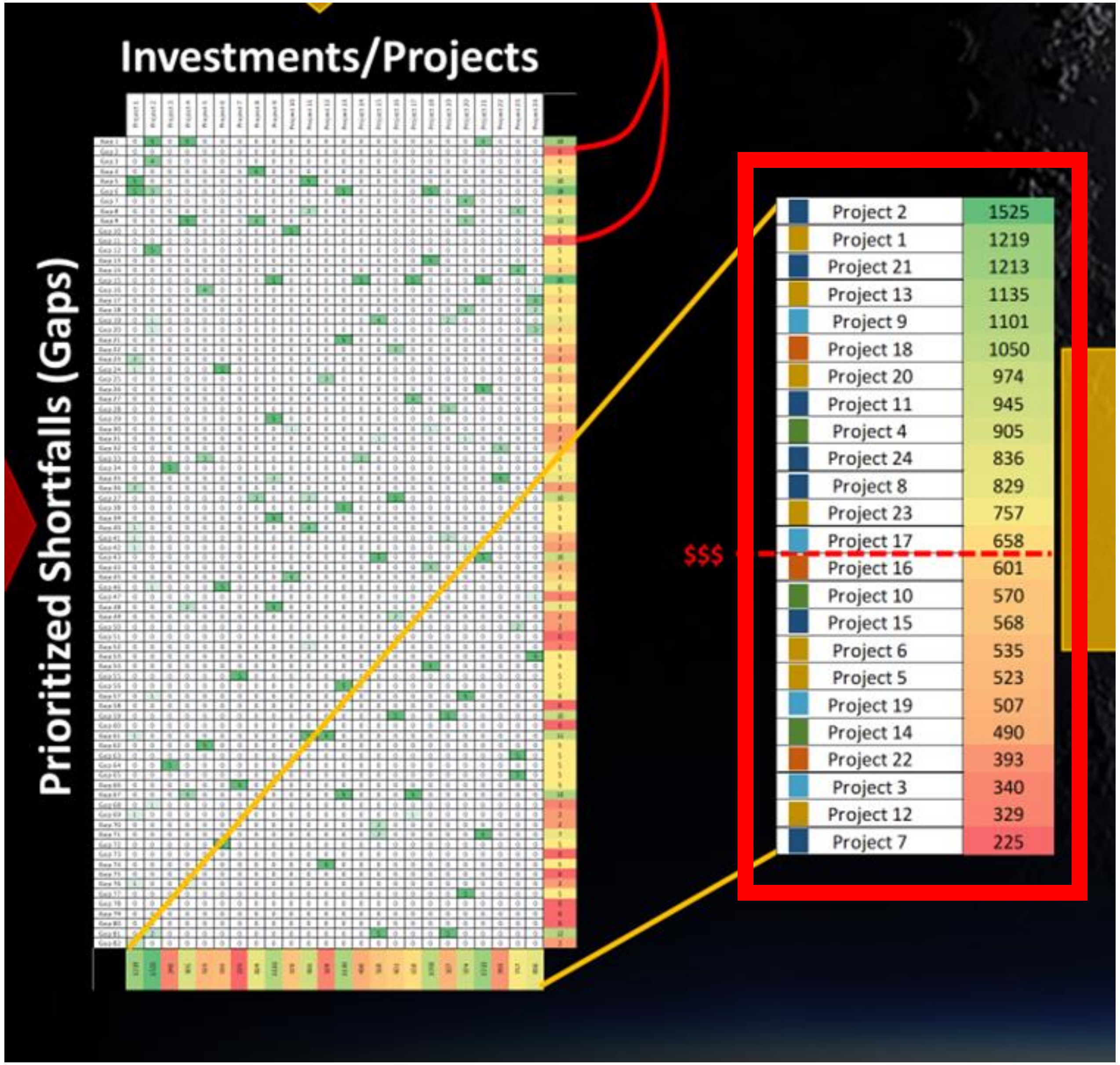
Investment Prioritization Process

- **Goal: Provide a quantifiable prioritization methodology to evaluate investments based on available credible data**

