



Technology Validation and Start-Up Fund

Round 10 Submittal Evaluations

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Submitted To:

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EXECUTIVE SUMMARY

YourEncore was selected as the contractor to perform the review process based upon having over 9,000 subject matter experts with a collective average of over 25 years of experience. For each of the ten areas of “project focus” a technical expert was selected to review the proposals. Once the technical review was complete, two business reviewers and a senior YourEncore manager reviewed each proposal. These experts have diverse backgrounds and a plethora of experience that make them ideally suited to review the proposals and recommend where the state of Ohio should invest to achieve maximum benefit for the state’s economic development goals. The Review Team evaluated each proposal based on the information submitted for review, and according to the criteria specified by OTF.

For Round 10, a total of 29 requests for funding were submitted to OTF’s Technology Validation and Start-Up Fund, 19 for Phase 1 and 10 for Phase 2. This represents a total quantity of requests for this round that was slightly below average, with Phase 1s nearly average and Phase 2s lower than average quantities.

While proposal quality again varied from highly professional and complete to unfocused and incomplete, the overall quality of proposals was average for that of the last several rounds. Of the 29 requests, 7 requests in Phase 1 (37%) and 4 in Phase 2 (40%) are recommended for funding to OTF by the expert Review Team. One of the ten Phase 2 applications was a prior Phase 1 awardee; it has been recommended for funding this round.

A total of eight applications not previously recommended for funding were resubmitted in this round¹. Resubmissions, which are responsive to past feedback, generally have a much higher quality than other proposals, especially for Phase 2 proposals. One of four Phase 1 reapplications (25%) are recommended, and two of four¹ Phase 2 resubmissions (50%) are recommended. 63% of these resubmissions still do not meet the full criteria necessary for approval. Therefore, teams that plan on resubmission are encouraged to take advantage of the opportunity to debrief with the review team to discuss potential improvements, as this may help clarify and focus the comments offered in this report. Further collaboration with the applicant’s Entrepreneurial Signature Program and Technology Transfer Office is highly recommended prior to resubmission.

Although sometimes too early in their life cycle for submission to the TVSF program, the technologies as proposed are generally sound. Most requests that are not recommended for funding lack fundamental elements of a business strategy. Phase 1 proposals were not recommended for funding due to concerns in Generation of Proof (6 of 19 had this fatal flaw); Path to Market (8 of 19); and Budget (4 of 19). For Generation of Proof half fell short by virtue of the technology being too nascent for commercialization. For the other applications Proof insufficiency was a business matter; that is, even if technical goals are met for the project, those goals are inadequate to validate the technology in the marketplace. Deficiencies in the Budget category were a mix of appropriateness of use (either

¹ One of the ten Phase 2 applications was a prior Phase 1 proposal that was not recommended for funding. It has been reworked and submitted as a Phase 2 application; it has also not been recommended for funding this round.

due to the stage of development, or suitability of the recipient within the RFP criteria), or were the result of internal inconsistencies that extended beyond the appearance of mere typographical inaccuracies. Phase 2 proposals not recommended for funding were deficient in their project financials and Proof points. Budget/ Use of Funds or Likelihood of Additional funding was of concern for most of those not recommended (5 of 10 Red) and is a recurring theme. Budget (3 of 10 Red; 1 Yellow) often relates to the stage of maturity of the company (either too nascent or well established), suitability of the budgeted recipient within the RFP criteria, or internal inconsistencies that extended beyond the appearance of mere typographical inaccuracies. Another area of deficiency is related to Proof. Similar to Phase 1 deficits, Phase 2 application Proof insufficiency was typically a business matter; that is, even if planned goals are met for the project, those goals are inadequate to further commercialization of the technology. Two applications warranted recommendation for rework as Phase 1 proposals, as they were quite nascent commercially.

Grant dollars recommended for funding is \$925,000, a total dollar amount which is slightly above average as reflective of the increased maximum award in certain categories. Percentage approvals are nearly average compared to past rounds.

Round	Approval Rate	\$\$ Recommended
1	35%	\$950,000
2	52%	\$900,000
3	44%	\$610,000
4	30%	\$864,000
5*	46%	\$1,462,000
6	39%	\$998,000
7	57%	\$1,100,000
8	37%	\$710,000
9	31%	\$550,000
10	38%	\$925,000

THE PHASE 1 PROPOSALS THAT ARE RECOMMENDED FOR FUNDING

Proposal #	Lead Applicant	Title	State Funds Requested	Total Budget	Recommend
16-117	Cleveland Clinic	Companion Diagnostic Platform for Optimization of Personalized Anticancer Therapy	\$49,960	\$99,920	\$49,960
16-120	Case Western Reserve University	HemeChip for Point-of-Care Diagnosis of Sickle Cell Disease in Newborns	\$50,000	\$100,000	\$50,000
16-122	Northeast Ohio Medical University	Development of a New Commercial Kit for Screening Cell Specific Gene Therapy Vector	\$50,000	\$100,000	\$50,000
16-123	Case Western Reserve University	Evaluation of Percutaneous Electrodes for Direct Current Nerve Block	\$50,000	\$100,000	\$50,000
16-124	Ohio State University	REZEN	\$50,000	\$100,000	\$50,000
16-125	Case Western Reserve University	SynthoPlate Technology: Evaluation and Validation	\$50,000	\$100,000	\$50,000
16-126	Case Western Reserve University	Low Cost, Self Powering Wireless Sensors and Sensor Networks for Enabling Energy-Efficient Smart Buildings	\$50,000	\$100,000	\$50,000

THE PHASE 2 PROPOSALS THAT ARE RECOMMENDED FOR FUNDING

Proposal #	Licensing Institution	Lead Applicant	Proposal Title	State Funds Requested	Total Project Budget	Recommended	Capital Raised to Date	Time to Market	Additional Capital to Market
16-133	Cleveland Clinic	Infuseon Therapeutics	Commercialization of the Cleveland Multiport Catheter for Delivery of Therapeutics to the Brain	\$150,000	\$150,000	\$150,000	\$600,000	0.7 yrs	\$150,000
16-137	Ohio State University	SpineDynx	SpineDynx - Spine Research Institute - Clinical Lumbar Monitor	\$150,000	\$150,000	\$150,000	\$1MM	1 yr	\$150,000
16-138	Ohio State University	MatchTx	MatchTx: Cancer Treatment Matching Software for Clinical Trials and Research	\$125,000	\$250,000	\$125,000	\$0	1 yr	\$250,000
16-139	University of Akron	O2 RegenTech	OXAID	\$150,000	\$150,000	\$150,000	\$77,500	2 yrs	\$1MM

PROPOSAL RECOMMENDATIONS - PHASE 1 SUMMARY MATRIX

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-113	Bowling Green State University	KnoWare: Citizen-based Environmental Monitoring	Red	Green	Yellow	Red	Green	Green	Red	Green
16-114	Ohio State	Enhanced Power Converter	Red	Green	Green	Red	Green	Yellow	Green	Green
16-115	Cleveland Clinic	Alpha-Lactalbumin ELISA-4	Red	Green	Yellow	Green	Red	Red	Green	Red
16-116	Cleveland Clinic	Subvalvular Annuloplasty Ring	Yellow	Green	Yellow	Yellow	Green	Red	Yellow	Yellow
16-117	Cleveland Clinic	Companion Diagnostic Platform for Optimization of Personalized Anticancer Therapy	Green	Green	Green	Green	Green	Yellow	Green	Yellow
16-118	Cleveland Clinic	CTC Biochip	Green	Green	Yellow	Yellow	Yellow	Red	Green	Red
16-119	Cleveland Clinic	Monoclonal Antibody Therapy for Ovarian Cancer	Red	Green	Yellow	Red	Yellow	Green	Green	Red
16-120	Case Western Reserve University	HemeChip for Point-of-Care Diagnosis of Sickle Cell Disease in Newborns	Green	Yellow	Green	Yellow	Green	Green	Green	Yellow
16-121	Kent State	Early Self-Monitoring Diagnostic Tool for Prevention of Diabetic Foot Complications Using Liquid Crystal Technology	Red	Red	Green	Red	Green	Green	Yellow	Green
16-122	Northeast Ohio Medical University	Development of a New Commercial Kit for Screening Cell Specific Gene Therapy Vector	Green	Green	Green	Green	Green	Green	Green	Green
16-123	Case Western Reserve University	Evaluation of Percutaneous Electrodes for Direct Current Nerve Block	Green	Green	Green	Green	Green	Green	Green	Green
16-124	Ohio State	REZEN	Green	Yellow	Green	Yellow	Green	Yellow	Green	Yellow
16-125	Case Western Reserve University	SynthoPlate Technology: Evaluation and Validation	Green	Green	Green	Yellow	Green	Green	Green	Yellow
16-126	Case Western Reserve University	Low Cost, Self Powering Wireless Sensors and Sensor Networks for Enabling Energy-Efficient Smart Buildings	Green	Green	Yellow	Yellow	Green	Green	Green	Yellow
16-127	University of Toledo	Scratch and UV resistant, Light Weight Parts for Automotive Application and Window Glazing	Red	Yellow	Green	Green	Green	Green	Green	Yellow
16-128	University of Akron	Solution-Processed Uncooled Ultrasensitive Broadband Polymer Photodetectors	Green	Yellow	Yellow	Red	Green	Green	Yellow	Red
16-129	University of Akron	A Platform for Remote Virtual Physical Examination	Green	Yellow	Green	Red	Green	Green	Red	Yellow
16-130	Case Western Reserve University	Software for Dual Energy Xray Coronary Calcium Imaging	Green	Green	Green	Red	Yellow	Yellow	Yellow	Green
16-131	University of Akron	Electrospun Drug Eluting Implant Coating	Green	Green	Red	Red	Yellow	Red	Green	Green

DEFINITION OF COLUMNS:

Proposal # – A unique OTF number for each proposal

Licensing Institution – The Ohio Institution of higher learning that is requesting funds

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

Generation of Proof to be Licensed – The proposed proof needed to move the technology to a point where it is ready to be licensed to a start-up or young company is deemed meaningful and likely impactful to that end

Project Plan/Team – Proposed proof that the technology can be generated during a one year project period with the proposed resources to move the technology to a point where it is ready to be licensed by a start-up or young company

Independent 3rd Party Review – Will the validation/proof process be conducted or overseen by an independent party

Reasonable Path to Market – The technology has a commercially reasonable path to market entry of first product

IP Protection – Degree to which the intellectual property is protected

Start-up in Ohio – Degree to which the proposed project will likely lead to a start-up company if the technology validation is successful and needed proof is generated

Market Opportunity/Size – Is this technology a viable commercial opportunity in regards to the potential market size and competition

Budget Narrative/Use of Funds -- description of how the entity proposes to use the funding if received

DETAILS OF PHASE 1 RECOMMENDATIONS

Proposal 16-113	Bowling Green State University	<i>KnoWare: Citizen-based Environmental Monitoring</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-113	Bowling Green State University	KnoWare: Citizen-based Environmental Monitoring								

Rationale: Applicant proposes further development of a low cost, easy to use means of collecting environmental data by members of the public at large to facilitate enhanced environmental monitoring. The proposed technology would be used to collect water quality measurements, map the data in real-time and interpret the results. The offering consists of user iPhones, enhanced with provided apps and a foldable cardboard device for analyzing water samples. The foldable device uses a diffraction grating to split the light from a sample into component colors, which the iPhone camera can capture. This is analyzed by the “inSPEctor” app by translating the data into absorption spectra, comparing to calibration curves and estimating the sample concentration. This is then used by the KnoWare web app to map to geographic location.

The proposed plan is to demonstrate this technology by building the hardware and apps, focusing on nitrate measurements in water samples and demonstrating that KnoWare can be used for non-expert citizen-based water quality monitoring.

Proposed funding would be used to build 150 test kits, engage volunteers to operate the kits, and compare results to commercially available colorimetric nitrate test kits to determine reliability. Users would then complete a survey to assess the technology. A business model would then be developed with external consultants.

The review team found significant concerns related to Proof, Path to Market, and Market Opportunity. The Proof point makes suppositions with respect to the value proposition without customer input – at this stage it’s not clear whether achieving the proposed proof would meet any specific unmet market need aside from the potential novelty of a creative learning tool. The Path to Market is more analogous to a non-profit organization than to commercialization of the technology. The proposal lacks a business model to monetize the hardware and/ or service. The Market Opportunity is undefined.

This proposal is not recommended for funding.

A concern which was not sufficient to preclude funding relates to 3rd Party. The suggested crowdsource 3rd parties are lacking in the expertise necessary to fully validate the technology.

Recommendations for Improvement: Should BGSU choose to reapply for TVSF funding, the proposal must identify the additional Proof needed for commercial licensure by better defining appropriate customer targets and their respective unmet needs. The applicants must also provide a directional Market Path that shows the viability of the technology to support an ongoing concern, with particular attention to monetizing the technology in the marketplace. Further, an objective, accredited 3rd Party will need to be chosen to validate the technology.

Proposal 16-114	Ohio State University	<i>Enhanced Power Converter</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-114	Ohio State	Enhanced Power Converter								

Rationale: Applicant proposes further development of a Gallium Nitride AC-DC power converter claimed to be more efficient, compact, and lighter than existing converters. The applicant has developed the DC-DC board, which represents one third of the system and is described as the critical component. A full proof of concept system is to be finalized prior to proposed TVSF project commencement.

This technology would allow the power converter to be moved inside portable electronic devices, eliminating the existing bulky external converters.

The review team found significant concerns related to Proof and Path to Market. Demonstration of safety testing as the Proof point is not aligned with the claimed benefits of the technology – efficient, light-weight and compact. The Proof point needs to be defined in conjunction with a potential manufacturing customer. The Path to Market is undefined, particularly with respect to the value proposition and competitive price comparisons. Market interest has not yet been established. Potential complications of internal heat generation and full three-board system efficiency remain to be assessed.

This proposal is not recommended for funding.

A concern which was not sufficient to preclude funding relates to Start-Up. There is a reasonable likelihood of the technology being licensed, reducing the impetus for an Ohio Start-Up.

