

Utah Innovation Center

*An Innovation Partnership between
Government, Industry, and Academia*

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Mc Lean, VA

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Introduction

Utah Science Technology and Research Agency (USTAR) wants to create a spark across the State of Utah that ignites innovation and technology transfer to increase revenue and employment. Creating this spark between government, industry, and academia provides initial excitement and momentum; sustaining or even amplifying this stimulus requires consistent attention to foster the necessary relationships, and guide creative endeavors.

State leadership established USTAR to support technical entrepreneurs through incubator and accelerator programs, then broker technology transfers to industry that stimulate the economy and meet market needs. Having succeeded in recruiting top researchers to Utah universities, USTAR turns its attention to driving more immediate economic impact through an innovation center that can spark new technology development and increase revenue and employment for the state.

Concurrently, the Air Force Materiel Command (AFMC) recognized that its weapon systems and equipment continue to age without replacement, and that requires additional resources while defense budgets continue to shrink. Yet the Air Force must sustain readiness for high operational tempos. Seeking novel ways to stretch its budget, AFMC proposed innovation centers near each of the Air Force Sustainment Center's (AFSC) Air Logistics Complex installations in Georgia, Oklahoma, and Utah. AFSC hopes to advance the application of emerging manufacture (such as additive manufacture) and repair technologies, provide opportunities to develop promising engineers, scientists, mechanics, and technicians, and incubate research and business within the aerospace industry research and manufacturing base.

Purpose and Scope

Effectively operating an innovation center is hard; MITRE believes the best formula for a successful Utah Innovation Center lies in establishing a partnership between USTAR, AFSC, and an independent, objective third party to operate an innovation center near Hill Air Force Base (AFB).

This paper provides an overview of innovation best practices, then describes the principal steps required to establish and maintain a sponsoring innovation partnership. The preponderance of the paper focuses on establishing and maintaining the partnership:

- *Creating the partnership* to establish roles and responsibilities for each partner, their governance methods, and phased approach to innovation center implementation,
- *Establishing an innovation process* delineates the six steps for how innovation efforts and activities could be selected and the knowledge governing the process managed,
- *Innovation engagements* describes some innovation activities the innovation center may sponsor to engage industry, academia, other government organizations, and the public,
- *Allocating and balancing risk* provides a framework for determining the risk within innovation efforts and how the partners should determine risk allocations as part of the center's innovation process,

- *Metrics* will be critical, particularly in the initial implementation phase, to determine what is working or not, and should continue to receive funding, and
- *Funding and cost sharing* provides an approach the partners may consider to establish industry and academic associations and raise monies to fund innovation efforts and activities.

This paper provides best practices from existing public innovation centers, makes specific recommendations for roles, responsibilities, and processes for each partner, describes engagement options that can continue to spark innovation, and identifies points for further discussion where the partners may need to discover specific commonality. This paper does not address establishing a business process or marketing approach; it does, however, address potential outreach and engagement areas.

Approach

MITRE's approach to this study is best described by the benchmarking American Productivity and Quality Center research method: plan, collect, analyze, adjust. MITRE identified key areas of concern in establishing the innovation partnership including partnership parameters, technology transfer, governance, and innovation processes.

MITRE conducted research to identify existing innovation centers, particularly government sponsored, and public-private partnerships to understand best practices and lessons learned that can be applied to a USTAR, AFSC, and independent third party innovation partnership. Analyzing the data, MITRE sought to answer questions regarding the steps that USTAR, AFSC, and an independent third party should take to establish an innovation center. As data was collected and analyzed, initial plans and focus areas required adjustment, and further data collection and analysis was completed.

Innovation Center Best Practices

Reviewing over 30 innovation office assessments, MITRE learned what was working well within the public and public-private partnership spaces. Those sources used to inform this paper are cited in References. Important lessons learned or best practices that an innovation center partnership should consider following include:

- **Align with mission**—the partnership should establish a mission that ties to individual organizational missions and the specific impacts desired; this will enable the innovation center governance council to select needs-based innovation projects, that align with common partnership mission, goals, and objectives [6, 7, 10],
- **Establish processes**— innovation center processes must be transparent and clearly communicated with industry and academic affiliates to ensure that everyone knows what is expected, when, who makes the decisions, and what will happen next; all participants in innovation events and projects will be fairly and equitably treated [6, 7, 9],
- **Measure**—center leadership should measure for long-term outcomes, and short-term gains by setting interim targets with measures, collecting data, evaluating progress, and adjusting course as needed; the governance council must be willing to abandon projects that are not achieving interim targets while understanding that some failure is expected as an integral part of innovative success [6, 11],
- **Resource**—the partnership and its industry and academic affiliates must commit to supplying real resources—fiscal, human, physical (workspace, equipment, material, etc.) and technical; the innovation center should monitor and measure the impacts for resources expended to understand where the greatest impacts lie that align with the center’s mission focus [7, 9, 11],
- **Lead**—innovation leaders will be carefully chosen, then invested in and supported by the partners as the change agents that lead the center’s innovation efforts, and nurture relationships with industry and academic affiliates, and their senior leadership [6, 7],
- **Partner**—innovation efforts should be inclusive and the center partner as broadly as possible across geography and technology; explicit Technology Transition Agreements between the innovation center and its affiliates will ensure each obtains resulting intellectual property rights as appropriate [6, 7, 9, 10],
- **Dedicate a team**—innovation center staff should maintain a central, dedicated team augmented by others with specialized skills and backgrounds to drive each innovation; the partnership can engage more widely through challenges and other innovation events [6],
- **Share knowledge**—share, share, share! Partners need to share within the innovation center, and within individual organizations; thoughtfully applied, knowledge management techniques can help drive innovation as partners share with affiliates, with other agencies, with other businesses, with the public. Center leadership will share the lessons learned through the innovation process, the value

derived to the Air Force, affiliates, and the State of Utah as the governance council finds ways to continuously improve its innovation process [4, 6, 7, 10, 11], and

- **Communicate**—innovation center leadership will communicate openly and often with internal partners and external affiliates to generate awareness, and engage idea owners, submitters, and innovators to keep the innovative, creative energy, excitement, and spark alive [7, 9].

These best practices can form the guiding principles that as partners, USTAR, AFSC, and an independent third party, will subscribe to in establishing and operating the Utah Innovation Center. They may also serve as the structure for an annual State of the Innovation Center assessment to evaluate how well the partnership meets its collective objectives through mission alignment, innovation processes, tactical and strategic measures, resources committed, leadership, partnerships, staff, knowledge sharing, and communications.

Establishing and Maintaining an Innovation Partnership

MITRE recommends establishing a partnership between USTAR, AFSC, and an independent, objective third party to operate an innovation center near Hill AFB. This partnership, as suggested by AFSC, will connect USTAR with all three proposed AFMC innovation centers to include operations at Tinker AFB, OK (near Oklahoma City), and Robins AFB, GA (near Macon). The additional Air Force innovation centers can further extend the partners' ability to leverage and be leveraged by additional innovation centers.

The objective, independent third party requires a unique ability to understand the needs of federal agencies and defense organizations, specifically the Air Force. A history of operating successful innovation programs as well as effectively transferring them to industry is also a necessity for this third part organization. It should have deep technical skills, and proven relationships with academia. This organization would also preferably have a not-for-profit, public interest charter. A for-profit organization could operate in this capacity; however, it should be barred from engaging in any activity associated with an AFSC innovation center (including those in Oklahoma or Georgia) that results in a profit. Engaging a Federally Funded Research and Development Center (FFRDC) or University Affiliated Research Center (UARC) as this third party would be ideal.

USTAR and AFSC have individual and overlapping, joint, long-term goals that can be achieved from similar short-term objectives pursued through an innovation partnership. USTAR principally focuses on economic growth for the State of Utah by attracting existing corporations as well as fostering start-up companies, initially within the aerospace technology sector but expanding to cybersecurity and other economic sectors once reaching final operational capability. AFMC seeks to fill capability gaps, reverse engineer existing capabilities for aging equipment where original artifacts were lost, advance the art and body of knowledge for emerging manufacturing and repair technologies, and facilitate future workforce growth.

Creating the Partnership and Preparing to Engage Externally

After careful consideration and deliberation, USTAR, AFSC, and the independent third party (hereafter, the partners) should develop a formal, legally binding agreement that specifically enumerates the roles and responsibilities, success measures, and terms and conditions of the partnership. The latter may include International Traffic in Arms Regulations (ITAR), technical teaming agreements, intellectual property rights, technology transfer, warranties and liability, expenses, and affiliate relationships.

