

TECHNOLOGY VALIDATION AND START-UP FUND

Round 18 Submittal Evaluations

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Submitted To:

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Executive Summary

For Round 18, a total of 17 requests for funding were submitted to OTF's Technology Validation and Start-Up Fund, one Phase 1¹, and the remaining 16 were Phase 2 proposals.

The Phase 1 proposal was twice a prior Phase 1 awardee and is again recommended for funding (100%). Program performance data is just now becoming available and will be the focus going forward for returning applicants.

Of the 16 Phase 2 requests, five (31%) are recommended for funding to OTF by the Review Team. This proportion of successful Phase 2 proposals was below average project approval rates.

Five of the Phase 2 applications (31%) were prior Phase 1 awardees, and two of these (40%) are recommended for funding. In addition, four (25%) of the Phase 2 applications are resubmitted Phase 2 applications. Two of the resubmissions are recommended for funding (50%). Teams that plan on resubmission are encouraged to take advantage of the opportunity to debrief with the review team to discuss potential improvements. These phone debriefings may help clarify and focus the comments offered in this report, so that the applicants have a clear understanding of gaps to address should they choose to reapply. In addition, the Phase 2 process can be a difficult one to navigate without strong guidance from regional ESPs. Further collaboration with the applicant's Entrepreneurial Services Provider and Technology Transfer Office is highly recommended prior to resubmission. This is especially significant when the deficiencies of the proposal are business acumen related.

The TVSF program has a narrow focus for technology life cycle timing and distinctly targeted technology areas. Although the proposals occasionally fall outside of that window of opportunity for submission to the program, the technologies as proposed are generally sound. Most requests that are not recommended for funding lack fundamental elements of a business strategy. Applicants should continue to leverage their ESPs for proper guidance to determine whether and how they can meet program criteria. The use of those resources is even more encouraged as Team weaknesses are still trending. This is reflected by either a lack of business acumen, or simply too few members to fully drive the organization to commercial success.

Grant dollars recommended for funding in round 18 are \$1,150,000, a total dollar amount which is average.

¹ Since 'Phase 1 - Track A' (direct submission) is no longer an available proposal pathway; going forward Phase 1 Track A/ Track B will simply be referred to as 'Phase 1'.

Round	Approval Rate	\$\$ Recommended
1 (APR 2012)	35%	\$950,000
2 (AUG 2012)	52%	\$900,000
3 (DEC 2012)	44%	\$610,000
4 (JUN 2013)	30%	\$864,000
5 (FEB 2014)	46%	\$1,462,000
6 (JUN 2014)	39%	\$998,000
7 (OCT 2014)	57%	\$1,100,000
8 (FEB 2015)	37%	\$710,000
9 (JUN 2015)	31%	\$550,000
10 (DEC 2015)	38%	\$925,000
11 (APR 2016)	46%	\$1,239,000
12 (OCT 2016)	46%	\$3,537,269
13 (MAR 2017)	38%	\$1,567,500
14 (SEP 2017)	27%	\$498,832
15 (DEC 2017)	38%	\$2,250,000
16 (MAR 2018)	52%	\$2,098,600
17 (SEP 2018)	42%	\$2,100,000
18 (DEC 2018)	35%	\$1,150,000
Overall		\$23,510,201
Average	41%	\$1,306,122

Summary of Approvals

PHASE 1 PROPOSALS – THAT ARE RECOMMENDED FOR FUNDING

Proposal #	Lead Applicant	Title	State Funds Requested	Total Budget	Recommend
19-0216	CWRU	Phase 1 - TVSF - Pool of Funds	\$500,000	\$1,000,000	\$500,000

PHASE 2 PROPOSALS – THAT ARE RECOMMENDED FOR FUNDING

PROPOSAL #	Licensing Institution	Lead Applicant	PROJECT TITLE	State Funds Requested	Total Project Budget	Recommended
19-0218	The Ohio State University	Agile Ultrasonics Corporation	Commercial Scalability of Ultrasonic Processing of Composites	\$100,000	\$100,000	\$100,000
19-0222	The Ohio State University	Electronic Systems Incorporated	Hyperkalemia Sensor	\$150,000	\$150,000	\$150,000
19-0223	University of Akron	Hedgemon, Inc.	Hedgehog-Inspired Impact Protection Liner	\$150,000	\$150,000	\$150,000
19-0225	Air Force Research Laboratory	MAFAZO LLC dba Ignyte Assurance Platform	Cybersecurity Technology Development and Integration	\$100,000	\$100,000	\$100,000
19-0259	CWRU	CollaMedix Inc.	CollaSling	\$150,000	\$150,000	\$150,000

Proposal Recommendations - Phase 1 Summary Matrix

<i>PROPOSAL #</i>	<i>Lead Institution</i>	<i>PROJECT TITLE</i>	<i>Strategic Fit</i>	<i>Deal Flow; Budget Strategy</i>	<i>Project Selection</i>	<i>Selection Committee</i>	<i>External Participation</i>	<i>Project Management Strategy</i>	<i>Expected Licensing Outcome</i>
19-0216	CWRU	Phase 1 - TVSF - Pool of Funds							

DEFINITION OF PHASE 1 COLUMNS:

Proposal # – A unique OTF number for each proposal

Lead Institution – The Ohio Institution that is requesting funds

Project Title – The Project Title for the Request for Proposals Application Page

Strategic Fit - Strategic Fit with Institutional SWOT, evidence of past Phase 1 success rate or why new process will improve it.

Deal Flow; Budget Strategy - Quality and Quantity of Deal Flow. Budget is Strategically Suitable/ Commensurate with Given Process Strategy and Project Quantities.

Project Selection - Robust Project Selection Process

Selection Committee - Selection Committee Robustness and Composition (external majority; ESP/VC inclusion) and letters of support

External Participation - External Analysis of Project Submittals (ESP, etc.), and External (3rd Party Contractors/Collaborators) Project Activity Performance or Oversight

Project Management Strategy - Robustness of PM strategy/ process

Expected Licensing Outcome – Is this a Novel process? NewCo formation vs. YoungCo lic., Appropriate Quantities of each

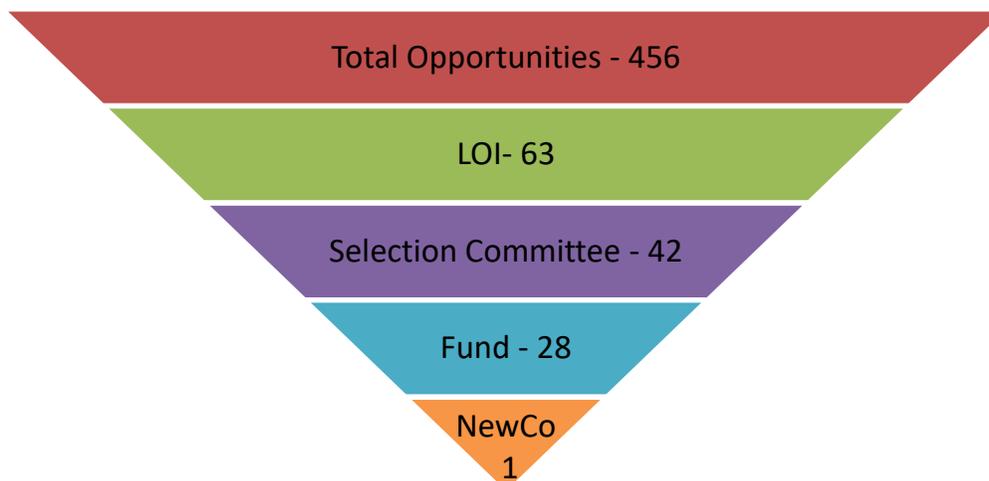
DETAILS OF PHASE 1 RECOMMENDATIONS:

Proposal 19-0216	CASE WESTERN RESERVE UNIVERSITY	<i>Phase 1 – Technology Validation Start-Up Fund – Pool of Funds</i>
Amount Requested: \$500,000	Recommended: \$500,000	
Prior Phase 1 Application(s):	17-0067, 18-0266	

19-0216	<i>Strategic Fit</i>	<i>Deal Flow; Budget Strategy</i>	<i>Project Selection</i>	<i>Selection Committee</i>	<i>External Participation</i>	<i>Project Management Strategy</i>	<i>Expected Licensing Outcome</i>
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Rationale: Applicant continues a Phase 1 Track B process that largely mirrors the TVSF model augmented with additional pre-vetting due diligence activity in the Institution’s Advancement Programs. To be eligible for funding, the project must be either vetted or funded by one of the 9 Advancement Programs of the University. The fund is intended to be the bridge between a translational research project and a viable commercial program. Interested qualified applicants submit a LOI, which is reviewed by the CWRU TVSF Program (CTP) Director to confirm eligibility. Qualified applicants are invited to submit the full proposal using the provided template. The Proposal, along with any additional pertinent materials, is provided to the Selection Committee. Using a rubric, each proposal is scored, and then discussed by the committee members. The top proposals are invited to provide an oral presentation to the Selection Committee. The Committee meets in executive session to decide who should be funded.

Over the last two years, this process resulted in the following results:



CWRU sees the success in the last year to be the creation of the of NervGen start-up company with 7 jobs created and follow on funding of \$2.8MM. The formation of additional new companies is hindered by the institution’s lack of access to entrepreneurial talent to lead Start-Ups.