Recommendations for Improvement: Should OSU choose to reapply for TVSF funding, the Proof end point tied to the claimed benefits of the technology must be defined prior to submission. This could potentially be accomplished by the project objective listed in Phase 1 section 2 (market survey). The applicants must also provide a directional Market Path that shows the viability of the technology to support an ongoing concern, with particular attention to the technical and economic value propositions.

Proposal 16-115	Cleveland Clinic Foundation	<i>Alpha-Lactalbumin ELISA-4</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-115	Cleveland Clinic	Alpha-Lactalbumin ELISA-4								

Rationale: Applicant proposes development of a laboratory test for a molecule overexpressed in certain breast cancers, viz., alpha-lactalbumin. While the proposal is focused on the lab test, it is part of a larger effort to take advantage of the presence of alpha-lactalbumin as a receptor-target for therapy.

Cancer treatments have been greatly improved by the development of receptor-targeted therapies in which a therapeutic agent is carried to a receptor known to be overexpressed in the particular cancer. One class, called triple negative breast cancers (TNBC), comprises 16% of all breast cancers, but has triple the mortality rate. The applicants have demonstrated that alpha-lactalbumin is overexpressed in a large majority of TNBCs, and further that vaccination can provide prophylaxis against breast tumors.

The proposal is concerned with a well-established sandwich ELISA (enzyme-linked immunosorbent assay) test. The sandwich ELISA uses two antibodies, the first to capture the antigen of interest, and the second to reveal its concentration.

The applicants expect that it will cost \$100,000 to complete preclinical development plus another \$200,000 for clinical validation and regulatory approval. Expected licensee Shield Biotech, Inc., a Cleveland Clinic spin-off formed in September 2013, has proposed to develop and commercialize a human alpha-lactalbumin breast cancer vaccine pending the results of this project.

Proposed funding would be used to develop the two antibodies necessary to carry out the sandwich ELISA test.

The review team found significant concerns related to Proof, IP, Start-Up, and Budget. The technology remains too nascent for the TVSF program. The Cleveland Clinic has performed similar work in the past and is capable of performing this work, but at this stage the technology exists in concept only. Plan milestones are considered basic research by the review team. IP has not been filed, which highlights the concern around work done to date. The Start-Up is described by the applicants as “well-financed”, and use of State funds to de-risk technology for well-financed companies is not appropriate to the goals of the program. Similarly, technologies developed using TVSF funds should be the core around which a start-up is formed. In this case the proposed technology (the assay) is a necessary, but adjunct, technology to support existing IP (the vaccine) already under development at the start-up. Funds budgeted towards Lerner Research Institute as Purchased Services are classified as Personnel due to the fact that LRI is within the applying institution, which will presumably exceed the allowable Personnel budget.

This proposal is not recommended for funding. While the work is necessary the approach as presented is not a good fit for TVSF.

A concern which was not sufficient to preclude funding relates to 3rd Party. The proposal has not identified independent review activities or external work to be performed, since contributors are affiliated with extant or prospective stakeholders.

Recommendations for Improvement: As noted, this proposal may not be a fit for TVSF. Should Cleveland Clinic choose to reapply for TVSF funding, the review team recommends the applicants work closely with Development to ensure alignment with program intent. Additional basic research is necessary to provide proof of concept prior to proposal submission. IP needs to be executed. Justification for the need for State funding must be provided and the Budget must be fully aligned with the TVSF proposal guidelines. Further an objective, accredited 3rd Party will need to be chosen to validate the technology.

Proposal 16-116	Cleveland Clinic Foundation	<i>Subvalvular Annuloplasty Ring</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-116	Cleveland Clinic	Subvalvular Annuloplasty Ring	Yellow	Green	Yellow	Yellow	Green	Red	Yellow	Yellow

Rationale: Applicant proposes further development of a novel annuloplasty ring to be implanted during open-heart surgery to reduce or eliminate mitral valve regurgitation (MR). These devices are the gold standard for repairing defective mitral valves. Many models are commercially available. The applicants claim that the new device is a distinct improvement over existing devices.

The mitral valve governs blood flow from the left atrium to the left ventricle, which pumps blood to the rest of the body. However, distortion of the heart structure caused by myocardial infarction allows backward blood flow during heart contraction.

This technology extends existing designs to add a “finger”, called a subvalvular support, which extends across the opening in the ring which “provides more leaflet contact surface area allowing unbalanced leaflets to close and prevent recurrent MR over time.”

Proposed funding would be used to design and analyze the mechanical properties of the ring, manufacture the initial units for testing, and conduct pre-clinical and biocompatibility testing to support an FDA 510(k) submission.

The review team found significant concern related to Start-Up. A stand-alone Start-Up is not an optimal business model for this technology, which has little potential as a platform. Direct licensing is a more suitable and likely pathway to market. Further, the applicants estimate the addressable market at \$50 million, which assumes a greater than 3x increase in mitral valve surgeries as a result of this new technology. The likely annual revenue will be well below \$50 million, again increasing the likelihood that this technology, if de-risked, will be licensed. Finally, the applicants note that the inventor has extant IP, granted in 2012, on similar annuloplasty rings. It is unclear what efforts have been made to commercialize those rings, further highlighting concerns that a new start-up will be able to successfully commercialize the technologies without direct license to an established entity. The applicants suggest the extant IP and the technology in this proposal could be foundational to a start-up, but the review team presumes the different designs would further divide the potential revenue of a relatively small market.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Market Opportunity, Path to Market, 3rd Party, Proof, and Budget. The Market Opportunity is relatively small for the investment required to bring the product to market. Path to Market is complicated by competing technology such as transcatheter mitral valve repair potentially making the technology vulnerable

to new developments. The proposal has not identified fully independent review activities or external work to be performed, since contributors are affiliated with extant or prospective stakeholders. The review team is concerned that 90 days may be insufficient for Proof of efficacy, as MR recurrence often occurs over long periods of time. Funds budgeted towards Medical Device Solutions as Purchased Services are classified as Personnel due to the fact that MDS is within the applying institution.

Recommendations for Improvement: Should Cleveland Clinic choose to reapply for TVSF funding, the applicants need to provide a compelling Business Model that shows the viability of the technology to support an ongoing concern, notwithstanding competitive and market forces. Applicant will need to ensure compliance with TVSF program budgetary requirements and a budget narrative should be included to clearly indicate how funds will be used. Further, an objective, accredited 3rd Party will need to be chosen to validate the technology. Finally, rationale should be provided on how market adoption may be impacted by lack of longitudinal efficacy data.

Proposal 16-117	Cleveland Clinic Foundation	<i>Companion Diagnostic Platform for Optimization of Personalized Anticancer Therapy</i>
Amount Requested: \$49,960	Recommended: \$49,960	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-117	Cleveland Clinic	Companion Diagnostic Platform for Optimization of Personalized Anticancer Therapy								

Rationale: Applicant proposes further development of a laboratory assay of a particular patient’s myeloma cells in the presence of an array of potential anti-myeloma drugs to assess the probable in vivo response of the patient to each of the drugs, thus providing objective, quantitative guidance for doctors selecting drugs for the patient’s therapy. The platform technology has potential for extension to other blood-borne cancers and solid tumors as well as chemotherapeutic drug efficacy testing.

In the US, multiple myeloma and non-Hodgkin’s lymphoma are prevalent (100,000 new cases each year) and lethal (30,000 deaths per year). Treatment of these cancers typically involves bloodstream chemotherapeutic drugs, which bind to and destroy the cancer cells. There are a great many FDA-approved therapeutic compounds, to which diverse patients respond differently. The technology in this proposal would provide doctors a quantitative way to select the most efficacious.

The proposed technology would create laboratory conditions that adequately mimic the conditions found in the body when a chemotherapeutic agent encounters myeloma cells, and measure the degree to which the agent destroys the cells.

Proposed funding would be used for refining and optimizing some aspects of the technology, matching drug concentrations over time to mimic normal excretion of the drug, and validating the technology by comparing its results with the measured results of treatment of patients with myeloma disease.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable system for chemotherapeutic selection.

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

Concerns which were not sufficient to preclude funding relate to Path to Market, IP, Budget, and Start-Up. Although the need is compelling and substantial, the applicant did not articulate the directional path to market. The IP application reference number is absent. Funds budgeted towards Cleveland Clinic’s department for quantitative health sciences as Purchased Services are classified as Personnel due to the fact that it is within the applying institution. Applicant will need to work closely with Development to ensure compliance with program budget rules. Applicant will also need to provide correspondence to Development confirming sources of cellular materials as compliant with ORC 2919.14. Although the platform technology is well positioned to support a Start-Up, explicit verbiage was absent.

Proposal 16-118	Cleveland Clinic Foundation	<i>CTC Biochip</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-118	Cleveland Clinic	CTC Biochip								

Rationale: Applicant proposes further development of a microfluidic device that separates circulating tumor cells (CTCs) tagged with magnetic nanoparticles from whole blood which can also be used to sort highly malignant cells from other more benign ones, laying the groundwork for clinical validation and ultimately FDA market clearance of a “liquid biopsy” device. The device

is expected to provide better prognostic data and a sensitive means to assess the effects of therapy.

An antibody coated with magnetic particles attaches itself preferentially to cells with a given antigen on their surfaces. The level of nanoparticle attachment depends on the level of antigen expression for the cells in question. This causes gradation in a magnetic field. The technology thereby sorts cells of different types into separate channels for analysis using a standard microscope. The future commercial method will also require a benchtop device incorporating automated fluidic systems.

Proposed funding would be used to manufacture 200 second-generation devices, for manufacturing scalability and ease of design modifications.

The review team found significant concerns related to Start-Up and Budget. The need for a Start-Up company is not apparent, as both manufacturing and marketing/distribution partners have been identified. Use of TVSF funds to de-risk a technology which is then licensed to major corporations is inconsistent with program goals. Funds budgeted towards Medical Device Solutions as Purchased Services are classified as Personnel due to the fact that MDS is within the applying institution. Further, this will presumably exceed the allowable Personnel budget.

This proposal is not recommended for funding. While the technology is compelling and has potential there may not be a fit with the goals of the TVSF program.

Concerns which were not sufficient to preclude funding relate to 3rd Party and Path to Market. The proposal has not identified fully independent review activities or external work to be performed, since contributors are affiliated with extant or prospective stakeholders. A license approach Path to Market is not a good fit with the intent of the TVSF program's goals.

Recommendations for Improvement: Should Cleveland Clinic choose to reapply for TVSF funding, the applicants need to provide a compelling Business Model that shows the viability of the technology to support an ongoing concern. Applicant will need to ensure compliance with TVSF program budgetary requirements. Further an objective, accredited 3rd Party will need to be chosen to validate the technology.

Proposal 16-119	Cleveland Clinic Foundation	<i>Monoclonal Antibody Therapy for Ovarian Cancer</i>
Amount Requested: \$49,945	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-119	Cleveland Clinic	Monoclonal Antibody Therapy for Ovarian Cancer								

Rationale: Applicant proposes further development of a vaccine to prevent and to treat ovarian cancer. A protein called AMHR2-ED (explained below) would be the basis of this vaccine. Current demonstrations of the effectiveness of a vaccine are confined to mouse models. When administered, this protein causes the mice to produce anti-AMHR2-ED antibodies, which have been shown to prevent development and to cause regression of ovarian tumors in mice. The next step is to create a panel of anti-AMHR2-ED mouse antibodies to evaluate for efficacy.

The technology utilizes “retired” proteins, which played some important role during an earlier stage of life but are no longer produced in quantity in normal animals, including people, but are overexpressed in animals with cancer. The substance, anti-Mullerian Hormone Receptor 2 – Extracellular Domain (AMHR2-ED), is one such entity. It is a key to developing sexual differentiation during early gestation, but afterward it plays hardly any role in women, especially after menopause. Conversely, it is abundantly overexpressed in ovarian cancers. The applicants have demonstrated in mice that administration of AMHR2-ED is effective as an ovarian cancer vaccine.

Ovarian cancer is a relatively rare cancer, (22K annual diagnoses in the US). However, it is especially lethal, with a five-year survival rate of only 45%.

Proposed funding would be used to develop AMHR2-ED specific monoclonal antibodies; and to characterize them with respect to unintended cytotoxicity and their ability to destroy ovarian tumor cells.

The review team found significant concerns related to Budget, Proof, and Path. Funds budgeted towards Lerner Research Institute as Purchased Services are classified as Personnel due to the fact that LRI is within the applying institution. Further, this will presumably exceed the allowable Personnel budget. Regarding Proof, the technology appears too nascent for the TVSF program. As the intended licensee is a Cleveland Clinic spin-out, objective input on the relevance and impact of the proposed proof points may be needed to ensure the technology is ready for license at the end of the project period. The Path to Market is of concern due to the significant amounts of money (\$30MM) and time (5-10 yrs.) to get to market. The time and investment required, along with the nascent state of development, raise significant concerns as to whether this technology is a fit with the goals of the TVSF program.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to 3rd Party and IP. The proposal has not identified fully independent review activities or external work to be performed, since contributors are affiliated with extant or prospective stakeholders. IP protection is incomplete, as “additional...patent protection will be sought when effective monoclonal antibodies are identified.”

Recommendations for Improvement: Should Cleveland Clinic choose to reapply for TVSF funding, additional basic research is likely necessary prior to proposal submission. Applicant will need to ensure compliance with TVSF program budgetary requirements. Further an objective, accredited 3rd Party will need to be chosen to validate the technology. Once effective targets are discovered, the IP protection will need to be completed.

Proposal 16-120	Case Western Reserve University	<i>HemeChip for Point-of-Care Diagnosis of Sickle Cell Disease in Newborns</i>
Amount Requested: \$50,000	Recommended: \$50,000	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-120	Case Western Reserve University	HemeChip for Point-of-Care Diagnosis of Sickle Cell Disease in Newborns								

Rationale: Applicant proposes further development of a diagnostic device employing electrophoresis of red blood cells to identify sickle cell disease and other blood disorders. Field validation will take place in Ghana (sub-Saharan Africa) under the auspices of the Global Sickle Cell Disease Network.