Initial organizational roles for USTAR include provision of facilities, infrastructure, sponsoring innovation events, and providing state advocacy for participation. The independent third party will provide technical expertise to lead the innovation center (as funded by USTAR), and engage with federal, or other Department of Defense (DoD) organizations on behalf of the innovation center. AFSC will provide mission and system subject matter experts and identify and prioritize mission needs. AFSC's ability to bring concrete problems to the innovation center provides one of the keys to a successful innovation effort. All partners share the responsibility to communicate internally and

externally. Further details of specific roles, responsibilities, measures and terms and conditions are beyond the scope of this limited effort, and should be addressed as part of follow-on activities to implement the innovation center.

Adapting the Data Governance Institute’s framework (Table 1) for an innovation governance focus outlines essential components to guide the partners’ external engagement with organizations including industry, academia, UARCs, and other not-for-profit organizations [14]. The governance components reflect keystone activities or artifacts (mission and vision) that also align with MITRE’s recommended innovation process, while others identify and describe primary governance roles (innovation steward). The partners should establish all initial governance components before welcoming affiliate industry or academic organizations.

Table 1. Innovation Governance Components

Component	Description	Implementation consideration
Mission and vision	Clear statement describing need and outcomes of innovation governance	<ul style="list-style-type: none"> • Defined by the innovation process and accomplished by the governance council • Reviewed annually and/or updated as needed
Goals, metrics, and measures (for innovation activities)	Goals should be specific, measurable, and actionable, relevant, and timely; metrics should enable progress assessment and evaluation	
Standards and policies	Innovation policies, standards, compliance requirements, business rules, and definitions	
Accountabilities	Defined innovation governance process roles and responsibilities	
Decision rights	Identifies decision making authorities, and the process under which they are made	
Innovation processes	Processes used to manage innovation priorities and technology transfer (See Establishing an Innovation Process)	
Controls	Means to manage risk	
Stakeholders	Individuals or groups that affect innovation	Roles and responsibilities defined by the innovation governance council charter
Data stewards	Stakeholders that make data-related decisions such as data rights, policy or standards	
Innovation governance council	Organization that establishes and manages governance functions and resolves stakeholder issues; comprised of stewards	<ul style="list-style-type: none"> • Core governance group established by charter • Defines roles and responsibilities of stewards and stakeholders • Assigns decision authority • Establishes policies, processes, and standards

Component	Description	Implementation consideration
		<ul style="list-style-type: none"> • Audits compliance • Determines strategic direction, goals, metrics, and collects data to determine success

Management and governance of the innovation center and innovation process will be key to the center’s success and achieving the partners’ joint objectives. Innovation itself is somewhat uncontrolled and chaotic, but its governance should be transparent, and use consistent, repeatable processes to provide focus, bound scope, deliver consistent grading of proposals, and ensure impartiality. The governance council chair must have decision rights to govern the center and innovation process on behalf of the partners and affiliates. Two options for chairing the governance council include a 12-month leadership rotation beginning with the independent third party, and moving to AFSC, then to USTAR, or AFSC and USTAR jointly chair the council. Successful innovation requires decisive leadership.

The innovation governance council will be at its most active during the early days establishing its charter, and setting the mission, vision, goals, roles and responsibilities, and processes in place. The partners, later in consultation with affiliates, will determine the periodicity with which they review, approve, and prioritize innovation activities, receive updates, and determine continuance of efforts. Specific considerations are identified in *Establishing an Innovation Process*.

The governance council may consider adopting specific requirements and project management practices outlined in the Carnegie Mellon Software Engineering Institute (SEI) Capability Maturity Model Integrated for Development (CMMI-DEV) [15]. In addition to the business rules and processes that will govern the innovation activities and environment, CMMI-DEV specific practices can provide guidance that will help the governance council implement repeatable, predictive, transparent practices.

Once the governance council approves its foundational governance artifacts and initiates governance processes, its activity will be event driven as changes are requested. It ramps back up annually to review foundational governance artifacts, task, collect, and analyze measurement data associated with long-term outcomes, and make any changes deemed appropriate. Governing and managing the innovation activities and environment is essential to its ability to enable mission success; however, it should be applied lightly as it guides and actively manage activities.

MITRE further recommends that the partners consider a two phased approach to the innovation center implementation. Heuristics suggest that three to five years are required to establish an innovation center, its practices, and a place within the desired government, industry, and academic ecosystem. This initial three- to five-year period would constitute the first, initial operating capability phase. As partners establish an agreement, it should include outcomes specific to this first phase that reflect growth and maturation of an innovation center developing capabilities as an incubator, maker, and/or accelerator for specific technologies.