Phase 1 post-project impact in terms of follow on funding leverage and creation of jobs for this program to date has been over \$12MM for \$1.6MM TVSF funds invested in 15 projects. The majority of that is in Federal grants (75%) with an additional \$2.1MM in equity investment.

TVSF Phase 1 Impact									
	Total TVSF Budget	Federal \$	State \$	University \$	ESP \$	Other non-dilutive \$	Equity \$	Total Follow on \$\$	Actual Jobs Created
	\$1,579,780	\$10,001,000	\$0	\$0	\$0	\$700,000	\$2,100,000	\$12,801,000	7
%		78%				5%	16%	100%	
Leverage factor		6.3				0.4	1.3	8.1	

The funds requested are \$500,000 for a program of \$1,000,000 to support 9 projects funded out of 30 applicants. Three of those funded projects are anticipated to mature into Start-up companies or license to young companies. Changes to the program from the prior proposal period include the following enhancements: (a) improvements in administration of the grant, (b) continuing to attract proposals outside of the Life Sciences and (c) increased faculty support to foster commercialization post project funding.

The proposal addresses all of the criteria for Phase 1 TVSF process and is recommended for funding.

Concerns which were not sufficient to preclude funding relate to Deal Flow, Project Selection, Project Management, and Expected Licensing. The vast majority of the Letters of Intent and funded projects are in the Life Sciences. Since the majority of Case resources (approximately 90%+) are related to life sciences this is not an extreme imbalance but still requires attention. This was discussed in the prior application and CWRU is continuing development of a strategy to increase the quantity and quality of traditional engineering applications, which are primarily constrained by a lack of local resources for vetting and funding those projects into the TVSF queue. Additional due diligence is needed to ensure Project Selection matches the intent and criteria for the TVSF program. Even though there have been significant successes around peripheral technologies with NervGen and Hemex Health, projects should be funded that more closely match TVSF subject matter topics and are near term with respect to time to market, with funds needed for commercialization readily achievable in that time frame. Project Management needs additional resources or processes to ensure that easily anticipated institutional delays in program funding and project progress are addressed prior to program inclusion. This is evidenced by the need for four of six (67%) projects needing an extension beyond the one-year deadline for completion. Although this is the most mature institutional Phase 1 program (third application), licensing outcome data is not quite available at this stage but should become evident for the next round. The above concerns should be giving due attention to remediation during this program time period. Should they promulgate into the next request for funding, they will likely be viewed less favorably in the evaluation process.

Proposal Recommendations - Phase 2 Summary Matrix

PROPOSAL #	Licensing Institution	Lead Applicant	PROJECT TITLE	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
19-0217	Air Force Research Laboratory	Agile Power LLC	Solid Electrolyte Battery	Red	Red	Yellow	Red	Yellow	Green	Green	Green	Green
19-0218	The Ohio State University	Agile Ultrasonics Corporation	Commercial Scalability of Ultrasonic Processing of Composites	Green	Green	Yellow	Green	Yellow	Green	Green	Green	Green
19-0219	University of Akron	Akron PolyEnergy Inc.	Polymer Binder for Silicon Anode based Lithium Ion Batteries	Yellow	Green	Yellow	Red	Yellow	Green	Yellow	Yellow	Green
19-0220	Air Force Research Laboratory	Constant Sentinel, LLC	Enhanced cloud computing security	Red	Red	Yellow	Red	Yellow	Green	Yellow	Green	Green
19-0221	The Ohio State University	Diamond Cybersecurity Inc.	DIAMOND	Red	Red	Yellow	Red	Red	Yellow	Green	Yellow	Green
19-0222	The Ohio State University	Electronic Systems Incorporated	Hyperkalemia Sensor	Green	Green	Yellow	Yellow	Yellow	Green	Green	Green	Green
19-0223	University of Akron	Hedgemon, Inc.	Hedgehog-Inspired Impact Protection Liner	Green	Yellow	Yellow	Yellow	Green	Green	Green	Green	Green
19-0224	CWRU	Lucid Diagnostics, Inc	Replacing Endoscopic Imaging with Non-Invasive Office Based Screening Test For Barrett's Esophagus	Red	Red	Yellow	Red	Red	Green	Green	Yellow	Yellow
19-0225	Air Force Research Laboratory	MAFAZO LLC dba Ignite Assurance Platform	Cybersecurity Technology Development and Integration	Green	Green	Yellow	Yellow	Green	Green	Green	Green	Green
19-0226	The Ohio State University	MedPro Analytics Inc	ClinMetrix	Red	Green	Yellow	Yellow	Red	Yellow	Green	Green	Green
19-0227	University of Toledo	PK BIMA LLC	Therapeutic GAGR Composition for Non-Invasive Bone Healing	Yellow	Red	Yellow	Red	Red	Yellow	Green	Yellow	Yellow
19-0228	University of Toledo	Psyneurgy Pharmaceuticals LLC	Preclinical development of a treatment for autism spectrum disorders	Red	Green	Yellow	Red	Green	Green	Green	Yellow	Green
19-0229	University of Toledo	Retractor, LLC	A minimally invasive rectal retractor for pelvic tumors radiation therapy	Yellow	Red	Yellow	Green	Green	Red	Green	Yellow	Green
19-0230	The Ohio State University	Tailored Technologies LLC	Reading RACES	Red	Green	Yellow	Yellow	Red	Yellow	Yellow	Green	Green
19-0231	Cleveland Clinic Foundation	Volotas LLC	Clinical Intelligence Platform	Green	Yellow	Yellow	Yellow	Yellow	Red	Green	Green	Green
19-0259	CWRU	CollaMedix Inc.	CollaSling	Green	Yellow	Green	Yellow	Green	Green	Green	Green	Green

DEFINITION OF PHASE 2 COLUMNS:

Proposal # – A unique OTF number for each proposal

Licensing Institution – The organization from which the Lead Applicant will negotiate Intellectual Property terms.

Lead Applicant – The Ohio start-up company that is requesting funds

Project Title – The Project Title as chosen by the applicant

Proof/ Likelihood to Raise Additional Funds – Are the proposed proof objective(s) sufficient to generate a saleable product, or to raise additional funds for commercialization? Will it be meaningful and impactful to that end?

Project Plan / Budget Narrative (Use of Funds) – Can the proposed proof objectives be generated during the one-year project period with the proposed resources? Is the Budget Narrative comprehensive for the objectives proposed, and is the use of funds appropriate for the objectives? Does the budget identify appropriate deliverable suppliers?

Team – Does the identified Team have sufficient experience, business acumen, and commitment to commercializing the new technology?

Business Model – Realism and achievability of the proposed business model

Company Backing – Is there evidence of financial backing and support, independent of the licensing institution?

IP Protection/ License with Ohio Institution – Is the intellectual property adequately protected, and does it shield the proposed business model? What is the impact of known competition on this IP? What is the applicant's prospect of executing a license with the Ohio institution within nine months of the date of the submission?

Opportunity/Market Size – Is the size of the potential market sufficient to provide a business opportunity for the applicant, regardless of any extant competition?

Start-up in Ohio – Does the Lead Applicant plan to maintain operations in Ohio? If so, does Ohio present an appropriate ecosystem for this technology?

ESP Interaction - Degree to which the applicant has partnered with local ESP to ensure robustness of business model and obtained objective input on project activities

DETAILS OF PHASE 2 RECOMMENDATIONS

Proposal 19-217	AGILE POWER LLC	<i>Solid Electrolyte Battery</i>	
Licensing Institution	Air Force Research Laboratory		
Amount Requested: \$100,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0217	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: The applicant proposes further development of solid-state electrolytes to potentially replace liquid electrolytes in lithium batteries. This new technology would eliminate safety concerns posed by liquid electrolyte lithium cells, which are prone to explosive and/or fiery failure when exposed to extreme heat or physical deformation. The applicant is developing another AFRL technology in parallel, a patent-pending ink which can produce layers of solid-state electrolytes which are 100 to 500 times thinner than conventional methods. The applicant envisions combining these technologies to create a cost-effective, safe and light weight battery product for aerospace, defense and consumer markets.

Solid state electrolytes have been studied as a replacement for liquid electrolytes for potentially greater energy densities and improved safety. Overcoming technical and economic challenges have hindered commercialization of the technology. If the applicant is successful in their development process the technology would likely find commercial applications, even at a higher price point than current liquid electrolytes, for applications that demand safer operations to avoid catastrophic situations (e.g. aerospace and defense).

The proposed plan and funding would be used to obtain customer input on design of form factors and production methods, purchase equipment and develop initial prototypes, finalize form factors and product specifications, conduct safety and performance testing, and commence manufacturing to realize first sales.