Sickle cell disease (SCD) is a genetic disorder, curable only with transplantation of stem cells, but is treatable with various palliative measures, especially when caught early. Without detection and treatment, at least half of the 400,000 infants born yearly with SCD in sub-Saharan Africa will die. Existing tests for the disease use liquid chromatography, which in the African setting take too long for results (2-6 weeks) and cost too much (at least \$10).

Applicants have developed an electrophoresis device to detect SCD. A small amount of blood from a finger-stick (or heel-stick in the case of newborns) is applied at one end of a strip of absorbent and moistened paper, and an electric field applied. Different varieties of hemoglobin migrate under the influence of the electric field, resulting in separation. The applicants believe the devices can be manufactured for about 45 cents and provided to end users for about \$2 after manufacturing scale up.

The electrophoresis device integrates with a smartphone app to produce Point of Care quantitative results.

Proposed funding would be used for refinement of the design, manufacture of a pilot run of 5,000 units in Ohio, and 3rd Party field validation in Ghana.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable system for Newborn Sick Cell diagnosis. The level of unmet need in Africa may itself be sufficient, despite the low sales price, to sustain an Ohio company. While the applicants do not attempt to identify a payor, the review team believes that NGOs are a likely customer for the technology. In addition, the applicants believe that once the technology is demonstrated and established it can be transferred to other markets for use in government-mandated pre-marital testing at a higher sales price, displacing more expensive methods and improving margins over the long run.

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

Concerns which were not sufficient to preclude funding relate to Budget, Path to Market, and Plan. Pilot manufacturing costs are a substantial multiple of full production projections, and unit quantities are elevated in comparison to typical Phase 1 validation studies. Path is limited in the near-term by constriction to 3rd World markets with ambiguity around the payor. The Plan is challenging logistically given the amount of work occurring in Ghana and overall numbers of patients to be tested.

Proposal 16-121	Kent State University	<i>Early Self-Monitoring Diagnostic Tool for Prevention of Diabetic Foot Complications Using Liquid Crystal Technology</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-121	Kent State	Early Self-Monitoring Diagnostic Tool for Prevention of Diabetic Foot Complications Using Liquid Crystal Technology								

Rationale: Applicant proposes further development of a sock coated with liquid crystals that change color with temperature to be worn by patients with diabetes in order to reveal incipient abnormalities that affect temperature in the foot.

Among the most common and debilitating consequences of diabetes is diminished blood circulation in the extremities. The lack of blood may cause nerve damage, which among other things prevents the patient from perceiving conditions like infection and inflammation or cold due limited circulation. Conditions do not necessarily encompass the whole extremity, but may be confined to a portion thereof. With these conditions in mind the applicants have conceived the idea of making a sock coated with thermochromic liquid crystals (TLC - substances that change color with temperature), which the patient could put on to recognize hot or cold zones on his or her foot and to seek medical aid if necessary.

Applicants have coated a flat piece of cloth with liquid crystals and demonstrated that the differential warming caused by placing a hand on the fabric results in a discernible image of the hand. They have also formulated liquid crystals that change color over three different temperature ranges: 24-27C; 28-31C; 32-35C, which are thought to span the range of interest for this diagnostic application. The actual color changes produced are not diagnostic; therefore special patterns must be printed into the ink design for interpretative assistance.

Proposed funding would be used to develop the TLC inks, the application process, fabric optimization, pattern design choice, and 3rd Party validation.

The review team found significant concerns related to Proof, Plan, and Path to Market. The Proof end points are deficient by virtue of a significant lack of practicality considerations. The applicants have not demonstrated attention to the substantial multitude of variables that would impact the application of this technology in a dynamic environment into a feasible qualitative diagnostic. Issues such as durability, cleanability, activity profile of the wearer, fabric pliancy, thermal influence of the environment, spatial observation by the wearer, and diagnostic interpretation confound the usability of the technology. The review team considers the Plan too aggressive to accomplish within one year with the resources indicated. Further, validation utilizing extremity revascularization blood flow seem too indiscriminate versus the localized concern of the indicated pathophysiology. The Path to Market seems impractical due to the complexity of variables and diagnostic interpretation by a layperson.

This proposal is not recommended for funding.

A concern which was not sufficient to preclude funding relates to Market Opportunity as it is undefined. While diabetic complications are a large market opportunity, it is unclear what the potential for this technology might be.

Recommendations for Improvement: Should Kent State choose to reapply for TVSF funding, applicant would need to provide a compelling narrative on the practicality of such a system in a dynamic environment utilized by non-professional consumers. Further, a more detailed plan that enumerates the resources necessary to accomplish the goals outlined would need to be included.

Finally, a directional financial enumeration of basic business metrics like: addressable market, competitive pressures, and potential market share, needs to be provided for review.

Proposal 16-122	Northeast Ohio Medical University	<i>Development of a New Commercial Kit for Screening Cell Specific Gene Therapy Vector</i>
Amount Requested: \$50,000	Recommended: \$50,000	
Prior Phase 1 Application(s):	15-193, 15-773	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-122	Northeast Ohio Medical University	Development of a New Commercial Kit for Screening Cell Specific Gene Therapy Vector								

Rationale: This proposal is a resubmission of 15-773 (itself a resubmission of 15-193) which was not recommended for funding due to concerns regarding 3rd Party and Budget. This proposal does adequately address the previous concerns of the reviewers.

Applicant proposes further development of a kit for screening cell-specific gene-therapy vectors.

A promising avenue for the treatment of cancer and other genetic and metabolic diseases is gene therapy, which is introducing to the diseased cells in the body a small amount of genetic material that will disrupt or otherwise alter the functions of the diseased cells, causing those cells to mutate in a manner that treats the disease. Vectors, whose function is to carry the genetic material into the defective cells, are key to the potential of treating cancer. A vector that invades only the defective cells, leaving normal cells alone is needed. Adeno-associated viruses (AAVs) have been found to lend themselves well to this function.

The applicants have developed a way to create millions of variants of capsid proteins, all carrying fluorescent tags. When this 'library' of multiple variants is mixed with targeted gene therapy cells, those cells allow themselves to be invaded by one or more of the AAV variants. The researchers can then extract from a particular type of cell the DNA that created the variants that made it possible for the virus to invade those cells, thus isolating the effective variant(s), which are now specific for that type of cell. These procedures can be repeated with the resultant products of the preceding procedure, thus producing an ever more-specific AAV for the target cells.

Proposed funding would be used to optimize three different cell types known to be important in cancer and genetic research (HepG2, a human hepatocellular carcinoma cell line; K562, a human

myelogenous leukemia cell line; and HSF-6, a human embryonic stem cell line.), introduce mutations in the capsid protein, determine the efficacy of the products, and conduct a 3rd Party review.

The concept for advancing gene therapy disclosed in this proposal seems to be paradigm-shifting, as it will enable easy creation of highly specific vectors to remedy a wide range of poorly treated diseases and conditions.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable product.

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

Note: Applicant will also need to provide correspondence to Development confirming sources of cellular materials as compliant with ORC 2919.14.

Proposal 16-123	Case Western Reserve University	<i>Evaluation of Percutaneous Electrodes for Direct Current Nerve Block</i>
Amount Requested: \$50,000	Recommended: \$50,000	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-123	Case Western Reserve University	Evaluation of Percutaneous Electrodes for Direct Current Nerve Block								

Rationale: Applicant proposes further development of electrodes that are expected to be part of a nerve-blocking device particularly useful for patients following knee or hip replacement, which is known to be especially painful in the early period after surgery.

Using electrical signals to block nerves has been part of the modern medicine for 30 years, and interest has grown enormously in recent years, in part due to advances in electronics.

These devices are sometimes called electroceuticals, since they are designed to replace pharmaceuticals to relieve pain. Their advantages over administration of various analgesic drugs are several: localized treatment, instantaneous results, few side effects, and non-habit-forming.

The applicants are developing a new nerve-stimulating device that uses charge-balanced direct-current (CBDC) with an external power source, which requires electrodes to conduct power from the external source to the site of the nerve. The Proof point is whether “this approach is safe for repeated delivery to the nerve over a period of a few weeks...for post-surgical pain.”

Proposed funding would be used to fabricate and test the electrodes in vitro, and then perform several animal tests for material safety of the device without power, and then efficacy and safety of the device in operation at the 3rd Party, NAMSA.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable system for Nerve Block pain treatment.

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

Proposal 16-124	Ohio State University	<i>REZEN</i>
Amount Requested: \$50,000	Recommended: \$50,000	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-124	Ohio State	REZEN								

Rationale: Applicant proposes further development to improve the overall efficiency of ultraviolet light emitting diodes (UV-LED) in order to replace standard mercury lamp-based UV sources for water purification applications. The market size is very large and expected to grow at 25 percent over the next 10 years. As LED sources are replacing incandescent bulbs this approach is very appealing for the suggested application as the LEDs have longer service lifetimes and are more power efficient, while eliminating hazardous mercury from the water supply treatment equipment and reducing overall lifecycle costs significantly.

Proposed funding would be used to optically optimize the LED and iteratively engineer further optimization as needed to a commercially acceptable end point of 10% efficiency, with 35% or greater possible in a final prototype. This effort would then be followed by 3rd Party validation.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable system for commercializing UV-LED lamps.

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

Concerns which were not sufficient to preclude funding relate to Path to Market, Start-Up, Plan, and Budget. Although the market is significant and important, the Path to Market is undefined by the applicants. There is a reasonable likelihood of the technology being licensed, reducing the impetus for an Ohio Start-Up. The Plan has iterative engineering activities that are somewhat open ended without hard data targets for efficiency gains per iteration. Release time of the university personnel is not included in the budget and funds budgeted towards Nanotech West as Purchased Services are classified as Personnel due to the fact that NW is within the applying institution. Applicant will need to work closely with Development to ensure compliance with program budget rules.

Proposal 16-125	Case Western Reserve University	<i>SynthoPlate Technology: Evaluation and Validation</i>
Amount Requested: \$50,000	Recommended: \$50,000	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-125	Case Western Reserve University	SynthoPlate Technology: Evaluation and Validation								

Rationale: Applicant proposes further development of artificial blood platelets. Platelets are the principal elements in blood that form clots to stanch the flow of blood at the site of an injury. The applicants have proven the concept in a rodent model.

Transfusing blood into patients for various reasons – making up for blood lost through injury, surgery or other events, or adding blood-containing elements in which the patient is deficient – is a routine part of modern medicine. Blood and blood products derived from donors have limitations of: inadequate supply, pathogenic or foreign contaminants, special storage facilities with limited shelf life constraints, and high collection costs.

Commercial and military demand for an artificial blood remains high. Artificial blood that carries oxygen as efficiently as red blood cells exists, but finding artificial substitutes for other elements in blood has proved more difficult. In particular, devising artificial platelets is a formidable problem because it is necessary not only that the blood clot at the site of an injury but also that it not clot elsewhere. If the applicants successfully validate this technology they will be in an excellent position to address these unmet needs and disrupt the market.

Proposed funding would be used for scale-up, sterilization, stability analysis, and larger animal (porcine) studies for efficacy and safety.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable system for a synthetic blood product.

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

Concerns which were not sufficient to preclude funding relate to Path to Market and Budget. Path is complicated by extant if potentially inferior competitors. Funds budgeted towards CWRU Core Services as Purchased Services are classified as Personnel due to the fact that it is within the applying institution. Applicant will need to work closely with Development to ensure compliance with program budget rules.

Proposal 16-126	Case Western Reserve University	<i>Low Cost, Self-Powering Wireless Sensors and Sensor Networks for Enabling Energy-Efficient Smart Buildings</i>
Amount Requested: \$50,000	Recommended: \$50,000	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-126	Case Western Reserve University	Low Cost, Self Powering Wireless Sensors and Sensor Networks for Enabling Energy-Efficient Smart Buildings								

Rationale: Applicant proposes further development of a low cost self-powering wireless sensor system which can be easily integrated with a building smart HVAC system to enable significant energy savings. The system’s competitive advantage is that it harvests building vibrational and environmental electromagnetic energy and eliminates the needs for replacing batteries. Because it utilizes wireless connections to the building control system it enables ease of deployment and use of large numbers of sensors for maximum energy savings. The concept consists of a small circuit board with energy harvesting components, supercapacitors for energy storage, temperature, pressure and humidity sensors along with a controller chip and transmitter. A lab prototype has been developed. The proposal presents a plan to develop a series of alpha and beta prototypes, each successively smaller in scale and with additional capability. Finally a complete system-level test using the beta prototype will be conducted in a building using an independent 3rd party that will demonstrate commercial viability.

The market identified is the building energy management system (BEMS) and the sensor subset market (\$434MM by 2023). This market is driven by desire to reduce the high levels of energy consumption by buildings. The potential energy reduction is up to 30% in buildings, which account for 41% of US energy consumption.

Proposed funding would be used to develop prototypes and validate with a full system test in a Building Energy Management System.

The team finds the proposal is well thought-out and constitutes the next step in developing a marketable system for self-powered sensors.

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

Concerns which were not sufficient to preclude funding relate to Path to Market, 3rd Party, and Budget. Although the market is significant, the Path is undefined in the proposal. 3rd Party does not appear to be fully independent due to past relationships between various stakeholders (Co-PI/ Inwtine Connect/ NOPEC). Funds budgeted towards ThinkBox as Purchased Services are classified as Personnel due to the fact that TB is within the applying institution. Applicant will need to work closely with Development to ensure compliance with program budget rules.

Proposal 16-127	University of Toledo	<i>Scratch and UV resistant, Light Weight Parts for Automotive Application and Window Glazing</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	15-789	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-127	University of Toledo	Scratch and UV resistant, Light Weight Parts for Automotive Application and Window Glazing								

Rationale: This proposal is a resubmission of 15-789 which was not recommended for funding due to concerns regarding Proof, Plan, and Path to Market. This proposal does not fully address the previous concerns of the reviewers.

Applicant proposes further development of scratch and UV resistant coatings for automobile plastics. The resubmission confounds the application, and thus amplifies the review team’s concerns, by changing market focus to replacing glass windshields with coated plastics, while retaining project objectives that are related to coating pillar trim. The goal is to replace the lacquering methods currently in commercial practice.