An evaluation at the conclusion of the first phase should assess the effectiveness of the partners in accomplishing their joint mission, achieving joint and organization-specific success measures, and the value of the independent third party's continued participation within the partnership. The evaluation should offer specific recommendations for the future focus of the innovation center, its leadership and governance, industry and academic affiliations, technical focus areas, innovation types, and expanding economic sector concentrations to include a cybersecurity center of excellence, and preparing the innovation center for its second phase where it reaches its final operating capability.

Establishing an Innovation Processes

MITRE adapted innovation processes identified during the literature review to meet the requirements of a USTAR- and AFSC-sponsored innovation center. Each of the six steps in the process shown in Figure 1 should be enabled by careful knowledge management efforts to inform both the business and technical needs of the innovation center and the innovation processes.

Scope

As part of establishing the innovation processes, the partners and governance council should determine the center's strategic planning cycle, which sets the Scope for the remaining innovation activities. An initial annual planning cycle with quarterly or semi-annual updates provides an appropriate starting position. These Scoping activities should include:

- **Strategic focus areas**—identify subjects of priority interest to the partners, stakeholders, and affiliates to solicit proposals or host events,
- **Innovation engagement options**—select the number and type of events (hack-a-thons, challenges, conferences, warfighter workshops) that the center will host and schedule them (see Appendix A),
- **Resource allocation**—determine the resources that will be obligated at the beginning of the innovation center's fiscal year, at quarterly increments, and what will be held in reserve for immediate needs to fund out-of-cycle ideas, and
- **Risk categorization**—divide risk allocations across the proposal categories to meet innovation mission and vision objectives.

Scoping activities should be explicit. The governance council should evaluate the strategic focus areas and enumerate specific skills or technical gaps that exist within those areas. These gaps provide areas where the innovation can target industry or academic leaders with innovation engagements that find a willing and motivated audience to begin addressing the gap areas.

Solicit

The partners and affiliates should identify the means by which they plan to accept proposals. MITRE recommends establishing a mobile application and website with self-explanatory idea submission capabilities that automatically populate a database where ideas can be tracked and their disposition recorded. Methods to collect sensitive or



Figure 1. Recommended Innovation Process

proprietary proposals should also be considered. Although not the preferred means, the innovation center should also accept email.

The software enabling the on-line submissions should send an automatically generated acknowledgement email to the submitter, including those providing ideas by email or hardcopy, that identifies when the idea will be reviewed by the governance council, with a link to the evaluation and selection criteria that will be used to assess their idea. On-going, transparent engagement with idea submitters is as important as the ideas generated; it helps maintain positive experiences that promote future engagement and continue the innovation spark.

Evaluate

As determined by the annual planning cycle or driven by specific event schedules, the governance council should evaluate each proposal using criteria established as part of the scoping processes. The evaluation and selection criteria should be publicly available, and published with the focus area or event announcement soliciting proposals. Any scoring mechanisms should also be published and publicly available. Once the proposals are evaluated, the governance council should assign a risk category and prioritize the proposals.

Select and Fund

Using the funding allocations (see Funding Model) determined during annual planning activities, the governance council should select the proposals that it will fund during each evaluation and selection cycle. This process should be applied to all proposals submitted for normal funding, out of cycle needs, or as part of an event (performance challenge, gaming event, etc.). The primary focus of selection and funding activities will be consistently using standard, repeatable, transparent processes that are clearly communicated to the innovation community and submitter.

Evaluate and Transfer

Implementation plans for each selected and funded project should include periodic reviews with the governance council. The council should be prepared to review and evaluate the progress of each project to determine if it is executing successfully, and if funding should continue. When complete, affiliates may choose to transfer the resultant prototype, design, and/or technical data to develop further, or manufacture independently; the council may also determine that further investigation fits with its strategic focus areas and select the project for additional funding.

Innovation and managing innovation are hard. Successfully transferring that hard-won capability to production is even more difficult. It will require careful planning, and clearly written, explicit technical teaming intellectual property rights agreements. Certain technical solutions may also require AFSC to implement innovative contracting approaches beyond standard production-run procurements. The ultimate objective of the innovation center is to achieve commercial production or operational implementation of a prototype capability developed from a funded project or engagement event, and that end-goal must be incorporated as part of the planning process from the beginning.

Manage Knowledge

Well managed and curated information enables efficient innovation, innovation management, and can help drive and focus innovation priorities. Knowledge management practices at each phase of the innovation process can enable data-driven decision making, prevent duplication of effort, identify expertise, measure progress, and make the information needed readily and easily available within sensitivity and classification constraints.