The review team found significant concerns related to Proof, Plan, and Business Model. The technology appears very early in its development cycle, with no evidence provided of a proof of concept. Similarly, the proposed proof points lack measurable objectives, which could include cost, weight, performance, etc. The applicant may not yet be aware of those objectives, as step one of the project plan is to gain input from customers. There was a lack of enumerated technical challenges in the project plan, including scale-up from small cells to commercial form factor, creating doubt as to whether the proposed timeline and budget are sufficient to address these unspecified challenges. The business model is vague, lacking a clear sales channel and providing no explanation of exponential revenue growth, which presumably penetrates beyond the initial identified market of man portable military applications. Competitive pressures from emerging technologies were not addressed in the proposal, casting further doubt on the projected revenue growth.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Additional Funds, Team, and Company Backing. While the proposal includes an anticipated equity raise it is unclear what trigger exists for investment, nor whether the potential investors are informing the proposed proof points for the project. No time commitments were specified for the team members, and no background information was provided for the CTO. The company does not appear to have any financial backing aside from unspecified amounts of self-funding; company is in discussions with investors.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding they need to obtain customer and/or investor inputs to inform the proposed Proof points and demonstrate clear and measurable deliverables for same. Evidence should be provided that proof-of-concept work has been conducted, beyond reference to theoretical calculations. If the technical challenges present in the proposed Project Plan are in fact minimal and would not require iteration, the applicant should state their rationale for that approach. Otherwise the applicant should address the challenges and present a plan to overcome them. The business model should be further specified, providing a description of the proposed sales approach and supporting data for the anticipated revenue stream.

Proposal 19-0218	AGILE ULTRASONICS CORPORATION	<i>Commercial Scalability of Ultrasonic Processing of Composites</i>	
Licensing Institution	The Ohio State University		
Amount Requested: \$100,000	Recommended: \$100,000		
Prior Phase 1 Application(s):	OSU, 16-0464*	Prior Phase 2 Application(s):	N/A

19-0218	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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*This proposal is an extension of the concept developed earlier in an approved Phase 1 proposal

Rationale: Applicant proposes further development of patent-protected processes and equipment to produce composite material products that are up to 10% thinner, lighter and stronger than existing products. Currently, composites are formed through consolidation of multiple, individual layers of material into a single composite. During that process air bubbles are often trapped, creating voids which can compromise the integrity of the final product. In the applicant’s initial target market of body armor, manufacturers compensate by adding material to the composite, making the materials thicker, heavier and more expensive than necessary.

The applicant will apply ultrasonic energy during their stack-and-horn assembly process, with the vibrations removing up to 99.9% of trapped air from between the layers of material. This process was proven and refined in a prior TVSF Phase 1 project. Therefore, the applicant is confident they can produce materials for body armor which is lighter and stronger and should meet with a ready market.

The proposed plan and funding would be used to purchase and install equipment to produce the industry-standard 63-inch scale composite. This equipment will be used for initial production and to achieve first revenue.

The proposal addresses all the criteria for the Phase 2 TVSF and is recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team, Company Backing, and IP. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. Although Company Backing has not yet been acquired, Rev1 is in the process of assisting the company in securing investments. IP rights have only been secured by the university for the domestic market, with foreign rights being in process. Initial market focus is on domestic defense, so this extant limitation should not pose an existential concern.

Proposal 19-0219	AKRON POLYENERGY INC.	<i>Polymer Binder for Silicon Anode based Lithium Ion Batteries</i>	
Licensing Institution	The Ohio State University		
Amount Requested: \$ 100,000	Recommended: \$0		
Prior Phase 1 Application(s):	UA*	Prior Phase 2 Application(s):	N/A

19-0219	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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*This proposal is an extension of the concept developed earlier in an approved Phase 1 proposal

Rationale: Applicant proposes further development of higher density lithium ion batteries with the intent of displacing existing lithium ion technology in the consumer, automotive and aerospace sectors. The applicant is focused on silicon-based anodes, which have the potential to significantly increase energy density, but have a tendency to fracture over repeated cycles. In small-scale lab cells, the applicants have demonstrated crosslinked polymer binder materials which limit expansion of the silicon anode under loading conditions. This would then allow for greater amounts of energy to be stored and increase the number of cycles, thus extending battery life.

If the applicant can continue to demonstrate performance improvement at larger scales, they should be able to solicit additional development support from potential industry partners. They then plan to pursue a blended model of manufacturing some components in house while also utilizing toll manufacturers where appropriate.

The proposed plan and funding would be used to scale up the battery from coin cell to pouch cell scale, which is the desired demonstration scale for the first targeted customers.

The review team found significant concerns related to Business Model. The anticipated time to market is approximately five years and there is some uncertainty around timing, which ultimately is predicated on customer reaction to the prototype work. Similarly, it is unclear at this point which market, whether consumer, automotive or aerospace, is the target. Requirements vary across market segments, sometimes significantly. The applicants did not provide insights on competing technologies which may be critical given the lengthy time to market. Last, there was no pro forma presented to demonstrate the applicant's ability to profitably capture market share.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Proof, Team, Company Backing, Market Opportunity, and Start-Up. Work is beginning prior to customer feedback that could alter the Proof points and, in turn, affect the plan and impact the Business Model. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. No external Company Backing exists, although the parent company has a commitment to backstop shortfalls in resources, including the CEO who is employed by the parent. The addressable market opportunity remains

undefined. Start-Up equity is approximately half with the parent company and half with the PI who is not a company employee. This could affect long term stability of the entity as an ongoing concern.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding, a pro forma financial statement should be included with supporting rationale and assumptions. While the review team appreciates the very real challenges faced by the applicant in anticipating customer behavior and reactions to their technology, additional efforts should be made to gain clarity. This could include letters of intent upon meeting certain milestones. These further discussions may also help the applicant decide on an initial target market. Attention should be given to the competitive landscape as it may look five years hence.

Proposal 19-0220	CONSTANT SENTINEL, LLC	<i>Enhanced cloud computing security</i>	
Licensing Institution	Air Force Research Laboratory		
Amount Requested: \$100,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0220	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: The applicant proposes further development of a software platform which leverages unique identifiers present in all smart phones to serve as a home security tool. The Constant Sentinel system can capture the unique smart phone identifier, add geographical location and time stamp and store the information. Theoretically, anyone carrying a smart phone within a property’s security perimeter could be identified and their movements tracked through this system.

The concept of tracking individuals using smart phone identifiers is not new and is increasingly common as a tool to track shopper movements and behaviors in retail settings. The applicant hopes to deliver this relatively proven technology into the large and evolving home security market which itself is increasingly leveraging the Internet of Things.

The proposed plan and funding would be used to build and test prototype units, create a website for customer interaction and finally produce a market-ready version.

The review team found significant concerns related to Proof, Additional Funds, Plan, Budget, and Business Model. It appears as though the technology is too nascent to be considered for funding. Specifically, there is no information or data provided on proof of concept versions, or for that matter a description of exactly how the technology would work, both technically and regarding consumer interface. The Proof lacks clearly measurable objectives, and even if those were present it does not appear that potential customers or investors informed those objectives. These factors play into concerns about applicant’s ability to raise Additional Funds, as specific milestones/metrics for investment have not been enumerated. The Plan is likely overly aggressive, as very little time is provided to address issues as they arise, and issues should be expected given the early stage of technical development. If alpha devices are deployed for testing in month six there is little time and money remaining to make significant changes. The Budget does not identify vendors, so the amounts listed may be estimates, reinforcing the perception that the Plan may be overly aggressive. The Business Model estimates a \$250 customer acquisition cost which, if correct, would result in acquisition costs that exceed the total revenue the company would generate during the first five years (15,500 customers x \$250 = \$3.875M). The hardware is being sold at near cost to gain market penetration, creating more pressure on the financial forecast. Another concern for the business model is the lack of a clear value proposition, i.e., how would this system reduce crime, is the customer expected to call 911 whenever a strange phone enters the security zone, is the data generated able to be used as evidence in a court of law, if this system or something comparable gains traction what would prevent subjects from turning off or leaving the phone elsewhere, etc.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team, Company Backing, IP and Market Opportunity. There are no time commitments defined for the Team. No financial Company Backing exists; though the company claims to be self-funded, sources and amounts were omitted. The IP to be licensed will be incorporated into the product offering, but it's unclear how or even to what extent the IP enables a clear product differentiation. The Market Opportunity is unclear, as there is no evidence that there is a strong customer pull for this type of product offering.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding the Business Model must be revised and assumptions confirmed. Applicant will need to better define the value proposition for the product and align that with proposed pricing, which ultimately needs to translate to profitable revenue. Additional development work, including a proof of concept, should be complete prior to resubmission. Proof points in a resubmission should include specific and measurable endpoints which should be informed by customer or investor needs. The project plan should specify vendors and provide Budget estimates based on firm, written quotes.

Proposal 19-0221	DIAMOND CYBERSECURITY INC.	DIAMOND	
Licensing Institution	The Ohio State University		
Amount Requested: \$100,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0221	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: Applicant proposes further development of software which identifies cybersecurity issues within a corporate network and prioritizes those issues by estimating both resources required to fix the issue and the potential cost exposure to the business if the issue is not fixed. The software has completed alpha testing, and the applicants target near-term paid beta rollouts.

While the cybersecurity field is quite crowded and has significant extant competition, the applicant claims better predictive modeling of vulnerabilities and prioritization of same which eases the administrative burden on C-Suite decision makers.

The proposed plan and funding would be used to address ‘must have’, ‘nice to have’ and ‘if there’s budget’ features. These tiered features are interwoven with paid beta rollouts, allowing the company to generate initial revenue while still refining the product.