UV protection is provided by infusing a UV absorbing molecule into the polymer substrate. The high density of the UV absorbing molecules at the surface prevents the UV light from denaturing the polymer substrate. The high density of infused molecules at the surface also acts as anchor points for a hard coat deposited through the vapor phase. The increased number of anchor points enhances adhesion of the hard coat to the surface, preventing scratching.

Proposed funding would be used for proof of concept and production methodology development.

The review team found significant concern related to Proof. The technology remains too nascent for the TVSF program, and Proof milestones are considered basic research by the review team. Most proof points appear open-ended explorations for deposition techniques, plasma gas composition, and procedure development, among others. To date, proof of concept has only been established on “small, flat polymer substrates.” Applicant states that “to be considered for licensing...larger, arbitrarily shaped samples” need to be demonstrated. No evidence that the proposed process will work on non-planar surfaces has been presented.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Plan and Budget. The review team considers the Plan too aggressive to accomplish within one year with the resources indicated, given the number of variables to be investigated and controlled. Purchasing services from the potential licensee, although not prohibited, is not in the spirit of the TVSF program use of funds.

Recommendations for Improvement: Should UT choose to reapply for TVSF funding, the proposal must have executed the clear proof of concept, refine the proof points and then identify the additional Proof needed for commercial licensure in the target market segment. The Plan needs to be commensurate with the timeline and resources available to the project.

Proposal 16-128	University of Akron	<i>Solution-Processed Uncooled Ultrasensitive Broadband Polymer Photodetectors</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	15-201, 15-786	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-128	University of Akron	Solution-Processed Uncooled Ultrasensitive Broadband Polymer Photodetectors								

Rationale: This proposal is a resubmission of 15-786 (itself a resubmission of 15-201) which was not recommended for funding due to concerns regarding Budget. This proposal does not fully address the previous concerns of the reviewers.

Applicant proposes further development of photodetectors in the ultraviolet thru infrared spectrum that can operate at room temperature, and are thus lower cost. They are further capable of use in flexible sensing applications.

This breakthrough technology would utilize a single, room temperature, full spectrum, flexible detector to replace current technology that requires multiple sensors with narrow bandwidth and additionally need ultra-low temperature environments to function properly.

Proposed funding would be used for the scale up in size to 4"x4" on rigid glass, and fabrication of samples on flexible transparent substrates, and 3rd Party validation. The plan proposed is to accomplish these goals and then demonstrate their use on state of the art electronic devices.

The review team found significant concerns related to Budget and Path. The revised proposal again makes significant changes to the Budget without justification or narrative for the modifications. Even after more than 100 customer interviews, and the review team previously indicating the need for a marketing strategy, the applicants still have not proposed a directional business pathway to commercialize this technology.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Plan and 3rd Party. The Plan has not been updated with customer input gathered by the applicant. The proposal has not identified independent review activities or external work to be performed for most objectives, since contributors are affiliated with extant or prospective stakeholders.

Recommendations for Improvement: Should UA choose to reapply for TVSF funding, the proposal modifications will need to be enumerated and the Budget narrative justified accordingly. Simply altering parts of the proposal without explanation or modification to the remaining parts of the proposal is not sufficient. Given the number of attempts, the applicant is encouraged to start any resubmission from scratch. The applicants must provide a directional Market Path that shows the viability of the technology to support an ongoing concern.

Proposal 16-129	University of Akron	<i>A Platform for Remote Virtual Physical Examination</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	15-784	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-129	University of Akron	A Platform for Remote Virtual Physical Examination								

Rationale: This proposal is a resubmission of 15-784 which was not recommended for funding due to concerns regarding Proof, Path, and Budget. This proposal does not fully address the previous concerns of the reviewers.

Applicant proposes further development of a Virtual Physical Examination application (VPE) for remote physical examinations of patients, based on a Bluetooth enabled stethoscope and a smartphone. The platform would enable caregivers other than physicians, or even patients themselves, to generate exam data for later review by physicians.

The VPE is composed of three components: an app that is installed on a mobile device, a cloud database to store the data generated by the mobile app, and an interface for the physicians or hospital staff to access the recorded exams and other data stored in a HIPAA compliant manner. The app utilizes a step-by-step guide for caregivers or patients themselves to perform physical examinations. To help a minimally trained person who is conducting the exam, the app is equipped with video recognition capability to utilize anatomical landmarks to optimize the exam. The exam provides video of oral mucosa, dentition, jugular venous distention, evaluation of thyromegaly, lower extremity edema, and dermatologic exam as well as the correct anatomic locations for auscultation of cardiac, pulmonary, and abdominal sites. The patient can also provide a detailed “Virtual History” utilizing voice recognition technology. Applicant claims the system can offer the average physician a reduction in patient encounter time up to 40%. The physician can then open real-time HIPAA compliant teleconferencing with the patient for further discussion of the treatment plan.

The review team found significant concerns regarding Path and Market Opportunity. The Path still lacks any reimbursement strategy or compelling value proposition that would drive adoption by the practitioners. Reimbursement for telemedicine is complex and rapidly evolving. The applicant states that “8+ point comprehensive physical exams” are required for full reimbursement, but this application does not align with existing reimbursement codes. Given the increasingly crowded telemedicine market space careful consideration of path and value proposition is needed. Market Opportunity does not define the addressable market.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Plan and Budget. The VPE was previously slated for completion in May 2015 and is now scheduled for ‘Fall 2015’ with no

explanation of the delay. Step one of the proposed project plan is contingent on having a completed VPE. The number of beta units was twenty. It has now been reduced by half, with an increase in Budget cost by \$10,000 without justification for the changes.

Recommendations for Improvement: Should UA choose to reapply for TVSF funding, the applicant should identify the applicable reimbursement code(s). An improved assessment of the competitive space and the value proposition of this device are required, including enumeration of the size of the addressable market.

Proposal 16-130	Case Western Reserve University	<i>Software for Dual Energy X-ray Coronary Calcium Imaging</i>
Amount Requested: \$50,000	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-130	Case Western Reserve University	Software for Dual Energy Xray Coronary Calcium Imaging								

Rationale: Applicant proposes further development and evaluation of software designed to tease out from dual-energy chest X-ray images new images of calcium in plaque in the coronary arteries. Such images, the applicants say, provide a way to detect coronary artery disease that is less expensive than CT imaging and more accurate than alternatives like cholesterol values and ultrasound images of carotid plaque.

Coronary artery disease is the leading cause of death in America and throughout most of the developed world. It is caused by fatty deposits inside the artery walls that become calcified. Visualizing this calcium has been shown to be a valuable indicator of arterial disease.

The gold standard for detecting calcium deposits in coronary arteries is CT. The applicants claim an equally effective, less expensive, and less radiation-intensive way to make measurements of calcium in the coronary arteries using dual X-ray images. The proposed software (which they call CorCalDx™) is designed to enhance visualization of calcium in coronary arteries.

Proposed funding would be used to: acquire both dual X-ray images and CT images for a group of patients suspected of having coronary artery disease for correlation, optimize the algorithms, and evaluate the sensitivity and specificity of the dual-energy method with respect to CT using a target of both above 85%.

The review team found significant concern related to Path to Market. The technology is dependent upon 3rd party X-Ray manufacturers to license and integrate. Further, the applicants did not provide a compelling narrative forming the rationale to induce practitioner behavior changes toward adoption of the method.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to IP, Market Opportunity, and Start-Up. The review team has concerns about what is protectable within this technology, especially in the early stages. By indicating that every X-Ray performed should also have this analysis, the Opportunity appears to be significantly overstated with no delineation of the truly addressable market. There is a reasonable likelihood of the technology being licensed, reducing the impetus for an Ohio Start-Up.

Recommendations for Improvement: Should CWRU choose to reapply for TVSF funding, the applicants need to provide a compelling rationale that the technology will drive behavior and investment by the medical community for the benefits gained, attempt to estimate the addressable market and business model, and address the concern that the technology is a better fit for licensing than for a Start-Up platform technology.

Proposal 16-131	University of Akron	<i>Electrospun Drug Eluting Implant Coating</i>
Amount Requested: \$49,814	Recommended: \$0	
Prior Phase 1 Application(s):	N/A	

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	3rd Party Review	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
16-131	University of Akron	Electrospun Drug Eluting Implant Coating								

Rationale: Applicant proposes further development and testing of an electrospun polymer (called Allomatrix™) mat impregnated with an anti-inflammatory drug to be wrapped around a tissue expander used in reconstructive surgery for the purpose of reducing or avoiding inflammatory response.

Electrospinning is an industrial technique for producing very fine fibers, often with unusual properties. The initial tests of this platform technology are directed toward devices used in breast reconstruction following mastectomy.

Breast reconstructive surgery is usually done in two stages: the first to implant a “tissue expander,” a doorknob-shaped solid made of silicone rubber that will serve to increase the amount of skin over the expander and to create a pocket for a permanent implant. The expanders are subject to complications, one of which is inflammation. The concept in this proposal is to wrap Allomatrix impregnated with an anti-inflammatory drug, either Zafirlukast (ZAF) or aspirin (AS). The model is to include the drugs in the polymer material before Allomatrix is spun.

A consequence of the inflammation is formation of a capsule of scar tissue around the implanted expander. The eluted drugs are expected to diminish formation of such a capsule, and measuring the difference in capsule thickness with and without the Allomatrix-based drug delivery system will define the efficacy of the approach.

The applicants have formed PolyFiberMatrix, LLC, intended to further develop and commercialize Allomatrix and other related products that will be licensed from the University.

Proposed funding would be used to manufacture the polymer and electrospun mats, optimization of the drug release, animal testing for safety and efficacy, and analysis of the results.

The review team found significant concerns related to 3rd Party and Start-Up. The proposal has not identified independent review activities or external work to be performed. A Start-Up entity is unnecessary within the proposed Business Model, as the drug eluting tissue expander would be licensed to a major device manufacturer, and the polymers would be manufactured at the GMP facilities of another medical device company. As such, direct licensing is a more suitable mechanism for this technology, and not aligned with the goals of the TVSF program.

This proposal is not recommended for funding.

A concern which was not sufficient to preclude funding relates to Path to Market. This is due to the significant amounts of money (\$2.3MM) and time (6-8 yrs.) to get to commercialization.

Recommendations for Improvement: Should UA choose to reapply for TVSF funding, an objective, accredited 3rd Party will need to be chosen to validate the technology. The applicants must also provide a directional Business Model that demonstrates the essential role of a Start-Up in the total value chain providing support for an ongoing concern, with particular attention to the technical and economic value propositions. Potential sources of future additional funds should also be identified.

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
16-132	Akron/Cleveland Clinic	Enzyme Catalyzed Polymers	Green Polymer Chemistry	Red	Red	Yellow	Red	Yellow	Red	Green	Yellow	Green
16-133	Cleveland Clinic	Infuseon Therapeutics	Commercialization of the Cleveland Multiport Catheter for Delivery of Therapeutics to the Brain	Green	Yellow	Yellow	Green	Green	Green	Green	Green	Green
16-134	Ohio State	NeuroPlay	NeuroPlay Gaming Therapy for Hemispatial Neglect	Red	Red	Green	Yellow	Yellow	Yellow	Green	Red	Green
16-135	Ohio State	Futurity	SPHERE	Yellow	Red	Green	Red	Green	Yellow	Green	Green	Green
16-136	Ohio State	Trellis Greenhouse Management	Trellis Greenhouse Management Software	Green	Green	Red	Green	Green	Red	Red	Red	Green
16-137	Ohio State	SpineDydx	SpineDydx - Spine Research Institute - Clinical Lumbar Monitor	Green	Green	Green	Green	Green	Yellow	Green	Green	Green
16-138	Ohio State	MatchTx	MatchTx: Cancer Treatment Matching Software for Clinical Trials and Research	Green	Green	Green	Green	Yellow	Green	Green	Green	Green
16-139	University of Akron	O2 RegenTech	OXAID	Yellow	Green	Green	Yellow	Green	Green	Green	Green	Green
16-140	Ohio State	ALCI Innovations	ALCI Glass Cleaner	Red	Green	Yellow	Yellow	Green	Yellow	Green	Green	Green
16-141	Nationwide Children's	GenomeNext	GenomeNext	Red	Red	Green	Green	Green	Green	Green	Green	Green

DEFINITION OF COLUMNS²:

Proposal # – A unique OTF number for each proposal

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

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

Proof/ Likelihood to Raise Additional Funds – The proposed proof needed to raise additional funds for commercialization is meaningful to investors and is expected to materialize.

Project Plan / Budget Narrative (Use of Funds) – Proposed proof needed to move the technology forward can be generated during the one year project period with the proposed resources and description of how the entity proposes to use the funding if received

Team – Experience and commitment of the team members in the commercializing new technology

Business Model – Realism and achievability of the proposed business model

Company Backing – Stability and backing of company, must have demonstrated backing and support independent of the university

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 will execute a license with the Ohio institution within nine months of the date of the submission.

Opportunity/Market Size – Potential opportunity for the start-up in regards to the potential market size and competition

Start-up in Ohio – Company plans to stay in Ohio

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.

² Note: In Round 9, some columns with related focus have been merged for clarity of the graphic. ESP Interaction has also been added to the RFP criteria.

DETAILS OF PHASE 2 RECOMMENDATIONS

Proposal 16-132	Enzyme Catalyzed Polymers	<i>Green Polymer Chemistry</i>	
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

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
16-132	Akron/Cleveland Clinic	Enzyme Catalyzed Polymers	Green Polymer Chemistry									

Rationale: Applicant proposes further development of a molecule carrying folate groups that attach to folate receptors on the surface of a breast cancer cell and become incorporated in the cell to aid diagnosis and therapy.

The molecule in development contains the common polymer, polyethylene glycol (PEG), which has the ability to attach multiple folate groups. It can then bind to folate receptors on the surface of a cancer cell. Folate is known to be expressed on the surface of some breast cancer cells. If the molecule also carries a tracer, such as fluorescein, it can be used for diagnosis; if it carries an anti-cancer drug, it can be used for therapy.

The platform technology could be used for diagnosis and treatment of other forms of cancer. The full nature of the trade secret technology was not disclosed.