- **STMD is investigating various approaches of a repeatable methodology on evaluating:**
  - Proposed new investments
  - Existing investments, for continuation consideration
  - Ultimately enable decision on use of limited annual funding available

- **Data Sources**
  - Inaugural STMD Shortfall Rank List
  - Project Connection Scores
  - Other Programmatic data

- **Desired Outcome:** Utilize objective measures to evaluate Return on Investment



Investment Prioritization Process – Summary

"Technical Benefit" = Sum of (Connection Score x Inverse Rank of Shortfall)

Sum [Prioritized Shortfalls X Investment → Gap Connection Scores] = Technical Benefit

Integrated Rank	Avg Score	Shortfall ID	Category
1	8.1	1618: Survive and operate through the lunar night	Thermal Management Systems
2	7.6	1596: High Power Energy Generation on Moon and Ma	Power
3	7.4	1554: High Performance Onboard Computing to Enable	Avionics
4	7.4	1557: Position, Navigation, and Timing (PNT) for In-Orl	Communication and Navigation
5	7.2	1545: Robotic Actuation, Subsystem Components, and	Autonomous Systems and Robotics
6	7.2	1552: Extreme Environment Avionics	Avionics
7	7.2	1519: Environmental Monitoring for Habitation	Advanced Habitation Systems
8	7.2	709: Nuclear Electric Propulsion for Human Exploration	Propulsion: Nuclear
9	7.1	1304: Robust, High-Progress-Rate, and Long-Distance A	Autonomous Systems and Robotics
10	7.1	1520: Fire Safety for Habitation	Advanced Habitation Systems
11	7.1	1531: Autonomous Guidance and Navigation for Deep	Autonomous Systems and Robotics
12	7.0	1591: Power Management Systems for Long Duration L	Power
13	7.0	702: Nuclear Thermal Propulsion for Human Exploratic	Propulsion: Nuclear
14	7.0	1559: Deep Space Autonomous Navigation	Communication and Navigation
15	7.0	1527: Radiation Countermeasures (Crew and Habitat)	Advanced Habitation Systems
16	6.9	1526: Radiation Monitoring and Modeling (Crew and H	Advanced Habitation Systems
17	6.9	879: In-space and On-surface, Long-duration Storage o	Cryogenic Fluid Management
18	6.8	1548: Sensing for Autonomous Robotic Operations in (	Autonomous Systems and Robotics
19	6.8	1558: High-Rate Communications Across The Lunar Sur	Communication and Navigation
20	6.8	1626: Advanced Sensor Components: Imaging	Sensors and Instruments
21	6.8	792: In-space and On-surface Transfer of Cryogenic Flu	Cryogenic Fluid Management
22	6.7	1569: High-Mass Mars Entry and Descent Systems	Entry Descent and Landing
23	6.7	1525: Food and Nutrition for Mars and Sustained Lunar	Advanced Habitation Systems
24	6.7	1571: Navigation Sensors for Precision Landing	Entry Descent and Landing
25	6.7	1573: Terrain Mapping Capabilities for Precision Landi	Entry Descent and Landing
26	6.7	1562: Advanced Algorithms and Computing for Precisi	Entry Descent and Landing
27	6.6	1597: Power for Non-Solar-Illuminated Small Systems	Power
28	6.6	1568: Entry Modeling and Simulation for EDL Missions	Entry Descent and Landing
29	6.6	1516: Water and Dormancy Management for Habitatio	Advanced Habitation Systems
30	6.6	1524: Crew Medical Care for Mars and Sustained Lunar	Advanced Habitation Systems
31	6.6	1546: Robotic Mobile Manipulation for Autonomous La	Autonomous Systems and Robotics
32	6.5	1592: High Power, Long Distance Energy Transmission	Power
33	6.5	1542: Metrics and Processes for Establishing Trust and	Autonomous Systems and Robotics
34	6.4	1390: Power and Data Transfer in Dusty Environments	Power
35	6.4	1532: Autonomous Planning, Scheduling, and Decision	Autonomous Systems and Robotics
36	6.4	610: Solar Electric Propulsion - High Specific Impulse	Propulsion: Non Nuclear
37	6.4	1563: Aerocapture for Spacecraft Deceleration and Ort	Entry Descent and Landing
38	6.3	1560: High-Rate Deep Space Communications	Communication and Navigation
39	6.3	1194: Prediction Modeling of Cryogenic Fluid Dynamic	Cryogenic Fluid Management
40	6.3	498: Broad and dependable supply chain for space-qua	ISAM and RPOC
41	6.3	1430: Small Spacecraft Propulsion	Small Spacecraft
42	6.3	1588: Protect Earth from Destructive Natural Impacts (	Miscellaneous
43	6.2	1565: Assessment and Validation Capabilities for Integ	Entry Descent and Landing