The review team found significant concerns related to Plan, Budget, Business Model, and Company Backing. The Plan should not include anything beyond the ‘must have’ features because at that point the company is generating revenue on a commercial product. Requested funds should be for mandatory product features. The Budgeted amounts are estimates which are not based on firm quotes from identified vendors. Further, the Budget should account for product revenues obtained during the project period which should be used as matching funds during the development cycle. The Business Model presented in the TVSF application is a ‘worst case’ scenario misaligned with the grant application narrative, which created challenges for the review team in determining financial viability. While the applicants explained they were trying to be conservative in their estimates (which in itself is appropriate) the stated rate of customer acquisition in the narrative does not align with the presented pro forma. And under the conservative scenario presented virtually no money is allocated for salaries in the first three years, which seems impractical. During the interview Rev1 explained they were working with applicant to possibly refine the Business Model from direct customer sales to a B2B approach which would sell the product through other, established cybersecurity firms. The review team agrees this approach has merits, but again would present a misalignment with the stated approach in the application. There is no Company Backing at this point, with additional funds expected through the paid beta sales. There does not appear to be any contingency for working capital leveraging other sources.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Proof, Team, IP, and Start-Up. The Proof objectives are not fully measurable. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. Percent time commitment is undefined. IP License intent not stated in application. Evidence supporting the need for and the long-term viability of a Start-Up was not clearly stated.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding, the proposal should include a 'likely case' scenario for both revenue and costs to allow for proper evaluation within the pro forma. A decision should also be made, prior to resubmission, as to whether the applicant will pursue direct sales, B2B relationships, or both. The decision should be reflected in the pro forma. Should the applicant decide to pursue paid beta launches during the project period the associated revenue should be accounted for and offset in the funding request. Applicants should take care to differentiate costs for 'must have' v. 'nice to have' features; if money for features with lower priority is requested in the budget, applicant should provide a rationale for the request. Applicants should be able to address their contingency plans to obtain working capital if the anticipated beta rollout does not go as expected.

Proposal 19-0222	ELECTRONIC SYSTEMS INCORPORATED	<i>Hyperkalemia Sensor</i>	
Licensing Institution	The Ohio State University		
Amount Requested: \$150,000	Recommended: \$150,000		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	19-0164

19-0222	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: This proposal is a resubmission of 19-0164, which addresses the prior concerns.

The applicant proposes further development of a device that can continuously measure in vivo the concentration of potassium in the blood of in-hospital patients known to be suffering from hyperkalemia (excessive concentration of potassium ions in the blood) or thought to be in danger of developing hyperkalemia.

Currently, hyperkalemia is detected with a test on a blood sample in the hospital laboratory, but this detection method is sporadic, moderately expensive, and subject to undesirable delays (typically, two hours). The initial product is a tiny real time conductive polymer coated subcutaneous wire (50µ x 2mm), and to be refined in the future as a bloodstream catheter insert for even faster readings. The probe has ion selectivity based on the chosen electrical input. This allows for more accurate measurements and real time treatment. Further, it minimizes the risk of over treatment for the condition. Applicants intend a 510K regulatory path and have a reimbursement code.

The proposed plan and funding would be used to create the commercial prototype, hire an FDA consultant, and perform animal testing of the system.

The proposal addresses all the criteria for the Phase 2 TVSF and is recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team, Business Model, and Company Backing. The Team will need ongoing and increased interaction with their stable of business advisors. The Business Model pricing doesn't fully capture the potential value of the technology and integration with hospital sensor suite will add technical complexity. Although Company Backing is in progress, firm commitments have not been secured.

Proposal 19-0223	HEDGEMON, INC.	<i>Hedgehog-Inspired Impact Protection Liner</i>	
Licensing Institution	University of Akron		
Amount Requested: \$150,000	Recommended: \$150,000		
Prior Phase 1 Application(s):	UA*	Prior Phase 2 Application(s):	N/A

19-0223	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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*This proposal is an extension of the concept developed earlier in an approved Phase 1 proposal

Rationale: Applicant proposes further development of a patent-pending material protection and personal protection platform inspired by the quills used by hedgehogs in the wild to protect against falls. The polymer elements in the system extend from a support surface, and when struck an omnidirectional cascade is initiated which reduces linear and angular acceleration. While this technology could be applied in a myriad of applications, the applicant has chosen to pursue football helmet liners as the first target market.

To date the applicant has demonstrated improvements in the football helmet liner market despite using sub-optimal 3D printing process to create the liners, as more robust injection molded parts are cost prohibitive. Initial feedback from major helmet suppliers has been quite positive and the applicant is confident they have a clearly differentiated product.

The proposed plan and funding would be used for design refinement, creation of injection molding processes to allow for more consistent performance improvements, and industry-standard testing as specified by major helmet manufacturers.

The proposal addresses all the criteria for the Phase 2 TVSF and is recommended for funding.

Concerns which were not sufficient to preclude funding relate to Budget, Team, and Business Model. Applicant will need to work with Development to ensure program Budget rules are followed with respect to intern contracting. The Team lacks business acumen and should augment with an associate or advisor with extensive experience related to fund raising, product value maximization, and strategic planning to ensure long term viability as an ongoing concern. Business Model path decision should be confirmed with the aid of the above advisor with respect to in house manufacturing versus serial product development.

Proposal 19-0224	LUCID DIAGNOSTICS, INC.	<i>Replacing Endoscopic Imaging with Non-Invasive Office Based Screening Test For Barrett's Esophagus</i>	
Licensing Institution	Case Western Reserve University		
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	14-407*	Prior Phase 2 Application(s):	19-0169

19-0224	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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*This proposal is an extension of the concept developed earlier in an approved Phase 1 proposal

Rationale: This proposal is a resubmission of 19-0169, which does not fully address the prior concerns.

Applicant proposes obtaining FDA clearance of a new device and CLIA (Clinical Labs Improvement Amendments) certification of a new test to enable early detection of Barrett’s esophagus (BE) with a simple office-based semi-invasive test.

The technology consists of a vitamin sized silicone-covered capsule containing a small, deflated balloon attached to a catheter. In an office-based procedure performed by a nurse, the patient swallows the capsule until it reaches the stomach, after which the balloon is inflated with air and gently withdrawn, swabbing the lower esophagus for cells. During capsule withdrawal, the balloon is deflated, pulling the sampled cells into the capsule, which protects them from dilution or contamination as it passes through the upper esophagus and mouth. The balloon is removed from the catheter, placed in a vial with liquid media and sent to a reference laboratory for analysis of the cytosine methylation of two genes – vimentin and CCNA1, which are known to be associated with cancerous and precancerous tissue.

The proposed plan and funding would be used to gain FDA clearance, garner CLIA certification, launch the commercial product, and perform human clinical validation.

The review team found significant concerns related to Proof, Additional Funds, Budget, Business Model, and Company Backing. The key Proof point identified by the applicants is the 510(k) submission of the balloon cell-sampling device. The applicant states that upon completion of this milestone, additional equity can be raised, but the milestone itself will cost \$750k, and despite placeholders for cost share in the application there are no cost share funds committed or in hand. The specific tasks to be completed with TVSF money were not identified and could not be evaluated for appropriateness. The applicant both claims strong support from PAVmed (primary holder of company equity) as a backstop for funds and lack of support from PAVmed as justification for funding request. The Business Model was not demonstrated through a basic pro forma. Additional Funds may only be obtained if an additional \$650k can be raised from as-yet uncommitted non-dilutive grants. The Business Model lacks enumeration of basic financial information.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team, Start-Up and ESP. The applicant does provide justification for an Ohio Start-up, but as the New York entity PAVmed owns 82% of the

applicant's equity and is currently running the company, concerns remain. The management Team is employed by parent company. ESP interaction appears to be minimal.

Recommendations for Improvement: As noted in prior feedback an appropriate path for applicant would be to continue to pursue alternate funding sources, if possible. If the applicant decides to reapply, the TVSF work proposed in the project plan must be broken out separately from the other work being conducted. Any proposed cost share must be in hand with sources and amounts specified. Clarity is also needed on whether PAVmed is a backstop with committed support or not, and efforts should be made to quantify the level of support to provide clarity to the matching funds. More detail is needed on the Business Model, including revenues, costs, time to market, distribution and manufacturing, etc. Additional interactions with the ESP may help the applicant understand the nuances of the TVSF program regarding funding and budgets.

Proposal 19-0225	MAFAZO LLC DBA IGNYTE ASSURANCE PLATFORM	<i>Cybersecurity Technology Development and Integration</i>	
Licensing Institution	Air Force Research Laboratory		
Amount Requested: \$100,000	Recommended: \$100,000		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	19-0170

19-0225	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: This proposal is a resubmission of 19-0170, which addresses the prior concerns.

Applicant already has software that has been developed to provide the necessary data and reporting for compliance management to multiple standards (HIPAA, FISMA, NIST RMF). They propose integration of two AFRL software technologies (malware protection and access control) into their product offering. These are natural extensions of the applicant’s software suite. The malware protection software uses forms of encryption that create a ‘moving target’ which reduces malware systems infiltration ability. The access control technology provides a three-factor approach to data/file security.

The proposed plan and funding would be used to design the user interface, develop core features, and test user acceptance and software performance.

The proposal addresses all the criteria for the Phase 2 TVSF and is recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team and Business Model. The CEO continues to show a lack of business/financial acumen but was receptive the reviewers’ advice and added several business advisors to the Team including a CFO. Existing resources are insufficient to allow for planned growth. A projected cash shortfall pending an equity raise would require delay in hiring staff and expanding marketing efforts. Since this IP seems to hold unique features in the industry and presents a large market opportunity, it appears that the start-up is not able to fully capture the technology’s commercial potential. While there is one ready customer to provide initial revenue the growth projections are unremarkable.