A rodent model study conducted during early research displayed fewer and milder side effects than typical anti-cancer drugs. However, a clinical trial was not performed at that time because of a lack of reproducible manufacturing of the molecule and the optimum number of folate groups attached to one polymer molecule had not been established. Those shortcomings have reportedly been overcome.

Proposed funding would be used for synthesis and characterization of the molecule, animal testing, and scale up at a 3rd Party.

The review team found significant concerns with the application with respect to Additional Funds, Budget, Business Model, and IP. The stage of development of this technology is more pertinent to a Phase 1 application than a Phase 2 Start-up. Procurement of Additional Funds at the Phase 1 stage of development is unfeasible. The majority of the work (\$120K or 80%) is Budgeted to be performed by the licensor, which does not meet the program criteria for a Phase 2 proposal. The Business Model is largely undefined and proposes four to five years with minimal revenue, possibly based upon sales of the intermediate product for research at other

institutions. The application states that “a patent application for the optimized MPDC will be...filed...in the next four months. As this is the core technology under development the IP should already be protected prior to application to the TVSF program.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team, Company Backing and Start-Up. These concerns may no longer apply if the applicant reapplies as a Phase 1, but are proffered should the applicant reapply as a Phase 2. The team is very heavily technical in nature, with only a 10% commitment from the proposed CEO to cover business development, fundraising and strategic planning. No Company Backing outside of grant funding exists, which echoes concerns around raising additional funds and the state of development of the technology. Finally, it isn’t entirely clear what the purpose of the Start-Up is at this early stage, and whether a standalone company is needed until further development work has been completed and strategy clarified.

Recommendations for Improvement: Should University of Akron and ECP choose to reapply for TVSF funding, the review team suggests reworking the proposal as a Phase 1 application.

Proposal 16-133	Infuseon Therapeutics	<i>Commercialization of the Cleveland Multiport Catheter for Delivery of Therapeutics to the Brain</i>	
Amount Requested: \$150,000	Recommended: \$150,000		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	15-796

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
16-133	Cleveland Clinic	Infuseon Therapeutics	Commercialization of the Cleveland Multiport Catheter for Delivery of Therapeutics to the Brain									

Rationale: This proposal is a resubmission of 15-796 which was not recommended for funding due to concerns regarding Team, Business Model, and Start-Up. This proposal does adequately address the previous concerns of the reviewers.

Applicant proposes further development of a special catheter for convection-enhanced delivery (CED) of therapeutic drugs to brain tumors.

Although the circulatory system flows throughout the brain supplying oxygen to power neural activity, the blood itself is kept entirely separate from the neural structures by the blood-brain barrier. This anatomical fact creates a problem for delivering a therapeutic drug to a tumor in the brain because the barrier also stops the drug molecules.

Various methods have been tried, and most have been found wanting, but a special catheter, called the Cleveland Multiport Catheter (CMC), has been found effective for delivering therapeutic drugs to brain tumors. Details of the catheter design are Trade Secret until patent issuance. By itself the CMC is not a therapeutic device, but the CMC filled with a drug is. The platform technology may be used for multiple drug combinations and for numerous cancer types. The technology will be sold to drug development partners directly, with additional revenue from implementation services, milestone licensing fees, and eventually royalties.

Proposed funding would be used to prepare submission and obtain FDA 510K approval, develop pharmacokinetic metrics, create an FDA compliant database, and for Marketing activities.

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

Concerns which were not sufficient to preclude funding relate to Budget and Team. The applicant’s management Team struggled to articulate Business Model metrics during the interview. The Budget is not as solidified as the review team would prefer. 510K approval costs are approximated and could be insufficient or over-projected. Further, a major portion of the Budget is for market entry acceleration; however the proposal does not quantify the chronological effect of that investment, only the essential nature of the work for commercialization.

Proposal 16-134	NeuroPlay, Inc.	<i>NeuroPlay Gaming Therapy for Hemispatial Neglect</i>	
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

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
16-134	Ohio State	NeuroPlay	NeuroPlay Gaming Therapy for Hemispatial Neglect									

Rationale: Applicant proposes further development and validation of a computerized training device that is expected to help victims of hemispatial neglect (a deficit observed in patients due to brain injury or stroke).

Hemispatial neglect is a phenomenon observable in patients with brain lesions or infarcted areas due to injury or stroke on one side of their brains. The consequence is that they neglect – that is, are quite unaware of one side of their bodies, failing to see, feel, hear, smell, or touch things that are there. Usually, they have not suffered sensory loss, but their brains simply fail to register the stimuli. For example, a patient with hemispatial neglect may eat only the food on one side of the plate, or, if asked to draw a clock, may draw a semi-circle with only the numbers 6-12. The condition interferes with ordinary activities.

The technology is a 3D video game, consisting of a compact personal computer, a device that tracks the direction of eye gaze, and a 3D image generator. A prototype has been tested with a limited sample of four patients, who showed improvement on standard tests and life skills.

Proposed funding would be used for design finalization, prototype manufacture, clinical trials, database creation, 510K FDA submission, marketing, iterative design work, and development of a second product.

The review team found significant concerns with the application with respect to Proof, Additional Funds, Plan, and Start-up. A Start-up has not yet been formed: the CEO and listed Secretary of State Registration Number belong to a venture capital firm. The stage of development of this technology and proposed Proof points are more pertinent to a Phase 1 application than a Phase 2 Start-up. Procurement of Additional Funds at the Phase 1 stage of development is unfeasible. The Plan activities are too early for commercialization.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Budget, Business Model, Company Backing, and IP. There are mathematical errors in the Budget narrative. The Business Model is lacking in details and there is a significant gap in needed funding without committed sources of capital. There is no firm commitment from external sources and the product may need to be bundled with technology from other entities to become marketable. Copyrights provide minimal IP protection.

Recommendations for Improvement: Should OSU/ IKOVE choose to reapply for TVSF funding, the review team suggests reworking the proposal as a Phase 1 application.

Proposal 16-135	Futurety, LLC	<i>SPHERE</i>	
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

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
16-135	Ohio State	Futurety	SPHERE									

Rationale: Applicant proposes further development of a Clinical Decision Support Software (CDSS) called SPHERE. This technology extracts patient data from Electronic Health Record (EHR) systems and makes it available to physicians and their patients during appointments with a

simplified visual ‘traffic light’ (red/ yellow/ green) indicator for specific factors, augmented by a 1 to 100 overall score for evaluating a particular health risk, such as cardiovascular disease. The assessment is based on the American Heart Association risk factors.

Electronic Health Records (EHRs) are federally incentivized for Medicare and Medicaid patients in the United States³. Some states have mandated EHR use⁴. Currently, EHRs primarily serve as data repositories. Most patients and physicians do not interact with the stored data. This technology extracts data from EHRs, analyzes the data via an algorithm and delivers it in an interactive visual format that facilitates patient/doctor interactions.

The technology is desired to fill a need in the market to meet missed ‘Meaningful Use’ and patient satisfaction goals dictated by the American Recovery and Reinvestment Act phased regulations and Insurer reimbursement structures. Some reimbursements are reduced when patients fail to engage with electronic health records and patient portals². Further, patient satisfaction scores fall without this interactivity.

Healthcare systems, looking to improve upon reimbursements, are the target market. The technology is a platform that can expand to implement additional health risk condition modules through future development. Further, it has the Early Mover benefit of extant integration with EPIC’s EHR, which serves over six million patients.

Proposed funding would be used for commercial grade refinement of the software, HIPAA regulatory audit, and implementation of technology at three sites in Ohio.

The review team found significant concerns with the application with respect to Budget and Business Model. The applicants did not adequately explain the need for State grant funding to conduct the three proposed trials, since they are to be paid for by the customers. Further, it appears that team personnel and travel costs are included in the budget which does not fit within the TVSF program rules. Business Model fundamentals were inconsistent within the information provided by the applicant. The review team has significant concerns about the pricing strategy, projected growth curve, and cost calculations. Further the applicant did not address likely pressures from competitive responses, especially over time. Also absent was any discussion of the necessary FDA approvals process for a Clinical Decision Support Software (CDSS), creating uncertainty about the path to market.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to IP and Proof. Copyrights provide minimal IP protection. Proof of improved outcomes for the patient were alluded to, but

³ Positively 2011-2016 with grants of \$44K-\$63K and negatively for Medicare -1% in 2015, up to -5% in 2019.

⁴ MA, MN mandated; MD financial incentives and penalties

not incorporated quantitatively in either the application narrative or the Plan milestones. Without demonstrable clinical outcome improvements, uptake by practitioners may diminish.

Recommendations for Improvement: Should Futurety choose to reapply for TVSF funding, the Business Model will need to be refined and precisely communicated to ensure the technology will support an ongoing concern. Justification for the need for State funding must be provided and the Budget must be fully aligned with the TVSF proposal guidelines. Positive clinical outcomes should be presented quantitatively in the narrative.

Proposal 16-136	Trellis Greenhouse Management	<i>Trellis Greenhouse Management Software</i>	
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	15-197	Prior Phase 2 Application(s):	N/A

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
16-136	Ohio State	Trellis Greenhouse Management	Trellis Greenhouse Management Software									

Rationale: This proposal is a resubmission of a Phase 1 application (15-197) which was not recommended for funding due to concerns regarding Market Opportunity. This proposal does not adequately address the previous concerns of the reviewers.

Applicant proposes further development of software for managing educational research greenhouse facilities. The technology was developed by OSU as an in-house solution called ‘Trellis’ to address feature deficits in existing greenhouse management tools, including both commercially focused products and insufficient intramural tools. Broader marketing focus would target commercial and hand held device clients in future years.

Proposed Funding would be used for Beta prototyping, and Sales & Marketing efforts.

The review team found significant concerns with the application with respect to Team, Market Opportunity, IP, and Start-Up. A Start-up has not yet been formed. Further, the negligible Market Opportunity does not warrant the creation of a Start-Up. The Team lacks any independent personnel, as it is comprised of two existing companies [Consolidated Greenhouse Solutions, LLC (est. 2012) and Rampart Hosting, LLC (est. 2005)]. As such, there is no individual responsible to lead this endeavor towards successful commercialization by an Ohio Start-Up. The IP has already been optioned to the two above entities and as such is unavailable to a new Start-Up. Further, copyrights and trademarks provide minimal IP protection.

This proposal is not recommended for funding.

Recommendations for Improvement: Ohio State University should continue to work directly with the existing companies they identified, or another, to license this technology for commercialization as an additional product offering.

Proposal 16-137	SpineDynx	<i>SpineDynx - Spine Research Institute - Clinical Lumbar Monitor</i>	
Amount Requested: \$150,000	Recommended: \$150,000		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	

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
16-137	Ohio State	SpineDynx	SpineDynx - Spine Research Institute - Clinical Lumbar Monitor									

Rationale: Applicant proposes to further develop technology, called SpineDynx, which assesses lower back pain (LBP) and its likely origin based on objective, quantified measurements of lumbar motion. The value of the technology lies not only in the device design but also in the data base assembled over a period of three decades, relating findings from the device to medical diagnoses and recommended treatments.

Lower back pain is an almost ubiquitous ailment, said to affect 80% of the American population at some period in their lives. With annual costs of up to \$350 billion for treatment and medication, having objective measures of LBP is of great interest to insurers and to industries where LBP is common. LBP has a misdiagnosis rate of up to 75%. The technology utilizes a wearable hardware component (vest/ waist harness) fitted to the patient who participates in a 15-minute test. The test is a video game-like experience to assign a ‘motion signature’ for comparison with the vast normative database to provide an objective quantitative measure of impairment, structural or muscular origin, and sincerity of effort by the patient. Clinicians then utilize these results for treatment planning and return to work decisions.

Two organizations – the Ohio Bureau of Workers Compensation (OBWC) and Schneider National, a trucking and logistics company – have committed to fund and conduct validation studies of the technology, if SpineDynx refines the device by optimizing the hardware and software in preparation for small-scale manufacturing and eventual scale-up. These studies will support regulatory filings as well as provide critical observations about suitability of the device in the context of an insurance entity and an industrial client.

Proposed funding would be used to refine the beta prototype to enable the manufacture of five commercial grade prototypes for deployment in the validation studies utilizing Ohio resources.

State funds would provide a meaningful investment to accelerate an impactful technology with great ties into Ohio. The written application stated that successful completion of Phase 2 work would lead to an angel investment, but during the in-person interview the review team learned that commitment was accelerated and is now in hand. After careful review of funding needs and targeted use of state funds, the review team agrees that Phase 2 funds will still be applied, as planned, to refinements to the device to make it commercial-ready. The revised timing of the angel investment simply allows some activities to be accelerated, and the state award remains a critical enabler.

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

A concern which was not sufficient to preclude funding relates to IP, as Trade Secrets provide minimal IP protection. However, the vast database, derived from decades of research efforts, presents a formidable barrier to entry.

Proposal 16-138	MatchTx	<i>MatchTx: Cancer Treatment Matching Software for Clinical Trials and Research</i>	
Amount Requested: \$125,000	Recommended: \$125,000		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	15-794

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
16-138	Ohio State	MatchTx	MatchTx: Cancer Treatment Matching Software for Clinical Trials and Research									

Rationale: This proposal is a resubmission of 15-794 which was not recommended for funding due to concerns regarding Team, Business Model, and Company Backing. This proposal does adequately address the previous concerns of the reviewers.

Applicant proposes further development of algorithms for analyzing the genetic profiles of clinical trial subjects, with the aim of identifying those subjects who are most likely to show a positive response to the drug tested, and potentially, to select the best cancer drug for treating an individual cancer patient.

The specific mutations driving cancer vary depending on location in the body and can vary between patients with the same type of cancer. The technology combines genomic data and clinical outcome data in a single platform to match each individual patient to the best treatment

using classification algorithms and a reference data set of genomic and outcome data. The service returns to the customer the best drug treatment matches inferred for each patient based on personalized genetic and clinical data as matched to the set of previous patients and their genetic and clinical profiles, treatments, and actual outcomes. Using genomic, clinicopathologic, and therapeutic data, including outcomes, the algorithm matches (classifies) new patients to previous patients that were treated effectively.

Proposed funding would be used for technology migration, software development and system validation.