Innovation Engagement Options

A variety of methods may facilitate solution development in the innovation center. These methods range from a small investment in general capabilities, to a high investment with focused capability development. Each method serves to achieve different goals, and can form a toolkit for the Utah Innovation Center. Described in order from low to high investment, these opportunities include:

Technology summits bring industry and government together to share and shape particular technology areas. Summits foster ideas, showcase innovations, connect potential solutions to customers, increase collaborative efforts, and shape policies/governing practices.

Challenge events leverage gamification techniques to develop, train, or draw out talents in particular areas of interest. Using gaming platforms creates a fun and exciting event that enriches the pipeline of participants for the area of competition. Challenge events effectively identify gaps in a capability area, as well as available talent and potential solutions to meet those gaps.

Mission-oriented workshops provide a lightweight, hands-on *operator* assessment of emerging capabilities to meet specific mission needs. Similar to large-scale experiments, these workshops put working solutions in the hands of the operators to evaluate the technology's fitness for purpose and mission employment of the technologies in consideration. The difference is in the rapid prototyping focus with modeling and simulations (M&S), and user interactions. The workshops provide immature systems (not fully production capable) an environment for experimentation enable iterative, rapid on-the-fly changes based on operator feedback, and the ability to rerun the scenarios.

Like mission-oriented workshops, **technology evaluation exercises** provide a hands-on operator assessment of emerging capabilities to meet specific mission needs. While the workshops provide lightweight, concept of operations-centric forums to vet prototypical capabilities, technology evaluation exercises are DoD-led exercises to deliver incremental capabilities to the end users. Rather than evaluating prototypes, these exercises provide a systems engineering framework which integrates developers and end users to produce needed capability, or sub-capability, at the end of every time-boxed iteration which are inserted into the acquisition process. Production quality systems, along with associated components such as preliminary technical manuals, training programs, etc. are within scope of these exercises.

Challenge-based acquisition activities assess the actual performance of potential solutions against clearly defined mission objectives and create incentives for industry to innovate. Previous challenge-based events demonstrated success in events sponsored by the Defense Advanced Research Projects Agency (DARPA) and the Joint Improvised-Threat Defeat Agency (JIEDDO). Traditional DoD acquisition methods are lengthy, serial, gate-like processes built around stringent specifications and arms-length relationships. Challenge-based acquisition uses transparent, accessible, concrete challenges to satisfy warfighter needs and stimulate industry innovation. It offers a more straight-forward approach to fielding new capabilities, upgrades, and enhancements to existing systems.

Examples of these methods, additional details, and specific recommendations for how USTAR and AFSC may sponsor these type of events through the Utah Innovation Center are identified in Appendix A.

Allocate and Balance Risk

As part of the annual scoping exercise, the innovation governance council will divide risk allocations across the proposal categories to meet innovation mission and vision objectives. Risk can be categorized according to the scope of impact and its complexity as a percentages of selected activities.

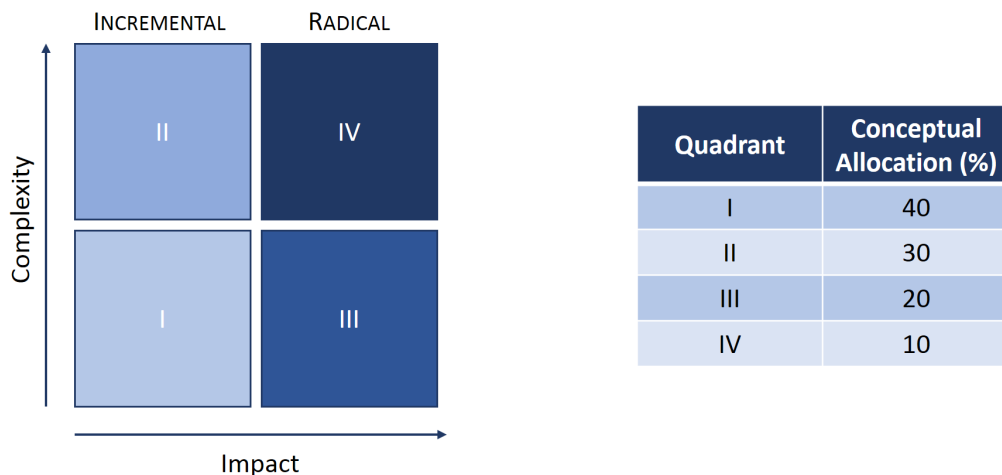


Figure 2. Risk Categorization and Allocation [10, 12]

The conceptual allocations listed in the illustration table in Figure 2 do not constitute a recommended allocation, but rather show a conservative approach to risk allocation and serve as a concept strategy for minimizing risk:

Quadrant I contains the lowest risk, and most limited footprint. Activities falling within this quadrant will typically exist within the bounds of existing focus areas and represent incremental improvements to existing capabilities. Examples include more power-efficient motors or longer battery life.