Proposal 19-0226	MEDPRO ANALYTICS INC	<i>Real-Time, Fused Holographic Visualization for Ablation of Cancerous Tumors</i>	
Licensing Institution	The Ohio State University		
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0226	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: Applicant proposes further development of a software platform, ClinMetrix, which integrates data from a hospital’s electronic medical records and human resource systems to provide dashboards for Advanced Practice Providers (APPs, e.g., Nurse Practitioners and Physician Assistants). A minimally viable, spreadsheet-based product has been in use at the OSU Comprehensive Cancer Center for four years and has been well-received, with applicant claiming a significant reduction in turnover. The benefits are realized by better accounting for APP time and activities, balancing workloads and ultimately reducing burnout.

The proposed plan and funding would be used to refine business model assumptions, gather system requirements at a second OSU hospital, and to develop and deploy the alpha product within OSU.

The review team found significant concerns related to Proof and Company Backing. The Proof point of an alpha system is necessary, but not necessarily sufficient if deployed within OSU. OSU does not intend to become a paying customer and is already supportive of the product, so requirements, milestones and deliverables from potential paying customers and/or investors should inform Proof points. There is no Company Backing at this point and no clear plan to obtain same.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Additional Funds, Team, Business Model, and IP. It appears unlikely the company can raise Additional Funds upon completion of the work as customer needs outside of OSU are not yet well-understood. The three-person Team plans to dedicate less than one FTE to this effort, and the CEO lacks C-suite experience. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. The Business Model would benefit from customer discovery beyond OSU, and it’s unclear why other major health systems in Ohio have not yet been approached for input. The applicants appear to have assumed that Year One revenue would come from OSU but during the in-person interview the TCO representative clearly stated OSU is not yet ready to become a paying customer. Similarly, there have not been any substantive licensing negotiations for the IP. A decision has not yet been made as to whether to keep the IP as trade secret or file for patent protection.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding, the proposed Proof point must directly link to first revenue or a capital raise. To enable that applicant should engage with investors and non-OSU customers to inform proof point and validate business model assumptions, with an additional goal of securing Company Backing to support growth.

Proposal 19-0227	PK BIMA LLC	<i>Therapeutic GAGR Composition for Non-Invasive Bone Healing</i>	
Licensing Institution	University of Toledo		
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	17-0355*	Prior Phase 2 Application(s):	N/A

19-0227	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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*This proposal is an extension of the concept developed earlier in an approved Phase 1 proposal

Rationale: The applicant proposes further development of a new compound called GAGR, which has been demonstrated in an animal model to be superior to currently-used compounds for bone healing following surgery, injury or disease. GAGR will compete against bone graft substitutes like bone morphogenic proteins and is expected to be superior due to fewer injections required, no serious (tumorigenic) side effects, and lower manufacturing costs.

The completed Phase 1 work demonstrated a marked increase in formation of cortical (hard outside wall) bone in female rats with severe osteoporosis.

The proposed plan and funding would be used to further refine the compound, test the compound in a rat model to compare its efficacy with that of commercially available alternatives, conduct a pilot clinical trial in human subjects, and begin preparation of a 510(k) application to the FDA.

The review team found significant concerns related to Budget, Business Model, Company Backing, and IP. The Budget clearly states that the applicant will pay four part-time employees to work on the project, which is not allowed under program rules. The dollar amounts in the two budget tables are inconsistent. Another significant portion of the Budget will be spent within the licensing institution. The Business Model contains no financials to demonstrate timing of revenue, cash flow, etc. There is no Company Backing at this stage. There is a mismatch in IP license timing; applicant states licensing is to be after 510K approval which is a post project objective.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Additional Funds, Plan, Team, Start-Up, and ESP. The applicant appears overly reliant on obtaining Additional Funds via speculative grants to continue development post-project. It appears that the Plan duration is 15 months unless some objectives are concurrent. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. Percent time commitment for the Team is not defined and members are listed as ‘interim’ with no long-term plan identified. This technically-adept Team would benefit from addition of a CEO or committed business advisor to provide business acumen and fundraising experience. The Start-up company was formed over five years ago and was recently re-named for this venture. ESP interactions were not well described, and while an EIR is mentioned it is unclear what role the EIR has taken with the company.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding they need to work with Development and their ESP to align the proposed budget to program requirements. The Business Model must include financial projections including costs for go-to-market distribution and manufacturing partners, revenue estimates and timing, etc. Company Backing must be addressed in more detail than a list of potential grants which could be obtained; investor input should be sought. Applicant will need to work with the institution and Development to ensure the timing of IP licensure occurs within the constraints of the program rules.

Proposal 19-0228	PSYNEURGY PHARMACEUTICALS LLC	<i>Preclinical development of a treatment for autism spectrum disorders</i>	
Licensing Institution	University of Toledo		
Amount Requested: \$100,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0228	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: The applicant proposes further development of a small molecule candidate pharmaceutical which holds promise as a treatment for Autism Spectrum Disorder (ASD). The mechanism of action is activation of brain receptors which enhance cognitive flexibility, a trait notably lacking in ASD individuals. The compound has undergone testing for effect in rats and was also found safe and well-tolerated in healthy human volunteers. A study published in 2012 described how administration of this small molecule to rats increased their willingness to explore new areas of a maze with food rewards at the end. The applicant hypothesizes that this drug candidate will reduce ineffectual repetitive behaviors in ASD patients, thus improving their ability to learn and to interact appropriately with others.

The proposed plan and funding would be used to synthesize the active pharmaceutical ingredient (API), formulate the API into an extended release tablet formulation, develop the clinical protocol for a Phase IIA study to provide the rationale for the compound's effects and to measure its suitability as a drug. The final step in the plan is to apply for designation of the compound as an Investigational New Drug (IND).

The review team found significant concerns related to Proof and Business Model. The technology is too nascent and is also not a good fit with the TVSF program with respect to the extensive time and investment needed to get to market, as well as the inherent risks of translational medicine. The Business Model lacks enumeration of the basic business financials. The applicant has no plans to commercialize the technology themselves, but rather license out.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Additional Funds, Team, and Start-Up. Additional Funds are possible but not ensured based on the proof objectives. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. It consists of the PI with an unknown time commitment and two graduate students. All lack sufficient business acumen to carry an ongoing concern to long term success. License out is the likely path to market which lessens the need for a Start-Up and lowers the ROI for Ohio.

Recommendations for Improvement: Development of candidate pharmaceuticals is in most cases not a good fit for the TVSF program for reasons already mentioned: timelines, costs, risks and lack of ready investors early in the development cycle. Should the applicant wish to reapply, a clear and compelling rationale should be presented to demonstrate why this particular molecule is an exception, i.e., why the

reasons for misalignment with TVSF don't apply. A business model with some financial detail should be laid out which must account for the go-to-market strategy (license, in-house, etc.)

Proposal 19-0229	RETRACTOR, LLC	<i>A minimally invasive rectal retractor for pelvic tumors radiation therapy</i>	
Licensing Institution	University of Toledo		
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	17-0064, 17-0356	Prior Phase 2 Application(s):	18-0230, 18-0472

19-0229	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: This proposal is a resubmission of 18-0230 and 18-0472, which does not fully address the prior concerns. Applicant proposes further development of a device that moves the rectum away from the prostate during radiation therapy for cancer of the prostate and other pelvic organs, thus reducing exposure of the rectum to radiation damage.

External beam radiation therapy customarily employs a variety of methods intended to maximize irradiation of the cancer while minimizing irradiation of surrounding normal tissue. Such methods include shaping the beam with filters, rotating the source around the patient to minimize adjacent tissue exposure, fractionating the dose in a series of treatments that allow healthy tissue to heal in the intervals between treatments; and tracking movement of the target area to guide the beam so that it remains aimed at the tumor during patient movements. Although these methods help to avoid damage, they do not eliminate it. This problem is significant in the case of prostate cancer because the rectum, which is highly sensitive to radiation damage, lies immediately behind the prostate.

The proposed device is a rod made of nitinol (an alloy of nickel and titanium), which has the remarkable property of shape memory, that is, the ability after deformation to return to its original shape when heated. The rod in its straight configuration would be inserted in the rectum, then heated electrically so that it deforms to its bent shape, thus moving the rectum away from the prostate. In addition, for this submission, the design has evolved to include a balloon activated bifurcated tip that is intended to allow the rod to bypass the Coccyx when deflected in that direction. An additional patent application has been filed for the intended field of use.

The proposed plan is to: assess the functionality of the device, set-up GMP fabrication, and prepare for FDA submission.

Proposed funding would be used to: set up internal quality system and 3rd party fabrication and assess the functionality in vitro and in vivo at NAMSA followed by discussions with the FDA.

The review team found significant concerns related to Plan, Budget, and IP. The device has been changed with the addition of the split end without any modifications to the project Plan or Budget to reflect those changes and any impact they may have on the objectives. The IP still has a marked weakness, as off label use of existing devices (e.g. esophageal retractors) can easily circumvent any protection, and the new patent application is not certain to be approved. The review team agrees there is a need for a functional retractor in this space but remains unconvinced that this particular device will dominate that niche.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Proof, Team and Start-up. Proof points lack measurable objectives. Team time commitment is not defined in this application and may remain insufficient to ensure long term company success. There may not be sufficient opportunity to sustain a start-up with only this one product and a license/exit remains a strong possibility.