The applicant has bolstered the Team with a full time COO with more than 30 years of healthcare executive management experience. They have obtained an external regulatory expert opinion supporting their path to market.

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

A concern which was not sufficient to preclude funding relates to Company Backing. The Applicant has obtained Letters of Intent from three universities to purchase. Further REV1 has committed to follow on funding upon consummation of at least two of those. These assurances are not equivalent to cash in hand, but do represent external endorsement.

Proposal 16-139	O2 RegenTech	<i>OXAID</i>	
Amount Requested: \$150,000	Recommended: \$150,000		
Prior Phase 1 Application(s):	13-506	Prior Phase 2 Application(s):	N/A

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
16-139	University of Akron	O2 RegenTech	OXAID									

Rationale: This proposal is an extension of the concept developed earlier in an approved Phase 1 proposal (13-506).

Applicant proposes further development of an oxygen carrying hydrogel wound technology called OXAID.

It is well-known that oxygen promotes wound healing, and most wounds with adequate blood supply get sufficient oxygen from the blood. However, wounds on patients with compromised blood flow often do not heal properly and become chronic wounds. Bandages made with

hydrogels, which keep the wound moist and protected, are of some help and are widely used. In some cases the treatment can be improved by bringing oxygen to the site, either by placing the patient in a hyperbaric chamber or by covering the wound site with some kind of tent into which oxygen is introduced, but these treatments are expensive and awkward to carry out.

OXAID employs a hydrogel that also has the ability to absorb oxygen and then release it over a period of time, thus gaining the therapeutic effects of both hydrogels and oxygen. The bandage is constructed from chitosan modified with perfluorocarbon chains for oxygen uptake and subsequent release. Animal model testing conducted under a TVSF Phase 1 award has shown the technology to have performance superior to ordinary hydrogel dressings.

The proposed Plan will demonstrate scalable manufacturability as a Proof point for investors and allow for sufficient future prototype production for 510K FDA submission pre-clinical work.

Proposed Funding would be used to set up a regulatory compliant pilot manufacturing facility and finalize the design. This facility will then supply product for additional testing and eventually commercial product post-FDA approval until larger scale manufacturing can be established.

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

Concerns which were not sufficient to preclude funding relate to Proof and Business Model. The Plan outcomes are all pertinent to the furtherance of this technology in the marketplace. However, many lacked precisely defined quantitative Proof end points. Although the Business Model has high potential and excellent margins, it lacked sufficient details and sophistication to engender full confidence. It should be significantly refined prior to seeking external follow-on funding.

Proposal 16-140	ALCI Innovations	<i>ALCI Glass Cleaner</i>	
Amount Requested: \$100,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	N/A

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
16-140	Ohio State	ALCI Innovations	ALCI Glass Cleaner									

Rationale: Applicant proposes to commercialize an odorless, all natural, human safe cleaner for the hospitality industry. It is especially effective at cleaning lipids from glass, but can also be used as a multipurpose cleaner for non-food preparation surfaces.

The trade secret formula developed at OSU is nontoxic, odorless, and significantly more effective at lipid removal from glass than existing products. These benefits decrease potential injuries from breakage, improve customer satisfaction, and reduce glass cleaning labor by 50% to 80%. Market surveys indicate significant potential demand for the product even at a higher price point than existing products.

The proposed market path is to leverage large food service distributors to employ the product into the high end restaurant market and then branch out into other hospitality industry segments. Applicant plans to develop additional problem solving products with an Ohio startup.

Proposed funding would be used for a market pilot in 40 regional restaurants, sample production, and marketing activities to secure a large distributor order.

The review team found significant concern with the application with respect to Proof. The Proof does not identify the specific measureable endpoints that the distributor(s) are expecting from the market pilot study in order to secure an order. Further, the distributor may not consider the market pilot as objective given the close relationships of the customers and the applicants.

This proposal is not recommended for funding.

Concerns which were not sufficient to preclude funding relate to Team, Business Model, and IP. Trade Secrets provide minimal IP protection. Although experts in the hospitality market, the Team needs to be augmented by a principal or advisor with significant business acumen in the commercialization of manufactured consumer products, as the skills necessary to manage the supply chain and bring a chemical to market are dissimilar from restaurant operations. This will be especially critical as the product line expands. The Business Model is lacking in sufficient details to assure success as an ongoing concern. Of particular concern is the heavy dependency upon the distribution model, without having solidified terms of the relationships. The nuances of potential exclusivity arrangements, discount structures, supply chain models, and a lack of attention to potential competitive responses add to the review team's apprehension.

Recommendations for Improvement: Should ALCI choose to reapply for TVSF funding, the Proof endpoint(s) must be identified and agreed to with the chosen distributor, and the Plan modified to ensure those metrics are met. The Business Model needs to be fortified to ensure maximal success. The Team should be augmented with manufactured goods expertise.

Proposal 16-141	GenomeNext	<i>GenomeNext</i>	
Amount Requested: \$150,000	Recommended: \$0		
Prior Phase 1 Application(s):	N/A	Prior Phase 2 Application(s):	14-435, 15-797

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
16-141	Nationwide Children's	GenomeNext	GenomeNext									

Rationale: This proposal is a resubmission of 15-797 (itself a reapplication of 14-435) which was not recommended for funding due to concerns regarding Budget. This proposal raises new budgetary concerns.

The applicants propose to take the Churchill genetic analysis software, developed at the Nationwide Children's Hospital Research Institute in Columbus, and use it as the basis for a cloud software offering. The business would offer storage of genetic data as well as analysis. The applicants claim Churchill provides results that are identical in quality to the much slower (2 weeks vs. 2 hours) gold standard bioinformatics approach, achieving the clinical gold standard of 100% reproducibility.

Proposed funding would be used for Sales & Marketing activities, and further software development.

The review team found significant concerns with the application with respect to Proof and Budget. No definitive Proof end-points were identified in the proposal, and it would appear that project activities are entirely different from the previous application with no explanation offered. Projected revenues for 2015 are more than \$2.8MM. This great fiscal progress negates the need for State grant funding for the Budgeted activities. Further, despite the concern around use of funds in a prior review no budget narrative was offered to explain who will be providing purchased services to the company.

This proposal is not recommended for funding. The technology is compelling and the applicants are making significant progress in creating a robust business, but the fit with the TVSF program is suboptimal.

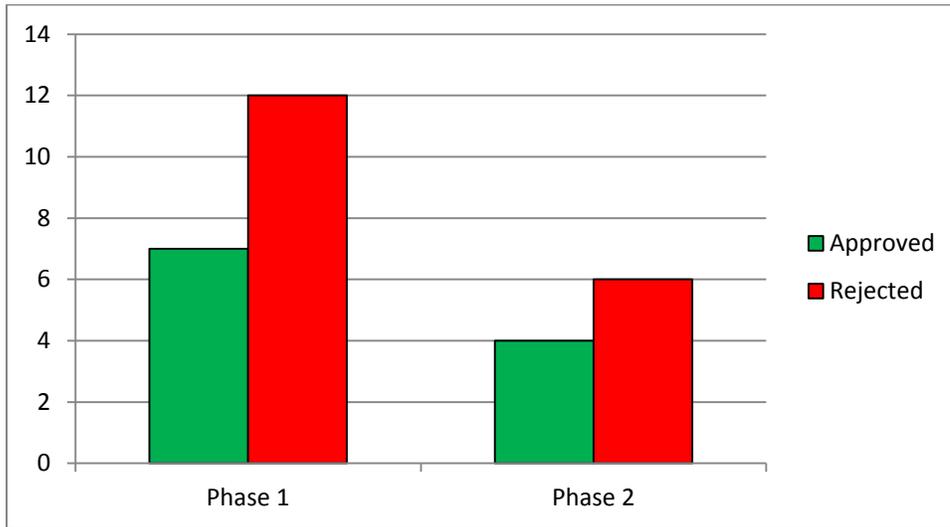
Recommendations for Improvement: GenomeNext has made an excellent commercialization inception and should self-fund or raise equity to further develop this technology.

FINAL SUMMARY

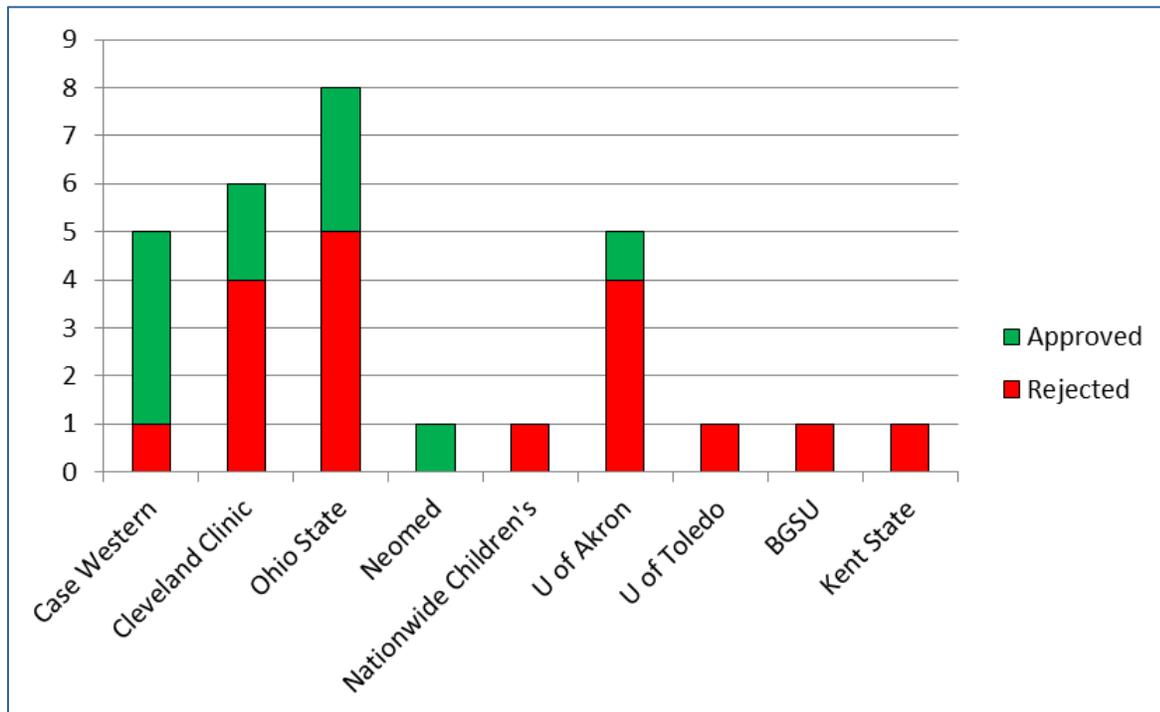
The Review Team is recommending 11 of the 29 finalized proposals (38%). The previous low was 30% in Round 4, and the high was 57% for Round 7. For this current round, 7 of the 19 Phase 1 proposals are recommended for funding (37%). For Phase 2, 4 of the 10 submitted proposals are recommended for funding (40%). 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.

For both Phase 1 and Phase 2, proposals which were recommended for funding did not have a “fatal flaw” in the proposal. The “fatal flaw” is 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.

PHASE 1 AND 2 RECOMMENDATIONS CHART



COMBINED APPROVED/REJECTED CHART BY INSTITUTION



If any applicant desires feedback or further clarification on the above recommendations a review session can be arranged through the Ohio Development Services Agency.

APPENDIX A-TEAM MEMBERS

TECHNICAL REVIEWERS' CREDENTIALS

John Banisaukas (Advanced Materials)

Summary:

An independent consultant specializing in Government Contracts Program Management and Administration, as well as a technical consultant to the carbon fibers advanced composites industry. Has a broad background and over forty years' experience in advanced composite materials.

Core Competencies/Field of Expertise:

Carbon Fiber

Advanced Composites

UCC's Parma, OH Research Center

Carbon Fiber Research and Development Engineer

UCC / BPA Carbon Fiber & Advanced Composites facility, Greenville, SC 21 years

Chairman of the Suppliers of Advanced Composite Materials Association (SACMA) Technical Affairs

Steering Committee

Marshall Heard (Aero Propulsion and Power Management)

Summary:

Expert joined the Florida Aerospace Alliance in 1999 after a 34-year career with the Boeing Company. He served as both Vice Chairman of the Alliance and Executive Director prior to becoming Chairman. While with Boeing, he divided his efforts between engineering, marketing/business development, and project management. As a Vice President he directed the Tandem Rotors Programs (CH-46 and CH-47), the Comanche Program (RAH-66), and served as the Deputy Program manager of the V-22 Joint Program Office. He was also Vice President of marketing/business development for Boeing's passenger, cargo, and tanker military aircraft programs and was Boeing Aerospace's senior executive in their Washington, D.C. office.

Expert has served on numerous Cabinet-level panels and commissions (including the Defense Science Board and the Commercial Space Transportation Advisory Committee). He has been a frequent witness before both the U.S. Congress and foreign legislative bodies on the subjects of strategic deterrence, battlefield mobility, and the role of technology in national defense policy. In addition to his role with the Florida Aviation Aerospace Alliance he also serves on the boards of Enterprise Florida, Inc., the National Aerospace Technical Advisory Committee and several other organizations. He has a keen interest in promoting science, technology, engineering and math (STEM) and serves on the Florida Coalition for the Improvement of Math and Science (CIMS), the Florida Center for Advanced Aero-Propulsion and is an Executive Committee member of the Aerospace Resources Center (ARC), the state's first BANNER center. Expert has an active aerospace related consulting practice specializing in business development and the integration of large scale systems.

Education:

A graduate of the U.S. Naval Academy, he also holds advanced degrees in engineering and business management from the University of Illinois and the Massachusetts Institute of Technology

Robert Hill (Agribusiness and Food Processing)

Summary:

Innovative Formulation Chemist with more than 25 years of successful experience in research and development of product formulations for herbicides, insecticides, and fungicides, as well as consumer products. A seasoned research scientist with experience at Dow Agrosiences and Colgate Palmolive. Developed novel formulations, led process development and scale-up activities, and established hygiene and safety procedures, including responses to EPA regulatory requests. Has worked in lab, greenhouse and small scale field evaluations,

Core Competencies:

Formulation Chemistry
Surface Chemistry
Biotechnology
GLP
Project Management
Project Deliverables
Insect, Fungi, Plant Formulations
Pre-Formulation Research
Formulation Development/Delivery

Education:

University of New Mexico
Field: Physical Chemistry
Degree: Ph.D.

