Technology Validation and Start-Up Fund

Round 2 Submittal Evaluations

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Submitted To:

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1. Executive Summary

YourEncore was selected as the contractor to perform the review process based upon having over 7,000 subject matter experts with a collective average of over 25 years of experience. For each of the eight areas of "project focus" a technical expert was selected to review the proposals. Once the technical review was complete, a business reviewer and senior YourEncore managers 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 most judicially invest in the future.

For round 2, a total of 25 requests for funding were submitted to OTF's Technology Validation and Start-Up Fund, 17 for Phase 1 and 8 for Phase 2. This is 12 fewer requests than received in round one. Of these 25 requests, eight requests in Phase 1 and five in Phase 2 were recommended for funding to OTF by the expert Review Team. As with Round 1, the Review Team was composed of subject matter experts in each field of technology, a business reviewer, and YourEncore senior managers. The Review Team evaluated each proposal based on the information submitted for review, and according to the criteria specified by OTF.

As with the first round of grant proposals, the Review Team found the technology to be very impressive, with 80% of the proposals being very solid in the technology with potential application for commercial products. In addition, the Review Team noted that nearly all of the grants which were resubmitted from the first round were significantly improved, and reflected the input in the report and debriefings, thus resulting in a favorable recommendation.

In an effort to be good stewards of the Third Frontier funds, the Review Team notes two trends which are of concern. First, with Round 2 there is a much greater incidence of lack of independent third party reviews. In round one, 16% of the Phase 1 grants were flawed in this area, while for Round 2 the incidence rate rises to 44% with another 11% of the grants being "yellow-concern" in the scorecard.

Secondly, both the Phase 1 and Phase 2 grant proposals and Phase 2 interviews reveal a significant deficiency in business planning. Without solid business planning, great technology does not realize commercial potential and build economic development, which is the purpose of the funds. In Phase 1, lack of business planning is reflected in the categories of reasonable path to market and the market size/opportunity. Of the nine Phase 1 grant proposals not recommended for funding, six failed in one or both of these areas. For Phase 2 grant proposals, lack of solid business plans is reflected in the category so named, and all of the grants which were not recommended had this as one of the "fatal flaws." A number of proposals did not demonstrate an understanding of unmet needs in their chosen market, provided poorly thought-out pricing/cost models (or none at all), or greatly underestimated the hurdles they would encounter as they move toward commercialization. Thus as with Round 1, the review team believes that the majority of the grant applicants could benefit from business mentoring prior to submitting their proposal.

The Review Team believes many of the proposals that did not receive positive recommendations can be easily improved, and to that end has provided individual recommendations for improvement for each of those proposals.

The Phase 1 Proposals that are recommended for funding are:

1. 12-452: Suicide Risk Index, Cincinnati Children's Hospital Medical Center $50,000
2. 12-454: Neonatal Intensive Care Unit Magnetic Resonance Imaging, Cincinnati Children's Hospital Medical Center $50,000
3. 12-455: Smart Treatment of ADHD, Cleveland Clinic $50,000
4. 12-458: Electromagnetic Probe for Real-Time Identification of Surgical Margins during Removal of Solid Malignacies, Ohio State University $50,000
5. 12-459: Self-Administered Gerocognitive Examination (SAGE) Apple iPad Application Analysis and Reporting Engine, Ohio State University $50,000
6. 12-461: Advanced Catalytic Material and Supercritical Reactor for Cost Effective Treatment of Flowback/Produced Waters, Ohio State University $50,000
7. 12-464: A Highly Selective Pyrophosphate Sensor for Biological Applications, University of Akron $50,000
8. 12-466: Injectable Bone Cement, University of Toledo $50,000

The Phase 2 Proposals that are recommended for funding are:

1. 12-471: Next Generation Illuminators for Imaging and Detection Applications, Core Quantum Technologies/Ohio State University $100,000
2. 12-472:Advanced Language Performance Portfolio System, ALPPS/Ohio State University $100,000
3. 12:473: Marine Jet Propulsion System, CGC Ultramarine/Ohio State University $100,000
4. 12-474: New Low Cost, Small Fiber NGJ Carbon Fibers, NGJ/University of Akron $100,000
5. 12-478: Portable Concussion Assessment, I-Comet/Cleveland Clinic $100,000

2. Proposal Recommendations - Phase 1

Summary of Recommendations

PROPOSAL #	Licensing Institution	PROJECT TITLE	Generation of Proof to be Licensed	Project Plan / Team	Independent 3rd Party Review (not "fatal")	Reasonable Path to Mkt	IP Protection	Start-up in Ohio	Market Opportunity / Size	Budget Narrative / Use of Funds
12-451	Case Western School of Medicine	Microparticles to Prevent Infection in Wound Healing								
12-452	Cincinnati Children's Hospital Medical Center	Suicide Risk Index (SRI)								
12-453	Cincinnati Children's Hospital Medical Center	N of 1								
12-454	Cincinnati Children's Hospital Medical Center	Neonatal Intensive Care Unit Magnetic Resonance Imaging (NICU MRI)								
12-455	Cleveland Clinic	Smart Treatment of ADHD								
12-456	Kent State University	Bistable Switchable Liquid Crystal Window								
12-457	Miami University	Device to Diminish Hypersensitive Gag Reflex Response								
12-458	Ohio State University	Electromagnetic Probe for Real-Time Identification of Surgical Margins during Removal of Solid Malignancies								
12-459	Ohio State University	Self-Administered Gerocognitive Examination (SAGE) Apple iPad application analysis and reporting engine								
12-460	Ohio State University	Third-party Payor Reimbursement Maximization Platform								
12-461	Ohio University	Advanced Catalytic Material and Supercritical Reactor for Cost Effective Treatment of Flowback/Produced Waters								
12-462	University of Akron	Robust Sensors to Detect Toxic Compounds in Water								
12-463	University of Akron	Polymer Solar Cells with a Low Temperature-Annealed Sol-Gel-Derived MoO3 Film as a Hole Transport Layer								
12-464	University of Akron	A Highly Selective Pyrophosphate Sensor for Biological Applications								
12-465	University of Cincinnati	Development of a New Use for an Old Drug; Probenecid for Heart Failure								
12-466	University of Toledo	Injectable Bone Cement								
12-467	University of Toledo	Facet Screw System								