Recommendations for Improvement: Should Retractor, LLC choose to reapply for TVSF funding, the proposal must account for product design changes and their impact on the plan objectives, budget, and path to market. Further provision of support regarding how the Business Model ensures the viability of the technology to support an ongoing concern in spite of available IP work arounds; and details of the team commitment to push the technology into the market. A robust rationale for return on investment for the State of Ohio, as a non-equity partner, should be provided.

Proposal 19-0230	TAILORED TECHNOLOGIES LLC	<i>Reading RACES</i>	
Licensing Institution	The Ohio State University		
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0230	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: Applicant proposes further development of a software package to assist students from kindergarten through 3rd grade with reading development. The claimed advantages of the software are speech recognition software and culturally relevant (to the student) learning content. The design is intended to deepen the engagement of the student and allow for language development. The software will provide real-time feedback to teachers that is standard-based and connected with instructional strategies.

The product has already completed a full alpha phase which demonstrated significant improvements in reading scores versus control.

The proposed plan and funding would be used to develop a robust beta version of the software and implement pilot testing in Columbus-area schools.

The review team found significant concerns related to Additional Funds and Company Backing. Product sales may not occur given the lack of specificity by the customers as to what they would need to see to commit to buying the product based on performance. The applicant stated during the in-person interview that a pilot of another reading software platform has been ongoing for nearly 1.5 years. Without agreed-upon milestones or triggers for purchase Additional Funds may not be available. As there is no Company Backing at present that places the company’s future in doubt.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Proof, Team, Business Model, IP, and Market Opportunity. There are no metrics for some critical Proof points, e.g., speech recognition error correction, and the level of grade improvement in pilot reading scores which would drive actual purchase. The Team lacks IT experience and business acumen. The Team should leverage Rev1 talent to help them develop a strong marketing plan for the educational software market and to help them better articulate their value proposition in a crowded market. The Business Model is plausible but unrealistic, overestimating SOM in Columbus and lacks a thoughtful approach to penetrate markets in which the applicant does not have personal contacts. The costs in the Business Model need justification, e.g., very low technical support budget, unclear sales force costs, lack of anticipated product development costs. The IP is protected by copyright only. Last, the Market Opportunity is uncertain; despite clear evidence there is a need to improve reading comprehension, slow uptake of existing software offerings cast doubt on the market potential.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding, alignment must be obtained from pilot customers as to 1) specific endpoint which would drive purchase, 2) timing of the pilot with an end date, and 3) non-binding agreement on number of licenses to be purchased if endpoints are met. Applicant should be pursuing Company Backing by engaging with investors or other funding sources; amounts and conditions for investment must be detailed. The Business Model should be subjected to scrutiny by third party advisors. The value proposition should be refined to clearly differentiate the product versus extant competition.

Proposal 19-0231	VOLOTAS LLC	<i>Clinical Intelligence Platform</i>	
Licensing Institution	Cleveland Clinic Foundation		
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0231	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: Applicant proposes further development of a patent-protected Clinical Intelligence Platform (CIP) software suite, which is intended to be sold to hospitals for the management and improvement of inpatient encounters. The CIP retrieves structured and unstructured clinical information from electronic medical records to identify opportunities for increased reimbursement to the hospital. During the pilot, coding optimization through the tool has increased identification of patient complications by 10%, leading to increased reimbursement on 400 discharges per month of \$7,600 per case. The tool reportedly increases productivity for coding teams by 5x.

As the system is fully developed at this point, the proposed plan and funding would be used to support deployment at the first customer.

The review team found significant concerns related to IP License. The terms of the license from the institution are sufficiently onerous as to prevent the company’s ability to raise additional funding. This includes the lack of exclusivity, which is a program requirement. During the in-person interview a JumpStart representative confirmed that the extant licensing terms have discouraged them from considering investment at this stage.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Budget, Team, Business Model, and Company Backing. The costs of implementation are high, offsetting customer revenue and necessitating additional capital from TVSF to mitigate the lack of external investment interest. The Team is relatively lean to ensure the long-term success of an ongoing concern and will need to be augmented as the business grows. The Business Model is complicated as it is based on a contingency reimbursement of a portion of the customer’s savings from use, lacks an understanding of the expected reconciliation rate, and as a result has the potential for disagreements on remuneration due. Revenue is anticipated to be high, however net margins are below expectations in this sector. Company Backing is nonexistent and as mentioned above cannot be obtained. However, mitigating this factor is the existence of paying customers.

Recommendations for Improvement: Should applicant choose to reapply for TVSF funding refinement of the licensing terms are critical. The license must be exclusive to align with program requirements, and the terms should allow the applicant to attract the needed capital to enable growth. The business model assumptions should align with applicant’s intent, which is to convert customers to a standard SaaS model after proof of concept. Cost assumptions should be revisited including what appears to be excessive SG&A.

Proposal 19-0259	COLLAMEDIX INC.	<i>CollaSling</i>	
Licensing Institution	Case Western Reserve University		
Amount Requested: \$150,000	Recommended: \$150,000		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

19-0259	Proof/Addtl Funds	Project Plan/Budget	Team	Business Model	Company Backing	IP Protection/ License	Opportunity / Mkt. Size	Start-up in Ohio	ESP Interaction
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Rationale: Applicant proposes further development of a collagen sling to support the neck of the bladder and urethra of women who suffer from stress urinary incontinence (SUI). There is a well-established market for polypropylene meshes which function identically to the product under development, however, those meshes have a long history of complications and key opinion leaders have expressed interest in safer alternatives. The collagen in the sling is electrocompacted and, as a natural product, is readily infiltrated with blood vessels and scar tissue while the collagen scaffold is gradually absorbed. It is expected, therefore, that the sling would greatly reduce or eliminate complications experienced with the mesh products, like encapsulation, migration and chronic inflammation.

The proposed plan and funding would be used to refine the regulatory strategy, conduct a pre-submission meeting with FDA, produce collagen threads, test for biocompatibility and test sterilization protocols.

The proposal addresses all the criteria for the Phase 2 TVSF and is recommended for funding.

Concerns which were not sufficient to preclude funding relate to Budget and Business Model. The budgeted supplies expenses were not tied to individual Plan objectives. Applicant will need to work with Development to ensure all program rules are followed with respect to expenditures. The Business Model has risk in that there is a long duration of five to six years before profitability.

Final Summary

The Review Team is recommending the Phase 1 proposal (100%), but with clear concerns which should be addressed prior to the next renewal request. The Review Team is recommending five of the 16 Phase 2 proposals (31%) for an overall approval of 6 of the 17 (35%). Based upon the historical averages from 17 previous, rounds, the 35% is below average. The previous low was 27% in Round 14, and the high was 57% for Round 7. With the Ohio Third Frontier accepting proposals on an approximate quarterly basis, the Review Team expects that many of the proposals will be revised to address the concerns of the review team.

Proposals which were recommended for funding did not have a “fatal flaw” in the proposal. The “fatal flaw(s)” are described in the reviewers’ comments in the previous sections and readily identified as red in the charts at the beginning of the each of the phase reviews. The recurring deficiencies are in Business Model with 7 fatal flaws, closely followed by Proof and Budget with 5 deficiencies each. Team is also trending weaker with 15 of 16 applications being marginal.

Appendix A - Corporate Background



Quantum Commerce, an Ohio Limited Liability Corporation, was founded in 2008 to provide consulting and services in the areas of quality, entrepreneurship, staffing, and advanced polymeric chemistry solutions. For almost a decade, the principals have been reviewing proposals, leading projects helping young entrepreneurial companies obtain financial sustainability or certifications such as ISO 9001, and providing advanced chemistry solutions for the construction services industry.

Quantum Commerce Profile:

- Quality
- Entrepreneurship
- Advanced Chemistry
- Project Management
- Six Sigma Process
- Strategic Business Consulting