James Mellentine (Fuel Cell and Energy Storage)

Summary:

A Project Management Professional (PMP) and LEED Green Associate, combining years of fast-paced business consulting experience with renewable energy & energy storage technology, economics, and policy research. Directed the analysis, design, quality assurance, deployment, and training activities for complex system implementations and business transformations. Recommended logistics process transformations and performance management solutions based on industry best practices customized for client needs. Conducted broad energy systems and policy research.

Core Competencies:

Project Management
Business Consulting
Renewable Energy
Energy Storage
Flow Batteries
Energy Systems Analysis
Project Financial Analysis
Energy Project Feasibility
Life Cycle Assessment

Sustainable Building

Education & Certifications:

University of Iceland/University of Akureyri, Master of Science, Renewable Energy Systems & Policy
University of Michigan, Bachelor of Engineering, Mechanical Engineering
University of Michigan, Bachelor of Engineering, Aerospace Engineering
Project Management Professional (PMP), Project Management Institute
LEED Green Associate, Green Building Certification Council

Phil Drew (Medical Technology)

Summary:

Expert provides data and analysis to users and manufacturers of medical imaging equipment. For hospitals and radiologists, the Expert 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

John McClure (Business Reviewer)

Summary:

Over 20 years of management experience. Expert builds shareholder and customer value through the development and implementation of creative business strategies and new product/service offerings for existing and new markets. Demonstrates the ability to successfully start up technology business ventures, including hardware, software, Internet, e-Commerce, and telecommunications solutions.

Experience

Sicuro-China LLC. - President & Chief Executive Officer
Comm South Companies, Inc. - President & Chief Executive Officer
ADVAIL Communications, Inc. – 2001 - Chief Operating Officer & General Manager
Wintegrity, Inc. – President & Chief Executive Officer

Electronic Data Systems Corporation (EDS) – Business Unit Vice President, Strategic Global Opportunities

Core Competencies/Field of Expertise:

Bankruptcy
Mergers and acquisitions including due diligence
Operations management
Financial support including public and private fund raising
Support of the development and presentation of client business plans

Education:

University of Iowa & Roosevelt University, Accounting

Joel Studebaker (Software Applications)

Summary:

Over 30 years of experience in project management and in all phases of the software development life cycle for pharmaceuticals, biotechnology, blood banking, and other industries. Experience in drug discovery, high-throughput genotyping, and analysis of medical and pharmacy claims.

Experience

Integrated eCare Solutions – Director of Data Analysis
CareAdvantage – Senior Data Manager
Orchid BioSciences – AD of Informatics
IBM – Advisory Engineer, Senior Industry Specialist

Core Competencies/Field of Expertise:

Project Management
Oracle 10g
Informatica 8.1
Erwin Data Modeling
SQL
Clinical Risk Grouper
SAS
Toad

Education:

Harvard University, Degree: Ph.D. Chemical Physics
Stanford University, Degree: B.S. Chemistry

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.

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:

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.

Numerous Proposal/Marketing courses Lockheed martin Co.

Margaret Ryan (Sensing and Automation Technologies)

Summary:

Chemistry Expert with broad range of Research, Consulting and Academic experience

Core Competencies/Field of Expertise:

Chemical sensors

Jet Propulsion Laboratory

Principal Member of the Engineering Staff, Power and SENSOR Systems Section,

Chemical sensors

Alternative SENSORS include an all silicon carbide sensor for identification of hydrocarbons and hydrocarbon mixtures for automotive applications, colorimetric oxidation sensors, and electronically conducting molecularly imprinted polymer sensors for identification of organic compounds in water.

Education:

PhD in Physical Chemistry from the University of Massachusetts

Walter Gist (Situational Awareness and Surveillance Systems)

Summary:

Successfully created and operates a consulting firm specializing in military aircraft avionics, advanced situational awareness, and weaponization. Several years of experience assisting foreign companies successfully market airborne equipment to the US military market. Organized and participated in proposal development, review and vetting. Has 41 years' experience in marketing to the large US military OEMs like Boeing, Lockheed-Martin, Northrop Grumman, and BAE Systems. Understands the process by

which foreign companies obtain access to International Trade in Arms Regulations (ITAR) controlled information and the rules and guidelines for doing so. He has also assisted in the merger and acquisition process.

Experience:

BAE SYSTEMS - Director, Business Development
GEC-Marconi/Plessey, Plc - Marketing and Sales Manager
Simmonds Precision - Aerospace Regional Manager

Core Competencies/Field of Expertise:

Mechanical Engineer by trade
New Business Development
Customer Relations
Marketing and Sales
Business Development Process

Education:

Business Administration, Pepperdine University Graziadio School of Business, Los Angeles CA

Timothy Newbound (Solar Photovoltaics)

Summary:

Organometallic synthesis of highly air- and moisture-sensitive compounds. Analytical evaluations using multi-nuclear NMR, FTIR, UV-vis, ESR, GC, x-ray structures and other methods to describe novel compounds described in peer-reviewed publications. Oil and Gas industry root-cause materials failure analysis for gas-oil separation plants (GOSPs), Water Injection Pump Stations (WIPS), pipeline systems (sour gas collection and Sales gas), Gas Plants (Amine sweetening and sulfur removal), natural gas and NGL fuel conditioning, dew-point control and light hydrocarbon separations. Research project management, project proposals, economic and technical feasibility studies and corporate strategic research assessments from industry-wide due diligence. Semiconductor materials development (Group IVA) and process scale-up for manufacturing of hydrocarbon functionalized nanocrystalline silicon free of surface oxides. Developed novel architectures using these materials in solar PV and Li-ion secondary batteries. Patent processing and intellectual property evaluation. Multiple international publications including ASME/IGTI O&G Division Best Paper Award, 2004.

Core Competencies:

Natural gas conditioning, dew-point control, dehydration, heavy-ends composition, (CGTs)
Natural gas corrosion inhibitors (US patent # 6,920,802, July 26, 2005)
Cross-functional team industrial applied research project management
Analytical materials identification and root-cause failure determination
Technical reporting and presentations preparation and delivery
Organic, inorganic and organometallic synthesis and characterization
Semiconductor (Group IVA) nanomaterials manufacturing process development

Education & Certifications:

Ph.D., Inorganic Chemistry, University of Utah

Thesis: "Substitution Effects and Reaction Chemistry of Metal-Pentadienyl Complexes"

B.S., Chemistry, Eastern Michigan University

Shankar Rananavare (Advanced Materials)

Summary:

A physical chemist, having extensive experience consulting in a wide range of subjects, including development of nano-sensors, nano-materials for nano-electronics, development and optimization of chemical formulations for agricultural, chemical, semiconductor and oil industries. Has also consulted extensively in modern high tech areas involving photo-lithography, resolving IP disputes among government and private sectors. Published over 50 peer reviewed papers and presented over 50 conferences at national and international level.

Core Competencies:

Chemical formulations, lipids, surfactants etc.

Drug delivery vehicles: Micro-emulsions, emulsions and vesicles.

Formulations for selective wet etching for semiconductor industry.

Photoresist and photo-lithography and nano-patterning.

Liquid crystals and flat panel displays.

Analysis and technology assessment.

Synthesis and characterization of nano-materials such as nano-particles, nano-wires, nano-tubes.

Education:

Ph.D., Physical Chemistry, University of Missouri-St. Louis, MO

B.S. Chemistry & Physics, Bombay University

Scot Liston (Business Reviewer)

Summary:

Over 20 years of management experience. Expert builds shareholder and customer value through independent consulting for start-ups, new business development organizations of large firms, and non-profits. Demonstrates the ability to lead and scale organizations focused on growth across new product & service development launch and scaling in consumer household, beauty, and health products, electronic component b-2-b, medical devices, medical services and franchising services.

Experience

Principal, Your Encore & independent business consultant

Finance Manager– Venntis, LLC, an electronics-based start-up company

CFO, FutureWorks & Agile Pursuits Franchising, Procter & Gamble – financial leadership to develop, launch and scale portfolio of new products and services across consumer products, medical, and services

Divestiture Leader, sale of Folgers to J.M. Smucker, Procter & Gamble

Sales Finance Manager, North America Market Strategy & Planning, Procter & Gamble

Division CFO, North America Coffee Products (Folgers & Millstone coffee, \$1.6B revenue)

Core Competencies/Field of Expertise:

Strategic Financial Leadership

Market & Customer/Consumer Analysis

New Business Development/New Product Launch
Financial Planning, Modeling & Management

Education:

MBA, Finance, Indiana University, Bloomington, IN
BS, Grace College, Winona Lake, IN

YourEncore Senior Manager-Robert Worden

Robert has held a variety of sales, marketing and business development roles over a 20-year career, both as an individual contributor and as a manager. He has extensive work experience across the globe, with a concentration in Latin America. His core competencies include sales, marketing, business development, general management, and Six Sigma (certified Black Belt). He earned his MBA from the University of Virginia.

YourEncore Project Manager-David Young

David Young is a Project Manager with YourEncore and has led projects in numerous industries. He also assists with business development, rule harvesting and analysis, and Engagement Management. His core competencies include Project Management, Program Management, business rule definition and analysis, and process definition. If a proposal fell outside the technical experts' core capabilities, the Project Manager engaged an Expert from YourEncore's network with deep expertise in the proposal's specific technical area.

YourEncore Expert – Gregory L Workman II

Greg has a Master of Business Administration (MBA), BS Chemistry (ACS), is a Six Sigma Master Black Belt, and Certified Quality Manager, he has 25 years of industrial experience in Food/Pharma, Chemical Manufacturing, Electronics, Logistics, and Construction Services. Included in this experience are extensive Project Management and Business Process Design. He currently leverages this experience as a YourEncore expert to Create Business Processes and Implement Process Improvements to existing methodologies for firms of all sizes (Startups to Fortune 500) in diverse industries (Food, Medical Devices, Packaging, Cosmetics, etc.)

He utilizes his Project Management skills to lead the TVSF review process; and Business Evaluation skills to review the individual proposals for merit.

APPENDIX B-OVERVIEW TECHNOLOGY VALIDATION AND START-UP FUND

DEVELOPMENT’S PURPOSE FOR FUND

Ohio’s Third Frontier (OTF) created the Technology Validation and Startup Fund (TVSF) to accelerate economic growth in Ohio through helping Ohio-based entrepreneurial companies commercialize technologies developed by Ohio institutions of higher education. The TVSF will accomplish this through:

1. **Validating Technologies:** Enhancing the commercial viability of protected technologies developed by Ohio institutions of higher education by supporting validation activities such as developing prototypes, demonstrations, and/or assessments. These validation activities will help generate the proof needed to either license the technology to an Ohio entrepreneurial firm or deem the technology unfeasible. The purpose of Phase 1 is to verify a milestone for licensing, not funding for basic research.
2. **Funding Startups:** Providing Ohio-based entrepreneurial firms the funding needed to accelerate the commercialization of licensed technologies from Ohio institutions of higher education. The goal is to enable these companies to 1) generate the proof needed to acquire additional outside funding to support commercialization or 2) support the commercialization of these licensed technologies. The purpose of Phase 2 is to establish start-up companies, independent of the university.

OFT has divided the Fund into 2 distinct Phases:

	Phase 1: Technology Validation	Phase 2: Startup Fund
Objective	<i>Evaluate the commercial viability of protected technology developed by Ohio institutions of higher education</i>	<i>Determine whether a company has the resources, acumen, and market opportunity to successfully commercialize licensed IP</i>

Activities	<ol style="list-style-type: none"> 1. Assess protected technologies from higher education institutions 2. Suggest technology development alterations to improve feasibility 3. Provide funding recommendations 	<ol style="list-style-type: none"> 1. Assess companies' plan for commercializing licensed technologies 2. Discuss improvement programs to unfunded Applicants 3. Interview strong candidates 4. Recommend funding candidates
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Due to the technical nature of the Phase I / Phase II Proposals, OTF required the selected reviewing contractor to have subject matter expertise in the following technical areas:

- *Advanced Materials*
- *Aero Propulsion and Power Management*
- *Agribusiness and Food Processing*
- *Fuel Cells and Energy Storage*
- *Medical Technology*
- *Software Applications for Business and Healthcare*
- *Sensing and Automation Technologies*
- *Situational Awareness and Surveillance Systems*
- *Solar Photovoltaics*
- *Shale*

APPENDIX C-EVALUATION CONTRACTOR-YOURENCORE, INC.

CORPORATE BACKGROUND

YourEncore is a company of veteran scientific, engineering and technical Experts that provides clients with solutions based on a lifetime of proven expertise. YourEncore deploys its expertise against capability, capacity, and technical challenges in a confidential environment to help clients develop products essential to healthier, safer and richer lives. Given its diversity of expertise and flexible resourcing deployment model, YourEncore offers unique flexibility to swap in and out the right expertise or team size to meet the needs of client demands.

YourEncore Expert Network Profile:

- 9,000+ Experts
- Avg. 25+ years' Experience
- 67% have advanced degrees
- Representing 1000+ different companies

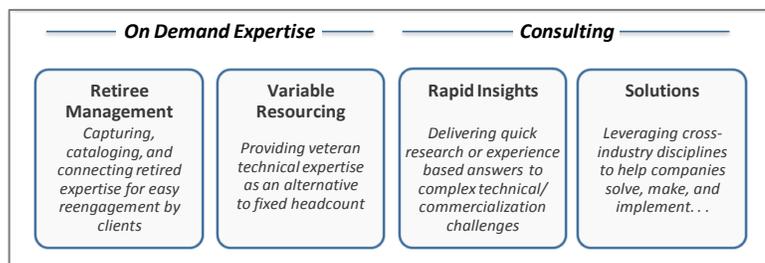
YourEncore was founded in 2003 by John Barnard of Barnard Associates. Barnard Associates is composed of a cross-functional team of highly experienced executive leaders, who advise start-ups on launching and growing businesses. Tim Tichenor, formerly the Director of the Business Development Center for Indiana University and Director of Business Advisory Services for Barnard Associates, is YourEncore's CFO.