Notional Data

Gap Title	Investment Title	Connection Score
Surface Berthing and Docking Mechanisms	On-Orbit Servicing, Assembly, and	1 - Investment minimally contributes to gap closure.
Excavation of granular (surface) regolith materia	Infrastructure Manufacturing with I	0 - No connection between [illegible]closure and investment.
Excavation of granular (surface) regolith materia	Fission Surface Power	0 - No connection [illegible] gap [illegible]sure and investment.
Excavation of granular (surface) regolith materia	ISRU Pilot Excavator	5 - Investment dire[illegible] & ma[illegible] contributes to gap closure.
Excavation of granular (surface) regolith materia	Motors for Dusty & Extremely Cold	3 - Investme[illegible] to gap closure.
Excavation of granular (surface) regolith materia	Polar Resources Ice Mining Experin	2[illegible]ctly contributes to gap closure.
Excavation of granular (surface) regolith materia	Ultra Fast Proximity Charging	[illegible] Inves[illegible]butes to gap closure.
Excavation of granular (surface) regolith materia	Fundamental Regolith Pro[illegible]rties, I	3 [illegible]vest[illegible]nt contributes to gap closure.
Modular design for in-space installation	On-Orbit Servicing, Assemb[illegible] and	4 - [illegible]ment directly & strongly contributes to gap closure.
Upgrade or install instruments on large space ob	On-Orbit Servicing, A[illegible]bly[illegible]nd	4 - Investment directly & strongly contributes to gap closure.
Excavation of hard/compacted/icy regolith mate	Fission Surface Pow[illegible]	0 - No connection between gap closure and investment.
Excavation of hard/compacted/icy regolith mate	Polar Resou[illegible] M[illegible]xperin	4 - Investment directly & strongly contributes to gap closure.
Excavation of hard/compacted/icy regolith mate	ISRU Pilot [illegible]avat[illegible]	4 - Investment directly & strongly contributes to gap closure.
Excavation of hard/compacted/icy regolith [illegible]te	M[illegible]rs [illegible] D[illegible] & Extremely Cold	3 - Investment contributes to gap closure.
Excavation of hard/compacted/icy regol[illegible] ma[illegible]	U[illegible] Fas[illegible]roximity Charging	2 - Investment indirectly contributes to gap closure.
Excavation of hard/compacted/icy rego[illegible]mat	[illegible]ntal Regolith Properties, I	3 - Investment contributes to gap closure.
Regolith and resource delivery sy[illegible]	[illegible]sion Surface Power	0 - No connection between gap closure and investment.
Regolith and resource de[illegible]very [illegible]tem	Motors for Dusty & Extremely Cold	3 - Investment contributes to gap closure.
Regolith and reso[illegible] deli[illegible]y s[illegible]tem	Ultra Fast Proximity Charging	2 - Investment indirectly contributes to gap closure.
Regolith and resou[illegible] system	ISRU Pilot Excavator	5 - Investment directly & markedly contributes to gap closure.
On-Surface In-situ Co[illegible]tructi[illegible] of Vertical Struct	Infrastructure Manufacturing with I	2 - Investment indirectly contributes to gap closure.
On-Surface In-situ Con[illegible]uction of Vertical Struct	On-Orbit Servicing, Assembly, and	2 - Investment indirectly contributes to gap closure.
On-Surface In-situ Construction of Vertical Struct	Vertical Solar Array Technology	0 - No connection between gap closure and investment.
On-Surface In-situ Construction of Vertical Struct	Moon-to-Mars Planetary Autonomo	1 - Investment minimally contributes to gap closure.
On-Surface In-situ Construction of Vertical Struct	Fission Surface Power	2 - Investment indirectly contributes to gap closure.
Broad and dependable supply chain for space-qu	On-Orbit Servicing, Assembly, and	5 - Investment directly & markedly contributes to gap closure.