The potential impact remains the same for *Quadrant II*, however the number of external dependencies required for success increases as does the risk associated with these efforts.

These activities provide systemic rather than unit-based improvements. Examples include LED light bulbs and electronic health records.

The *third quadrant* addresses a larger user or beneficiary population while retaining a relatively contained innovation effort. With lower risk and higher reward, these efforts may be harder to identify. Examples include Quicken and drug-eluting stents.

Finally, the highest risk and greatest reward efforts are categorized within *Quadrant IV*. These innovation technologies are disruptive and drive changes in their environment and users. Examples include Google and iTunes.

The percentage of innovation proposals that the governance council seeks in any quadrant is a management decision. The governance council may choose an opposite allocation with the greatest percentage of proposals approved in the fourth quadrant. [10]

Metrics

Measures are the basis of data-driven decisions that allow for corrective actions; they also show the impact of specific approaches for the program. Performance measurement is vital to the innovation program, particularly in the early stages when the center is developing its processes and needs to understand what is working, how well, and what is not. What matters is measured, what is measured is achieved. [13]

The innovation council should track two levels of activities: overall innovation program, and specific progress for each selected and funded project. Metrics that indicate overall program success could include the number of projects transitioned to industry for production, number of partnerships between industry leaders and start-ups or small companies, and a calculation of value based on areas of strategic focus or economic drivers. Partners may also choose to measure progress toward their organizational success criteria. Project-specific metrics will be unique to each project and should be nominally identified during the proposal, and further refined during project planning.

Funding and Cost Sharing

MITRE recommends that some innovation center funding be derived from an affiliate cost sharing model. This cost sharing model should identify three to five sponsorship levels; five levels are identified in the table here: Investor, Benefactor, Partner, Collaborator, and Supporter illustrate this concept. The partners should determine the number of levels and benefits associated with each level before beginning to engage with potential affiliates.

Specific contribution levels would be expected for each affiliate to obtain the benefits associated with each. The specific level of funding required for each sponsorship level should be determined by USTAR and AFSC with an understanding of what the target organizations may be willing to contribute. Similarly, the benefits derived for affiliating with the innovation center should reflect the value of each to the affiliate organizations. Table 2 identifies five possible sponsorship levels with a nominal baseline description of benefits derived for each level of funding. The partners will need to determine the actual number of contribution levels and the benefits associated with each.

Table 2. Contribution Levels and Nominal Benefits

Benefit	Investor	Benefactor	Partner	Collaborator	Supporter
Advertising for sponsored events		●	●	●	●
Opportunity to obtain technology transferred from innovation center		●	●	●	●
Access to labs, conference spaces, and classrooms when not scheduled		Priority 4	Priority 3	Priority 2	Priority 1
Solve immediate AFSC challenges	●	●	●	●	●
Collaborate with AFSC for federal grant monies	●	●	●	●	●
Seat on governing council	1 vote	2 votes	3 votes	4 votes	5 votes
Free registration for participants in sponsored events (annually)	2	3	4	5	unlimited
Access to labs, conference spaces, and classrooms for individually sponsored events with non-members (annually)	1	2	3	4	unlimited

Cost associated with funding specific innovation efforts as well as populating the innovation center laboratories with machining tools, fabrication and prototyping equipment, 3D printers, oscilloscopes, and other equipment will be borne by multiple sources. They may be donated by the manufacturer or by affiliate organizations as part of their contribution to the innovation center. Participation fees garnered from some innovation engagement activities may also contribute funds.

AFSC cannot guarantee funding during any fiscal year. However, Air Force staff can identify funding opportunities, and assist affiliates to obtain federal and DoD grants, capstone funds, and other DoD or federal monies.

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Defining Organizational Success

Each partner has specific motivations for joining the other two in creating and leading a Utah Innovation Center. While not comprehensive, at a high-level USTAR, the independent third party, and AFSC may define success as described in Table 3.