Today, YourEncore has over 75 employees and is a recognized leader in Expert advisory services. YourEncore has over 9,000 Experts in its network, and serves over 70 companies, including 9 of the top 12 pharmaceutical companies and 5 of the top 9 global consumer companies. YourEncore was awarded a top 100 "Most Brilliant Company" by Entrepreneur Magazine in 2011 and P&G's "External Enabler of the Year" Award in 2009.

SERVICES & EXPERIENCE

YourEncore deploys its Expertise in two ways: On-Demand Expertise, contracting of specialized Expertise to address short-term resource gaps, and consulting. Within Consulting, technology assessment and due diligence are core offerings. YourEncore performs assessments for over 50% of its 70+ clients, the majority of which are global leaders in their industries.

Figure 1: YourEncore's Services



SUMMARY OF QUALIFICATIONS

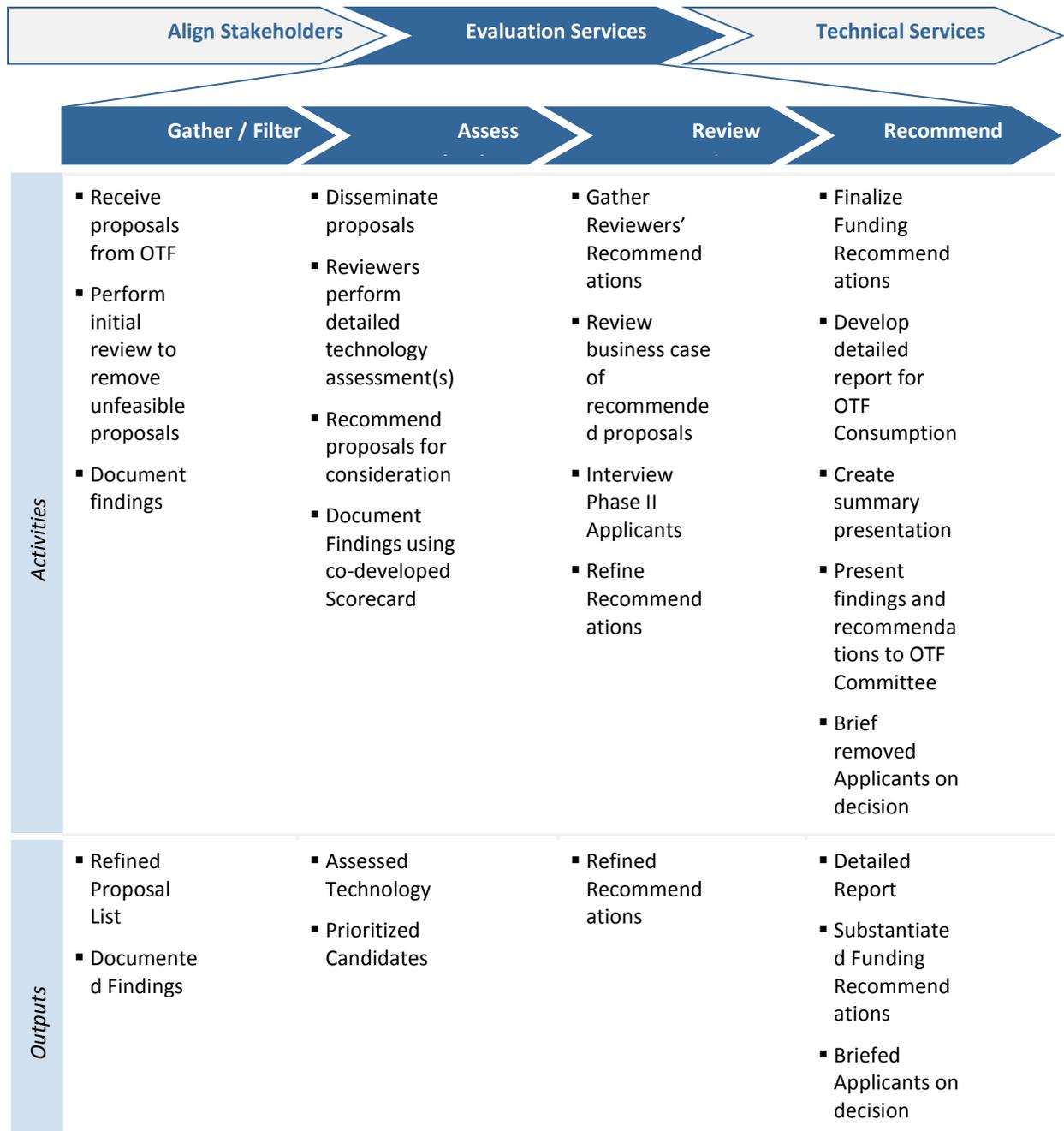


APPENDIX D-EVALUATION PROCESS

APPROACH AND MANAGEMENT PLAN

YourEncore engaged an Expert team comprised of a Project Manager, Business Reviewers, and Technical (i.e., Subject Matter) Reviewers in each technology focus area along with a senior manager to most efficiently and accurately assess all Phase I / Phase II proposals. Prior to implementing a robust Phase I and Phase II RFP evaluation process, YourEncore conducted a grounding session to align stakeholders around common objectives and finalize the expertise requirements.

After the stakeholders were aligned, YourEncore deployed a comprehensive Proposal Evaluation process that initially gathered and filtered all submissions, engaged subject matter experts to assess technologies/firms, and provided substantiated funding recommendations. Finally, to ensure a robust review, a YourEncore senior manager reviewed for consistency and quality.



Align Stakeholders

Shortly after selection, YourEncore held a half-day grounding session with YourEncore's stakeholders (i.e., Account Director, Project Manager, and Senior Managers) and OTF's desired stakeholders. This session assured alignment around common success criteria (i.e., funding goals, success metrics, and timelines), scoped the program's expertise requirements to ensure the right subject matter experts were engaged, and reviewed the evaluation scorecard. This scorecard included the following information:

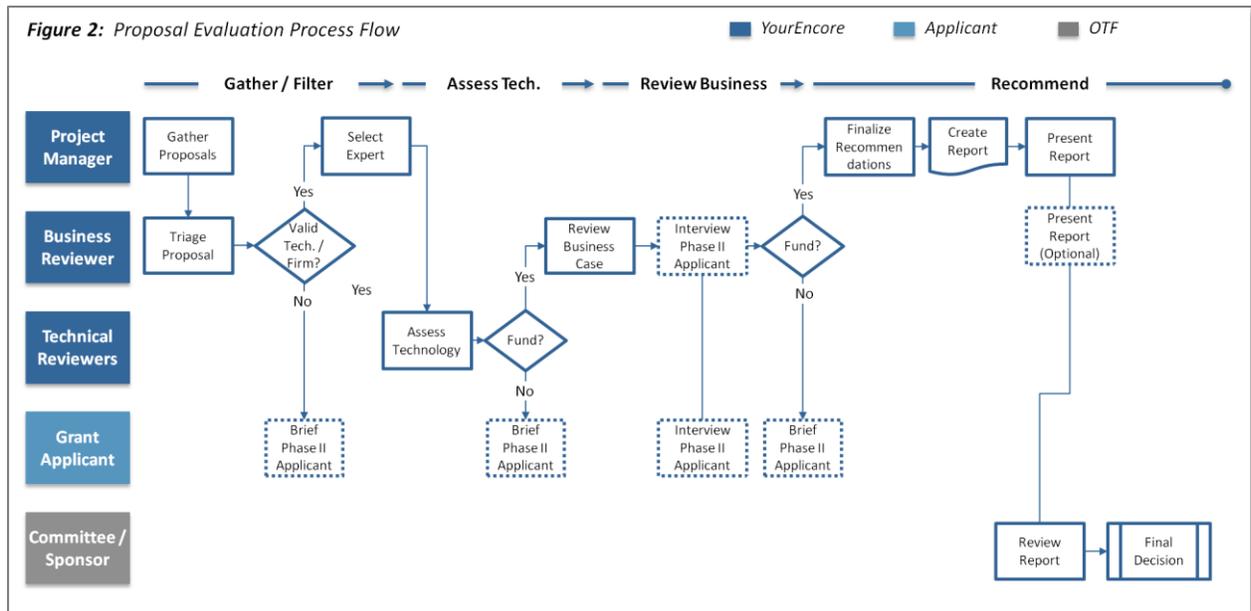
Key Evaluation Scorecard Components

- *Alignment and quality of response to the TSVF's RFP requirements*
- *Demonstrated proof to move technology / business to a next major milestone*
- *Evidence that milestone can be obtained during the one-year period and with the proposed resources*
- *Validation / proof process will be overseen by independent 3rd party*
- *Achievability of the proposed technical application and/or business model*
- *Demonstrated support/ stable backing that is independent from the university. (Phase II only)*
- *Strength of Intellectual Property (IP) protection*
- *Likelihood project will lead to the creation and/or success of an Ohio-based entrepreneurial company*

In addition, YourEncore conducted a grounding session with all technical reviewers to assure they were aligned on the criteria and they judged each proposal submission in a uniform manner.

Evaluation Services

To assure a robust decision for each Phase I and Phase II Proposal YourEncore instituted a four part approach that encompassed gathering / filtering submissions, assessing the technical feasibility, reviewing the business case, and recommending funding prospects.



Gather and Filter Submissions: After gathering the Proposals from OTF the Project Manager collaborated with the Senior YourEncore Manager to remove all submissions deemed unfeasible, document findings, and brief Phase II applicants as required. For those submissions deemed feasible, the Project Manager then identified an Expert with the necessary technical background to perform an in-depth assessment.

Assess Technology: Upon receiving the proposal, the YourEncore Technical Reviewers leveraged the co-developed evaluation scorecard to perform assessments for the Phase I / Phase II submissions they were provided. Upon completion of the assessment the Technical Reviewers documented their recommendations.

Review Business Case: The Project Manager compiled the technical assessments and disseminated recommended Proposals to the Business Plan Reviewers. The Business Reviewers then reviewed the business case and analyzed the market potential of each recommended proposal. For all recommended Phase II applicants, the Business Reviewers, the Project Manager and the YourEncore Senior Manager conducted a short on-site interview to further determine the company’s feasibility.

Recommend Funding Decision: After determining the final recommendations, the Project Manager and Senior YourEncore Manager developed this detailed report and summary presentation to share the assessments’ findings and the final funding recommendations, including dollar amount, with the OTF Committee. The OTF Committee will then use the final recommendations to distribute the funding as they deem appropriate.

TEAM STRUCTURE AND QUALIFICATIONS

To successfully execute YourEncore's proposal a clear team structure (See Figure 3) with defined roles and responsibilities was required.

DEVELOPMENT COMMITTEE

OTF has an established Committee to provide overall program sponsorship, guidance, and support to ensure the program's success.

DEVELOPMENT SPONSOR

YourEncore worked with Development's Paul Jackson, Senior Technology Commercialization Manager from the Office of Small Business and Entrepreneurship, to help set the direction for the team, review progress on a monthly basis, and work with YourEncore's Project Manager to resolve any issues. Furthermore, Mr. Jackson previewed the final outputs prior to Development Committee presentation and support implementation of improvement initiatives.

PROJECT MANAGER

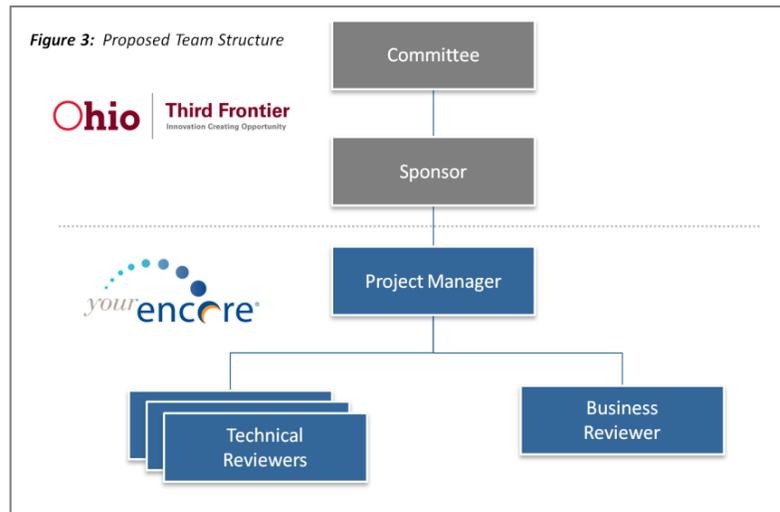
The YourEncore Project Manager managed the day-to-day operations of the program including ensuring all assessments are completed on-time. This individual established and managed the program's processes, assured process / scorecard compliance, and engaged / managed Technical Reviewers to ensure on-time completion of assessments. Furthermore, this individual leveraged YourEncore's internal Project Management system to track each proposal's submission, expert assignment, timelines, budget, and documented outputs.

BUSINESS REVIEWERS

To validate the Experts' recommendations YourEncore engaged strategic business development, entrepreneurial experts to perform review of all Proposals. Furthermore, these individuals participated in all Phase II onsite interviews.

TECHNICAL REVIEWERS

YourEncore identified and selected a team of subject matter experts to perform detailed technical assessments on Phase I and Phase II proposals, complete co-developed scorecard and document recommendations. Reviewers had expertise in each of the technology focus areas as specified by OTF.



SYSTEM INFRASTRUCTURE AND UTILIZATION

YourEncore leveraged its internal Project Management System, DelTek Vision, as the central system of record for the program. This system houses all information for thousands of YourEncore projects and has the capacity to handle all of OTF's Phase I / Phase II proposal information.

YourEncore believes this is the best solution due to the program's robust document repository, project management tools (i.e., timelines, budgets, experts engaged), reporting, and activity audit trail capabilities. By leveraging this system all Reviewers will utilize one system to house and track all the activities, scheduling, and documents associated with this program. Furthermore, this system will enable YourEncore to create reports on a regular basis to report on progress, budget utilization, and identify / reconcile issues.