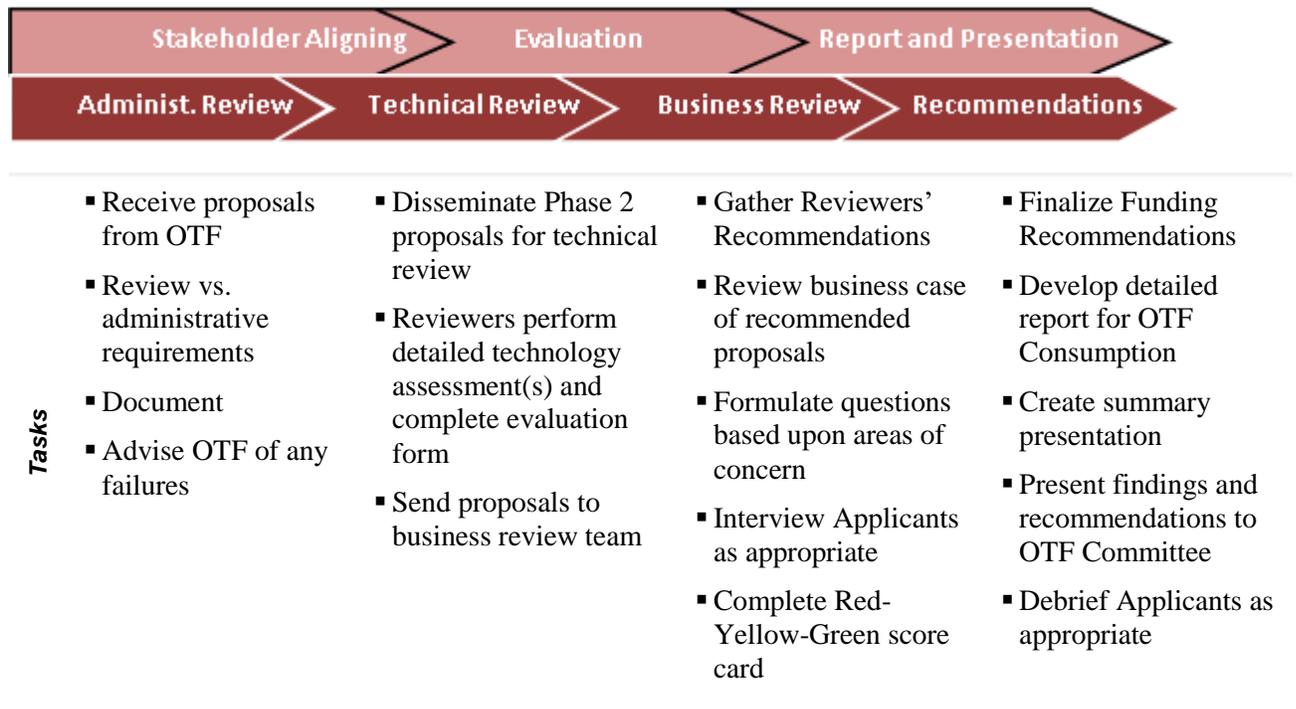
Quantum Commerce understands the unique needs and challenges startups. Quantum Commerce was founded by Camille Rechel and Greg Workman to provide business leadership, principally to young companies. Since inception, Quantum Commerce has generated profitability every year.

The principals are flexible in their methodology yet structured by principles such as Six Sigma. In some cases, they operate as President and CEO (construction services provider), as contractors and business mentors (strategic business consulting), or as owner/Senior Executive (technical staffing/ placement). Quantum Commerce utilizes additional contractors or consultants as needed to supplement expertise.

The Principals of Quantum Commerce are Camille Rechel (CEO) and Greg Workman (President). They have teamed with Robert Worden for this project. This team is uniquely qualified to review the TVSF proposals because the principals have been responsible for winning the prior TVSF contracts, and for designing and executing the existing evaluation process, as well as its evolutionary modifications to match program adjustments over the last seven years. Collectively, they have designed and executed all the TVSF reviews to date including the scoring mechanism, the interviews, the reports and the presentations to the commissioners. This team was also responsible for Project Management and proposal reviews for the Technology Commercialization Center (TCC) Program.

Appendix B - Overview of methodology

The figure below provides the high-level summary of the review process. In short, the Project Manager receives the applicant proposals and distributes them to one highly specialized technical reviewer and 3 business reviewers. The reviewers complete pre-defined scorecards which are based upon the TVSF proposal criteria. As appropriate, those likely to garner funding recommendations then proceed to the interview phase. Subsequent to the review process, the Project Manager and Business Reviewers make final determinations as to recommendations for funding, advise Development of the recommendations, prepare the written detailed report and presentation for the commissioners. After approval by the commissioners, the business reviewers will debrief the proposal applicants that did not receive funding, as preparation for potential reapplication.



Triage: This process initially gathers and filters all submissions, engages the appropriate subject matter experts to assess the technologies/firms. Based upon successful past experience, Quantum Commerce then engages appropriate SME's relevant to the precise focus of each Phase 2 proposal. SMEs, who have specific technical expertise for the proposal topic, will be selected by the Project Manager. Quantum Commerce improves the robustness of the reviews by utilizing a broad range of Subject Matter experts. Quantum Commerce utilizes the resources of the consultants that they have engaged in the past, augmented by the database of their technical staffing sister company. Combined, these represent an available talent pool of nearly 1,000 technical and business professionals to enhance the review process. As has been the historical model of TVSF evaluation, SMEs will be titrated into the process on a per proposal basis, as needed for their area of expertise.

Review: The Phase 1 proposals are sent to the business reviewers for their input on a scorecard based upon the criteria for the proposals. Phase 2 proposals are first sent to the Technical Reviewers with their

own evaluation form. Completed Technical Review Reports are forwarded to the Business Reviewers for consultation during their evaluation scoring.

The key criteria are outlined in the lists below.

Phase 1 Key Evaluation Scorecard Criteria

- What is the Strategic Fit with Institutional SWOT, evidence of past Phase 1 success rate or why new process will improve it?
- Quality and Quantity of Deal Flow. Budget is Strategically Suitable/ Commensurate with Given Process Strategy and Project Quantities.
- Robust Project Selection Process
- Selection Committee Robustness and Composition (external majority; ESP/VC inclusion) and letters of support.
- External Analysis of Project Submittals (ESP, etc.), and External (3rd Party Contractors/Collaborators) Project Activity Performance or Oversight
- Robustness of both the project management strategy and process
- What is the expected licensing outcome – New Company formation vs. Young Company license. Appropriate Quantities of each. Is this a Novel process?

Phase 2, Key Evaluation Scorecard Criteria

Phase 2 Business Reviewer Criteria:

- Does the identified Team have sufficient experience, business acumen, and commitment to commercialize the new technology?
- Business Model – Realism and achievability of the business model
- Is there evidence of financial backing and support, independent of the licensing institution?
- IP Protection/ License with Ohio Institution – Degree to which the intellectual property is protected relative to both the technology and the proposed business model and the applicant’s ability to execute a license with the Ohio institution within nine months of the date of the submission.
- Is the size of the potential market sufficient to provide a business opportunity for the applicant?
- Is the business plan to maintain operations in Ohio? If so, does Ohio present an appropriate ecosystem for this technology?
- To what degree has the applicant shown partnership with their local ESP, to ensure objective project input and business model robustness?

Phase 2 Technical Reviewer Criteria (includes business questions from the specific technology viewpoint)

- Are the proposed proof objective(s) sufficient to generate a saleable product, or to raise additional funds for commercialization? Will it be meaningful and impactful to that end?

- Can the proposed proof objectives be generated during the one-year project period with the proposed resources?
- Is there a strong likelihood of being able to raise additional commercialization funds at the end of the Project?
- Does the identified Team have sufficient experience and commitment to commercializing the new technology?
- Is the proposed business model realistic and achievable?
- Is there evidence of financial backing and support, independent of the licensing institution?
- Is the intellectual property adequately protected, and does it shield the proposed business model? What is the impact of known competition on this IP?
- Is the size of the potential market sufficient to provide a business opportunity for the applicant?
- Is the Budget Narrative comprehensive for the objectives proposed, and are the use of funds appropriate for the objectives? Does the budget identify appropriate deliverable suppliers?
- Is the business plan to maintain operations in Ohio? If so, does Ohio present an appropriate ecosystem for this technology?
- Does the proposal indicate that an exclusive license will be executed with the Ohio institution, within nine months of the date of the application?
- Does proposal state that aborted fetal tissues will NOT be utilized?
- After evaluating the proposal, what questions remain that would assist in making a final technical recommendation?

Interview: The Report Writer and Business Reviewers then will meet to review all comments, discuss each proposal, and form their questions for the interviews. Phase 1s have the opportunity to respond to one round of written questions prior to the interview. Quantum Commerce believes that the interviews should be conducted in a neutral, professional manner so that any concerns with the proposals have the opportunity for explanation, but not in a way that is too casual. Done properly, the interview not only provides the reviewers with the necessary information about the applicants' business acumen, but also provides the proposal applicant with valuable experience which will assist them with future venture capital fund raising interviews.

Report: After each interview, the Business Reviewers/Report Writers agree and complete the Red-Yellow-Green Score card with rationale for each criterion. This forms the basis for the recommendation for funding. The results are communicated to the representative of the state. The detailed report for the Commissioners is written and the synopsis PowerPoint presentation is created. These are the only documents upon which the Commissioners formulate their decision. It is therefore imperative that the report provide the strengths of the proposed technology, as well as the potential benefits to the State of Ohio. Equally important is the need to highlight any perceived weaknesses of the proposal, how the applicant plans to handle the weaknesses as well as the associated risks.

One or more members of the Business Review team present the findings to the Third Frontier Commissioners for their finalized decision. Subsequently, the business review team then conducts phone debriefings for the applicants that did not receive funding. Quantum Commerce strongly believes this is

not only a time to explain the rationale for the decision for the proposal, but also an opportunity for a young entrepreneurial company to gain experience. In reviewing reasons for rejections in prior rounds, the lack of effective business plans is a recurring theme. Unfortunately, this is often the stumbling block for a new company. Thus, by providing solid debriefings, the review team provides fledgling start-ups with input to improve the robustness of their planning.

Appendix C - Evaluation Management Plan

Project Manager: The Project Manager will receive the proposals from the State of Ohio and distribute them along with the evaluation form to the Business Reviewers and the SMEs.

Business Reviewers: The Business reviewers will evaluate each proposal for the business aspects of the proposals based on the scorecard criteria above.

SMEs: Quantum Commerce augments the robustness of the reviews by utilizing a broad range of Subject Matter Experts Based upon the topic for the Phase 2 proposals, SMEs will be selected by the Project Manager who have specific technical expertise in the subject matter of the proposal.