Table 3. Organization Innovation Success Descriptions

Utah Innovation Center	Independent Third Party	AFSC
Create new relationships between non-traditional companies and DoD and federal agencies	Help federal organizations leverage Utah's rapidly advancing high technology landscape	Grow manufacturing and repair technologies for the aerospace industry
Generate new business for companies, universities, and nonprofits	Gain insight into the innovation landscape	Develop the next generation of engineers, scientists, technicians, and mechanics
Strengthen position of military installations in Utah	Deliver innovative ideas, products, and services to enhance state, DoD, and federal missions	Strengthen aerospace industry research and manufacturing base

Understanding these specific motivations, and identifying means to measure them will be important to each partner as they form and progress toward achieving their individual and joint goals. Goals and priorities may also change overtime. For example, MITRE recommends that USTAR consider expanding the innovation concept beyond an AFSC-centric construct and engage across programs within the state, as well as emerging, tangential technologies and industries not currently resident within the State.

Taking the Next Steps

Effectively operating an innovation center is hard work; MITRE believes the best formula for a successful innovation center lies in establishing a partnership between USTAR, AFSC, and an independent third party. This paper described the principle steps required to establish and maintain a sponsoring innovation partnership, and made recommendations for actions that partnership should take, specifically:

- Create partnership through a formal, legally binding agreement that specifically enumerates the roles and responsibilities, success measures, and terms and conditions of the partnership,
- Define organizational success outcomes for each partner,
- Implement governance components before welcoming affiliate industry or academic organizations,
- Consider a two-phased approach to the innovation center implementation, evaluate at pre-determined point three to five years from inception to assess the effectiveness of the partners in accomplishing their joint mission, achieving joint and organization-specific success measures,
- Establish an innovation process

- Perform scoping activities to include strategic planning, selecting innovation engagements, and allocating resources and risk,
- Identify the means by which the innovation center will accept proposals,
- Develop proposal evaluation criteria,
- Determine innovation knowledge management practices and processes, and
- Track overall innovation program maturity and project specific outcomes,
- Select cost sharing model and sponsorship levels with associated benefits, and
- Evaluate the effectiveness of the partners in accomplishing their joint mission, achieving joint and organization-specific success measures, and the value of the independent third party's continued participation within the partnership.

With close collaboration and focused energy this joint venture between USTAR, AFSC, and the independent third party will successfully establish and operate a Utah Innovation Center.

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Appendix A Innovation Engagement Options

A variety of methods may facilitate solution development in the innovation center. These methods range from a small investment in general capabilities, to a high investment with focused capability development. Each method serves to achieve different goals, and can form a toolkit for the Utah Innovation Center; the innovation center governance council may choose any or all methods described here, or others deemed best suited to achieve the desired outcomes. Described in order from low to high investment, these opportunities include technology summits, challenge events, mission-oriented workshops, technology evaluation exercises, and challenge-based acquisition.

Technology Summits

Technology summits bring industry and government together to share and shape particular technology areas. Summits foster ideas, showcase innovations, connect potential solutions to customers, increase collaborative efforts, and shape policies/governing practices.

For example, the Federal Mobile Computing Summit, is hosted by the Advanced Technology Academic Research Center (ATARC), a not-for-profit organization that provides collaborative forums for government, academia and industry to address a wide range of emerging technology challenges. ATARC co-chairs an annual summit where the format ranges from large group briefings to small group white-boarding sessions. These forums bring the mobile computing community together to share ideas, challenges and help facilitate solutions. They also produce white papers and recommendations to the government for affecting policies and information sharing.

Like ATARC, USTAR may considering hosting similar events to focus on particular technology areas that are important to AFSC, affiliates, or organizations USTAR hopes to attract to the region. This method requires a relative low resource investment. It provides general information sharing and networking for industry, academia, and government, and opportunities for more specific engagements between needs and solutions as results of participation.

Challenge Events

Challenge events leverage gamification techniques to develop, train, or draw out talents in particular areas of interest. Using gaming platforms creates a fun and exciting event that enriches the pipeline of participants for the area of competition. Challenge events effectively identify gaps in a capability area, as well as available talent and potential solutions to meet those gaps.

Capture the Flag (CTF) competitions are one type of challenge event that uses gamification techniques. CTF events can draw participants from across the country. By conducting these CTF events with industry partners, the community gains a pipeline for cybersecurity talents to feed into real world projects.