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Investment-to-Shortfall Mapping Example

Project Composite Score = Sum of (Connection Score x Inverse Rank of Shortfall)

Domain	(All)
Status	Activ…
Capability	Adva…ed Propulsion

Short Rank	Gap ID	Gap Title	An Additively Manufactured, Leak-Proof NTO Swivel (16743)	Fiber-fed Pulsed Plasma Thruster (FPPT) for Active Debris Removal (16411)	Fully Additively-Manufactured LOX-LH2 Engine Demonstration (16242)	Green Hydrazine Propellant Blend (10205)	Green Propellant Zero-G Control Methods (14176)	High-Performance, Refuelable, "Green" Propulsion System for Multi-Object Removal/Retrieval System (16826)	Improving Interfacial Properties through Scalable Additive Manufacturing of Functionally Graded Propulsion Systems (15488)	Propellant Gauging During On-Orbit Refueling and Transfer Operations (10118)	Propellant Mass Gauging in Microgravity with Electrical Capacitance Tomography (14151)	RAMPT - Optimized and Repeatable Components in Additive Manufacturing (15006)	RAMPT - Refractory Alloy Additive Manufacturing Build Optimization (15007)	Rotating Detonation Rocket Engine (984)	Small Spacecraft Electric Propulsion System (10206)	Solar Electric Propulsion (3295)	Grand Total
		* Number of Gaps Addressed	1	2	1	1	1	1	2	2	2	11	11	1	2	10	
		** Sum of Connection Scores	3	6	5	3	4	1	3	9	4	38	38	5	7	20	
		Reach/Impact (Sum of Connection Scores X Inverse of Shortfall Rank)	231	694	125	9	12	3	263	1523	680	1254	1254	10	969	1746	
6	1552	Extreme Environment Avionics														0	0
8	709	Nuclear Electric Propulsion (NEP) - Human Exploration												0		2	2
17	879	In-space and On-surface, Long-duration Storage of Cryogenic Propellant								5	3						8
21	792	In-Space & Surface Cryogenic Fluid Transfer								4	1						5
22	1569	High Mass Mars Entry & Descent Systems												0			0
28	1568	Entry Modeling and Simulation for EDL Missions												0			0
[illegible]	610	Solar Electric Propulsion (SEP) - High Specific Impulse												0		2	2
41	1430	Small Spacecraft Propulsion		4	0			0						0	5	1	10
[illegible]	1588	Protect Earth from Near Earth Objects (Planetary Defense)														0	0
47	844	Surface Dust Mitigation via Passive Technologies							0			0	0				0
50	1138	In-Space Transfer of EP Propellant														1	1
54	1613	Surface-based fluid management for sustained lunar evolution	0														0
58	1221	Mars Ascent Vehicle Propulsion							2			4	4	0			10
60	1612	Surface-based fluid management for near/mid-term missions	0														0
62	1589	Space Situational Awareness														0	0
69	1431	Access Beyond LEO for Small Spacecraft												0		1	1
[illegible]	1590	Planetary Protection														0	0
71	611	Solar Electric Propulsion - Sub-kW & kW Class EP Systems													2	1	3
[illegible]	1483	Enable commercially-provided Rendezvous, Proximity Operations, and Captur[illegible]PO[illegible]pro[illegible]and services														1	1
111	1224	In-Space & Surface Transfer of Earth Storable Propellants	3														3
113	700	Solar Sails for Propellant-less Propulsion		0	0			0						0	0	0	0
116	1486	In Space and On Surface NDE and Qualification of Components [illegible]r M[illegible]ufact[illegible]ing, Assembly, and Construction							0			1	1				2
122	705	Nuclear Electric Propulsion (NEP) - Low Power Flagship [illegible]ce														1	1
126	544	Solar Electric Propulsion (SEP) to Support Orbital Syste[illegible]atewa[illegible]PPE														5	5
135	1476	Remediation of large space debris		2				0							0	0	2
140	1551	Distributed Avionics to Enable Improve[illegible] Perfo[illegible]ance [illegible]d SWaP Efficiency														0	0
149	1490	Additive Manufacturing for Ne[illegible] Hig[illegible]erfo[illegible]an[illegible] Materials										5	5				10
150	1408	Advanced deployable load-bea[illegible]														0	0
154	1491	Additive Manufacturing of Large S[illegible]le Co[illegible]ents										3	3				6
156	1437	Dynamic and Capable Thermal Cont[illegible] for Small Spacecraft														0	0
157	1511	Advanced Computational Fluid Dynamics Tools / Capabilities												0			0
163	1488	Additive Manufacturing for Propulsion			5							5	5				15
165	1436	Efficient and Safe Higher Power Systems for Small Spacecraft														0	0
167	703	Rotating Detonation Rocket Engine (RDRE)							0			3	3	5			11
170	1492	Materials and Process Modeling for In Space and On Surface Manufacturing							0			4	4				8
172	1489	In Space and On Surface Manufacturing from Recycled and Reused Materials and Components										2	2				4
173	612	In-Space Diagnostics for Electric Propulsion														5	5
176	1494	Digital Transformation Technologies for Terrestrial, In Space, On Surface Manufacturing, and Operations							0			4	4				8
184	1493	Computational Materials Informed Qualification and Certification for In Space and On Surface Manufacturing										4	4				8
185	701	Green Propellant Propulsion Systems		0	0	3	4	1	1			3	3	0	0	0	15