The SMEs will be specifically evaluating the aspects of the proposal based on the scorecard criteria above.

Interviewers: Since the interviews center on the Business model for the proposal applicant, the Business Reviewers will conduct the interviews. Quantum Commerce believes the interviews should be conducted in a professional manner, very similar to a new start-up company's interview for seeking venture capital. Interviews will be conducted in a neutral location, and last approximately 45 minutes.

Report Writer/Editors: Once all the interviews are complete, the Business Reviewers meet to discuss each proposal. In order to assure objectivity, Quantum Commerce utilizes a red-yellow-green score. Each proposal requirement is scored either green (meets the requirements), yellow (meets requirements with reservation) or red (fails to meet the requirements). The Report Writer will provide to the Third Frontier Commissioners, a comprehensive report which will include the Red-Yellow-Green scoring for each proposal, as well as the rationale for any yellow or red score. In addition, for each proposal, there is the team's overall positive or negative recommendation for funding. The Business Reviewers will review the draft report for accuracy, clarity and quality.

Presenter: Robert Worden, one of the Business Reviewers, will present to the Third Frontier Commission a summary of the findings and recommendations for funding. He will also answer any questions the commissioners may have regarding the process or individual recommendations.

Debriefers: Business Reviewers Camille Rechel and Greg Workman will provide each proposal applicant the ability to be debriefed as to the negative recommendation results for their proposal. It is the belief of Quantum Commerce that these debriefs are critical to a young start-up company as they learn how to navigate funding opportunities and how to develop robust business plans.

Contingency Plan: Given the annual workload of less than 25% for each key role, the primary contingency will be for the three main team members to cover for each other. Should that prove insufficient at any time, we will draw from our large network of professionals to augment the team.

Replacement Personnel: Personnel will be recruited from business contacts and/or the database of our sister technical staffing company. This represents an available talent pool of nearly 1,000 technical and business professionals to enhance the review process. Given these resources, replacement personnel are readily available.

Appendix D - Team Members' Credentials

(Note: this list will be expanded as SME/ technical reviewers are titrated in based upon proposal subject matter needs of each round and the actual SME engaged from Quantum Commerce's network.)

Camille Rechel (co-owner of Quantum Commerce, Business Reviewer, Advanced Materials)

Camille created the original Proposal response to the RFP in 2011, and upon award, successfully executed the work process outlined in it. She personally led rounds 1-2 as Program Manager. She was a Business Reviewer for several additional rounds. In addition to being a degreed chemist, Camille has over 25 years of Business Management experience. She holds several pioneering patents for polymeric coatings for optical fibers. She brings experience from the chemical industry and industrial electronics industry in entrepreneurship. She grew the start-up high tech polymeric resin business within Borden Chemical, a major Ohio based company at the time. Under her leadership, the business grew from literally a beaker to in excess of \$50 million. Next, Camille led the restoration of the service capacity for an electronics firm, where she reversed the negative profit to an entity that generated in excess of 30% profit for the company. Camille then joined YourEncore where she led multiple teams. The Business Development Team was started from scratch and under her leadership grew in sales responsible for greater than 25% of YourEncore's revenue. In addition, she is currently co-owner of 3 entrepreneurial companies, Quantum Commerce and two Technical Staffing providers. Quantum Commerce is leading this bid and execution, while the Technical Staffing ventures provide expertise to companies in the form of consultants, contractors and direct placements. Unlike many startups, these companies have been profitable since the first year. Her core competencies include customer service and business development.

Greg Workman (co-owner of Quantum Commerce, Project Manager, Business Reviewer, Advanced Materials)

Greg is the Managing Partner of Quantum Commerce's construction services entrepreneurial venture. In addition, Greg has a Master's of Business Administration (MBA), is a certified Quality Manager, is a certified Six Sigma Black Belt, a degreed chemist, and has more than 25 years of industrial leadership in a broad variety of verticals including food, pharmaceuticals, chemical manufacturing, electronics, logistics and construction services. He holds one chemical process patent. He leverages this expertise in business process design and improvements for companies ranging from start-ups to Fortune 500 firms. He has designed and implemented Management Systems and Manufacturing Processes for start-ups in the Biotech and Food industries. He was engaged with the previous award company to utilize his project management skills to lead the TVSF review process, and to utilize his business evaluation expertise to review the individual grant proposals for business merit, over the last four years.

Robert Worden (Business Reviewer, Biomedical/ Life Sciences) Prior to joining the Quantum Commerce team, Robert led a business development team at YourEncore for 9 years. In this role, he participated in or led the review team for TVSF and TCC proposals over several years. His consulting and business development background has exposed him to a wide variety of industries over a 20-year career, including life sciences, food and consumer, specialty chemicals and apparel. He is a certified Six Sigma Black Belt and earned his MBA from the Darden School at the University of Virginia. Robert currently works in the non-profit sector helping people experiencing homelessness find and retain employment.

John McClure (Business Reviewer) John brings over 20 years of management experience, including being President and C.E.O. of Sicuro-China, LLC, Wintegrity and Comm South Companies LLC, as well as COO and General Manager of ADVAL Communications. He builds shareholder and customer value through the development and implementation of creative business strategies and new product/service offerings for existing and new markets. In addition, he demonstrates the ability to successfully start up technology business ventures, including hardware, software, Internet, e-Commerce, and telecommunications solutions. His core competencies include bankruptcy, due diligence for mergers/acquisitions, operational management, business plan development and fund raising.

Subject Matter Experts Utilized to Date:

Phil Drew (Medical Technology/ Biomedical/ Life Sciences)

Summary:

SME provides data and analysis to users and manufacturers of medical imaging equipment. For hospitals and radiologists, the SME provides strategic planning services, program and space planning studies, studies of financial and organizational feasibility, and related assistance. For manufacturers and others interested in the commercial aspects of medical imaging he provides technological and market forecasts based on analysis of technical, clinical, operational and competition-related factors, as well as assistance in strategic planning, product planning and acquisition studies.

Experience:

Mallinckrodt Institute of Radiology
Department of Radiology for the State University of New York at Stony Brook
Cardiovascular Division of the Washington University School of Medicine
Arthur D. Little, Inc.

Core Competencies/Field of Expertise:

Electrical engineering
Mechanical engineering
Health care
Medical imaging
Hospital operations

Education:

Harvard University, Degree: Ph.D. Electrical engineering
Harvard University, Degree: M.S. Applied Mathematics
Carnegie-Mellon University, Degree: B.S. Mechanical Engineering

Thomas Jones (Sensing and Automation Technologies)

Summary:

Over 25 years technical management and engineering analysis experience with the system engineering and integration of Electro Optical and Spectral remote sensing collection systems. Excellent communicator who provides briefings to all levels of corporate and government organizations, as well as technical and program management. Functional oversight and administrative management of group of lead senior remote sensing technologists. Performs critical technical evaluations of technology feasibility and commercialization proposals, in the areas of sensor and automation systems: biosensors, chemical analysis sensors and nonlinear control systems.

Experience:

System Engineering Consultant

Lockheed Martin:

Management lead and technical oversight for multiple year remote sensing modeling corporate research & development effort. Resulting models used in proposals, studies and contracts and instrumental in acquiring new business. Technical management coordinator of system integration support to government sensor technology research and technology customers. Provided technical oversight consultation of government contactors including technical roadmap development. Technology manager of senior remote sensor system analysts and technologist group.

Core Competencies/Field of Expertise:

System engineering for electro optical remote sensing collection systems including spectral analysis and requirements development/ system operations support/ sensor system modeling and simulations/ mission analysis / operations concepts/ technology roadmaps/ functional management/ project management/ research & development technical oversight and management / proposal and new business development

Education & Certifications:

BEE Villanova university 1964

MSEE Drexel University 1969

Multi-year System Engineering Course General Electric Co. 1970-72

Numerous Sensor engineering courses Lockheed Martin Co.

Shawn L Meade (Software/Information Technology)

Summary:

SME provides expertise in Information Technologies, Strategy Development/Planning, Relationship building, IT Solutions, Business Process Re-engineering, Business Optimization, Leadership, Operations, Innovations/Transformations, Consulting, Project Management, ITIL, Toyota Way

Experience:

Manager of Technical Operations, CBTS

Director of IT Operations, Pomeroy

Senior Manager North American Networks, Luxottica

Core Competencies/Field of Expertise:

Computer science

Software development and management of same

ITIL

IT Strategy Development/Planning

Education:

Bachelor's Degree in computer science, Northern Kentucky University

James Mellentine (Energy Systems)

Summary:

A Project Management Professional (PMP), LCA Certified Practitioner, and LEED Green Associate, combining 10 years of business and sustainability consulting experience with deep knowledge of energy systems and policy.

Experience:

Ramboll Environ
Philadelphia University
Sustainable Solutions Corporation

Core Competencies/Field of Expertise

Strategic Planning
Corporate Sustainability
Sustainable Manufacturing
Sustainable Supply Chain
Life Cycle Assessment
Sustainability Reporting
Green Marketing
Energy Systems & Policy
Energy Project Feasibility
Green Building
Project Financial Analysis
Systems Deployment
Energy Storage
Flow Batteries

Education:

Master of Science in Renewable Energy Systems & Policy, University of Iceland & University of Akureyri
BSE in Aerospace Engineering, University of Michigan
BSE in Mechanical Engineering, University of Michigan