USTAR may consider hosting and operating similar game-based challenge events for some technology areas. Some areas (such as cybersecurity and networked operations) are more suited for gamification. Therefore, the use of a challenge event method would be mission need or technology dependent. The level of investment would be greater than hosting technology summits, but the benefits gained would be greater due to hands-on participation beyond just discussion.

Mission-oriented Workshops

Mission-oriented workshops provide a lightweight, hands-on *operator* assessment of emerging capabilities to meet specific mission needs. Similar to large-scale experiments, these workshops put working solutions in the hands of the operators to evaluate the technology's fit for purpose and mission employment of the technologies in consideration. The difference is in the rapid prototyping focus with modeling and simulations (M&S), and user interactions. The workshops provide immature systems (not fully production capable) an environment for experimentation enable iterative, rapid-on-the-fly changes based on operator feedback, and the ability to rerun the scenarios.

An example of such events are the Warfighter Workshops (WfW) conducted with specific Defense organization. In these events, the host provides the technology reconnaissance and evaluation capabilities, modeling and simulation capabilities, and application prototypes. The host collaborates with the Defense organization to define the concept of operations (CONOPS) and procedure necessary equipment for workshop evaluation. These Workshops bring together soldiers with subject matter experts to address specific Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) challenges. Agile sprints are conducted as iterative, incremental processes for technology evaluation that focuses on delivering experimental capabilities to the soldiers and engineers for mission evaluation.

WfWs provide a framework that integrates soldiers, engineers, technicians, industry partners and stakeholders to evaluate emerging and beta technologies at every iteration. The maturity of the technology and CONOPS drives the size and shape of the sprints. They allow the soldiers and subject matter experts to brainstorm different approaches, identify new information flows, and explore different technologies in an agile way.

USTAR may consider using such mission oriented workshops to further understanding of new and emerging technology's impact to mission outcome, user tasks, and the user's expectations. This method can drive positive impacts for government providers, end users and industry partners. For government providers, workshops can help improve affordability, efficiency and effectiveness of their lines of service. They can improve understanding of the overall risk associated with adoption of new and emerging technology, with focus on maturity, availability and operational need and timing. For the end users, workshops will improve understanding of what emerging technologies will benefit their operations rather than what will inhibit operations so they can more effectively prioritize technology requests. For industry partners, workshops enhance and shape commercial offerings to meet customer needs, by allowing users to work with their technologists during evaluation.

By comparison, planning and conducting mission oriented workshops requires more investment than holding challenge events. However, the investment would also lead to much greater and more targeted benefits in terms of integrating solutions with mission needs and CONOPS.

Technology Evaluation Exercises

Like mission-oriented workshops, technology evaluation exercises provide a hands-on operator assessment of emerging capabilities to meet specific mission needs. While the workshops provide lightweight, CONOPS-centric forums to vet prototypical capabilities, technology evaluation exercises are DoD-led exercises to deliver incremental capabilities to the end users. Rather than evaluating prototypes, these exercises provide a systems engineering framework which integrates developers and end users to produce needed capability, or sub-capability, at the end of every time-boxed iteration which are inserted into the acquisition process. Production quality systems, along with associated components such as preliminary technical manuals, training programs, etc. are within scope of these exercises.

USTAR may consider working with mission operators to plan, develop and support such exercises with structured processes and systems engineering functions. Key to these events is the upfront technology transition path into the customers' acquisition/fielding processes. Therefore, the level of investment in planning and execution is much greater compared to mission oriented workshops. However, the benefits from such investment is correspondingly greater in terms of technology insertion into fielded capabilities.

Challenge-based Acquisition

Challenge-based acquisition activities assess the actual performance of potential solutions against clearly defined mission objectives and create incentives for industry to innovate. Previous challenge-based events demonstrated success in events sponsored by DARPA and JIEDDO. Traditional DoD acquisition methods are lengthy, serial, gate-like processes built around stringent specifications and arms-length relationships. Challenge-based acquisition uses transparent, accessible, concrete challenges to satisfy warfighter needs and stimulate industry innovation. It offers a more straight-forward approach to fielding new capabilities, upgrades, and enhancements to existing systems.

USTAR may consider adopting a similar approach to work closely with mission operators to develop and conduct challenge-based acquisition events. As a full-scale alternative to traditional acquisition, challenge-based acquisition represented the highest level of investment among all parties involved relative to the other methods discussed. Similarly, it also yields the most impact in promoting wide-scale industry and mission operator participation, leading to competitive innovation and fielded solutions.

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