Sum of Score; Investment Type: SPAR; Investment ID

Shortfall Rank from Survey

Connection Scores

Notional Data

"Technical Benefit" = Sum of

{ [188 – shortfall rank] x connection score }

- Example for investment 10206:

  969 = (188-41)*5 + (188-71)*2

Two alternate options for investment relevance:

* # Shortfalls [Gaps] addressed

** Sum of Connection Scores

All data is notional

1st Approach: RICE* Method

- **Applying the RICE equation to fit the STMD Investment Prioritization activity**

Technical Benefit

$$\frac{\text{(Reach) X (Impact) X (Confidence of Investment)}}{\text{Effort}}$$

- **Reach:** Shortfall rank
- **Impact:** Connection Score – how well the investment closes the shortfall
- **Confidence of Investment** - Related to the development complexity and probability
  - For complexity, potentially use GCD's Advancement Degree of Difficulty (AD^2) process
  - For probability,
    - May start with TRL "distance" (delta TRL: 3-6) and the given project start and end date in SPAR to produce an output to get the confidence of project meeting that schedule
- **Effort** - Time and money it takes to get to maturity
  - Life Cycle Cost (LCC) or Estimated to Complete (ETC)
  - Period of Performance (PoP) or Time Remaining

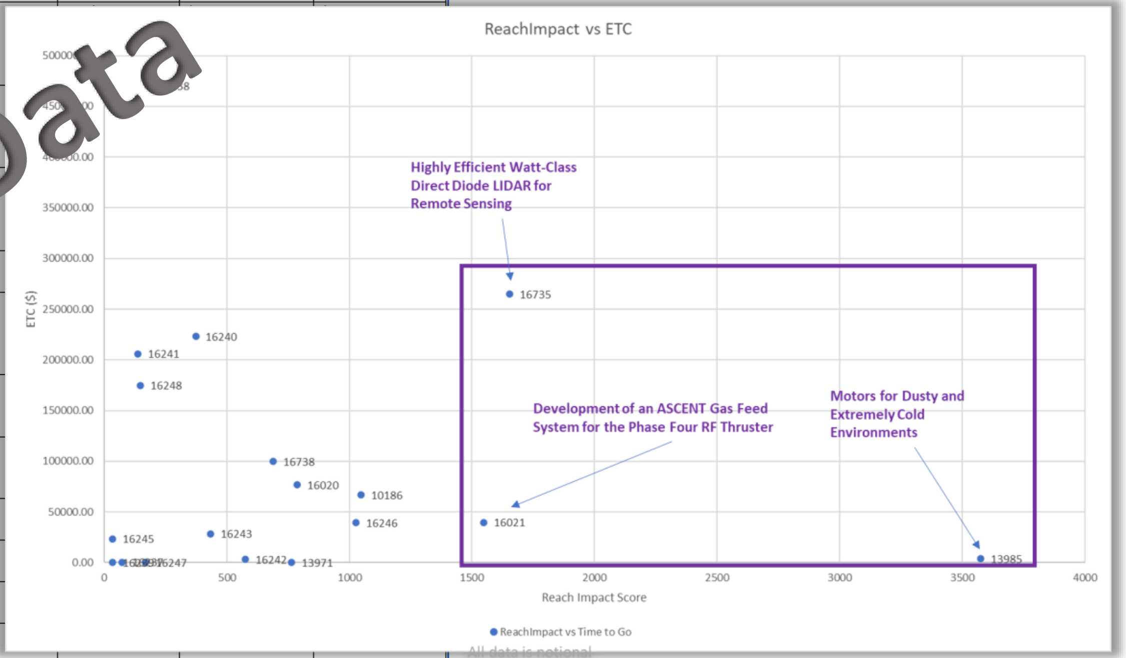
*** RICE Prioritization Method:** https://www.productteacher.com/articles/product-manager-guide-to-rice-prioritization

2nd Approach: Additional Investment Prioritization Attributes

- **Alternatives to a single numerical value:**
  - Sortable/Filterable Tables with additional programmatic Figures of Merit
    - Sort and filter tables for specific attributes of interest
  - Scatter Plots
    - Scatter Plots enable examination of quadrants of interest for two attributes at a time

Program	Capability	Investment #	Investment	Count of Gaps Addressed	Total of Connection Scores	Reach/Impact (Connection Score x 188 - Rank)	Delta TRL	Duration/PoP (Years)	Time to Go after FY24 (Years)	Running Total $	LCC	ETC (Award minus Running Total)
GCD	Avionics and Sensors	787	High Performance Spaceflight Computing - Implementation	32	112	11226	4	14.2	1.2	$89,305,531	$ 83,868,438	$ (5,437,093)
TDM	Advanced Propulsion	3295	Solar Electric Propulsion	15	38	3998	4	15.0				
SST	Communications, Position,	4707	The CubeSat Laser Intersatellite CrosslinK	6	18	1920	4	7.8				
TDM	Communications, Position,	5461	Deep Space Optical Communication	6	12	1569	2	[illegible]				
GCD	Small Spacecraft and Distributed Systems	7946	Distributed Spacecraft Autonomy	12	23	2417	1	7.0				
GCD	Landing Systems and Environments	7948	Safe & Precise Landing Integrated Capabilities Evolution	9	27	4165	[illegible]	9.0				
SST	Small Spacecraft and Distributed Systems	8050	Advanced Composite Solar Sail 3	7	20	[illegible]	1	6.3				
SST	Communications, Position, Navigation, and	8723	Cis Lunar Autonomous Positioning Software	0	0	0	2	4.1				
GCD	Entry Modeling and Instrumentation	8731	Scientifically Calibrated In-Flight Imagery	[illegible]	11	861	2	5.2				
GCD	Surface Power	8773	Regenerative Fuel Cell	3	12	1730	1	6.0				
GCD	Surface Habitation Systems	8776	Synthetic Biology	5	16	2018	1	7.0				
GCD	Advanced Materials,	8781	Superlightweight Aerospace Composites	1	3	42	3	6.0				
GCD	In-Space Servicing, Assembly, and	8782	In Space Manufacturing	0	0	0	0	6.0				
GCD	In Situ Resource Utilization	8783	Polar Resources Ice Mining Experiment-1	4	17	1748	1	5.2	0.6	$23,652,643	$ 26,093,117	$ 2,440,474

Notional Data



Enables greater visualization of strengths/weaknesses that may get lost in a single equation

All data is notional

3rd Approach: Combining Technical Benefit and Programmatic Metrics

Modified National Research Council (NRC)* Method

- **Developing methodology for combining the Technical Benefit score with other programmatic attributes**
  - Programmatic attributes can include:
    - Cost – Life Cycle Costs, Estimated Costs to Complete
    - Duration - Total investment schedule, estimated time to complete
    - Risk- Likelihood of success (e.g., "Advancement Degree of Difficulty" [AD2] metric)
    - Maturity – Expected TRL advancement
  - Exploring weighting options
    - For example, NRC weighted Technical Benefit as 2/3 of total score, and Programmatics 1/3
    - Can assign additional weights within Programmatics (e.g., Cost=40%, Risk=20%, Schedule=20%, Maturity=20%)
  - Results in a single, combined score for prioritization

Technical Benefit – **Programmatics** (Investment Risk, Cost, & Schedule) = **Prioritized Investments**

Project 2	1525
Project 1	1219
Project 21	1213
Project 13	1135
Project 9	1101
Project 18	1050
Project 20	974
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Scale	Risk	Category	Success Chance
9	100%	Chaos	Almost Certain Failure
8	80%	Unknown Unknowns	High Likelihood of Failure
7	70%	Unknown Unknowns	High Likelihood of Failure
6	50%	Unknown Unknowns	High Likelihood of Failure
5	40%	Known Unknowns	Probably Will Succeed
4	30%	Well Understood	Almost Certain Success
3	20%	Well Understood	Almost Certain Success
2	10%	Well Understood	Almost Certain Success
1	0%	Well Understood	Guaranteed Success

Schedule	Cost
< 2 years	<$5M
2-4 years	$5M - $50M
4-8 years	$50M - $250M
8+ years	$>250M

Project 1	1121
Project 21	1089
Project 2	1081
Project 13	1004
Project 20	989
Project 18	945
Project 9	936
Project 20	901
Project 11	874
Project 4	841
Project 24	808
Project 6	755
Project 5	721
Project 8	696
Project 23	621
Project 16	545
Project 10	521
Project 15	481
Project 19	435
Project 22	361
Project 14	320
Project 7	210
Project 3	184
Project 12	113

* NASA Space Technology Roadmaps and Priorities

Next Steps

- **STMD's Strategic Planning process is still evolving.**
  - Plan to utilize lessons learned to inform next Shortfall survey effort.
  - STMD recognizes the need for a process informed by objective data (incl. shortfall results) to inform investment decisions, but need to determine how numerical of an approach to take.
  - Striving for a prioritization methodology that is intuitive, objective, repeatable based on available credible data.
- **Plan to continue refining and collecting a complete dataset and develop a plan to maintain data integrity.**
  - Complete the Connection Scoring for active investments to the 187 shortfalls.
  - Determine what additional complexity/probability of success data to collect
  - Validate ETC/LCC data.
  - Potentially pursue "urgency" attribute, when roadmaps are available.
- **Intend to further evaluate the RICE equation**
  - Look at subsets of data and scatter plots to gain further insights and compare attributes.
    - Example Scatter plots:
      - Technical Benefit vs Cost
      - Technical Benefit vs Schedule
      - Technical Benefit vs Combined Programmatic Score

Regardless of approach, will still need "human in the loop" for decision-making.