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-newly added for Round 2, description of how the entity proposes to use the funding if received

Details of Recommendations

Proposal 12-451, Case Western Reserve University, Microparticles to Prevent Infection in Wound Healing, $50,000 requested. **Amount recommended: $0**

Rationale: This proposal seeks funding to further develop an improved means for encapsulating antibiotics in a hydrogel that permits timed-release of significant quantities of antibiotics over a period of a month or more. While the core technology as presented is compelling, the application of the technology is not. The primary benefit of the technology is the slow release of antibiotic, but the submitters do not specify why slow release is needed for wound dressings, which are presumably changed rather frequently. While the overall market opportunity for reduced infections from surgical wounds is substantial, it isn't clear how this particular product would secure market share over existing technologies. Since the core technology (hydrogel) is also presented in a much more logical application in a Phase 2 grant request for hernia mesh by the same development team, the proposal suffers from a lack of focus on the wound dressing application, as much of the verbiage from the Phase 2 grant request is included verbatim in this proposal as well.

In addition, much of the research to be funded by this grant request appears to be very early phase work, and there is no clear pathway to commercialization. Though the applicants mention several companies with whom they have been in contact, they do not mention a specific hurdle those potential partners or licensees would expect them to meet through this research, leaving the Review Team with the impression that the 'proof' needed to move the project forward may not be realized at the end of the project term. The IP position is similarly unclear. The development team believes they can protect their claims due to their prolonged delivery mechanism, but as noted above, it is unclear why this is relevant or important for wound dressings, specifically. The final concern of the Review Team is the third-party review body identified in the proposal, the CCCTIP Oversight Committee. While this is doubtless a third-party, the applicants do not elaborate on their relationship with the Committee, or whether there is any potential conflict of interest in their technology review process.

Recommendations for Improvement: First and foremost the Review Team would like to understand why and how wound dressings would need antibiotic release over a period of weeks or months. If this can be addressed, additional improvements could be made by clarifying the expectations of potential licensees or partners in regards to the 'proof' they would want to see from this research, and the overall relationship with the CCCTIP Oversight Committee should be clarified. On this last point it would be helpful to specifically state what ties the committee has with the development team.

Proposal 12-452, Cincinnati Children's Hospital Medical Center, Suicide Risk Index (SRI), $50,000 requested. **Amount recommended: $50,000**

Rationale: The SRI project is the development of a quantitative assessment tool that utilizes artificial intelligence methods to provide a decision support tool for clinicians who need to determine whether an individual is a potential suicide risk. The development team has an impressive body of data on which the tool is based, giving reason to believe there is meaningful science behind the concept. The rate of suicide in the United States makes it clear there is an obvious and large unmet need in suicide assessment tools, and the Review Team presumes that a truly effective and consistently applied tool would have significant market

potential. Credible commercial partners are involved in the process, and an impressive group within Cincinnati Children's is involved, all of which combine to merit a positive funding recommendation, given the early phase of development of the technology.

Going forward, the team should take care to provide focus and clarity on their target market. For example, while this tool is impressive, there are other methods, including hands-on assessments by healthcare providers, that must be taken into account. Presumably this tool will need to either demonstrate a sizeable improvement in precision over any existing screening methods and/or demonstrate a potential change in treatment paradigms that would somehow provide cost savings or other efficiencies. If hospitals cannot directly realize these savings the potential for broad market adoption is greatly limited. Given the rather lengthy (3 to 4 years) pathway to market, additional funding may be difficult to obtain without a well-thought-out commercial rationale.

Proposal 12-453, Cincinnati Children's Hospital Medical Center, N of 1, $50,000 requested. **Amount recommended: $0**

Rationale: N of 1 is a collaborative care system that would facilitate interactions between patients suffering from chronic diseases and their caregivers. For a chronic disease like Crohn's, there is a real need for customized treatments and rapid feedback on the efficacy of those treatments to minimize patient suffering and improve outcomes. The main gap in the funding request is the lack of a reasonable path to market. As with any healthcare application, the needs of payors, healthcare providers and patients are often divergent. Though providers and patients may want new treatment algorithms based on the N of 1 system, in a world of tiered medications and tightly managed costs it's simply unclear whether this system would gain broad-based adoption. Nor is it clear who would pay for the system itself. The Review Team can envision significant pushback from managed care, who may see this as a means to more rapidly place patients on higher-tiered medications while simultaneously being asked to pay for the N of 1 system behind it. Therefore, despite the potential usefulness of the tool and the unmet need it could address, a positive funding recommendation cannot be made. It should also be noted that the application does not mention an independent third-party reviewer, which is a key, but not critical, element of the OTF grant process.

Recommendations for Improvement: An objective, candid and realistic narrative should be provided as to the reimbursement strategy for the tool itself, and the team should also address how they will overcome payor pushback to changing the timeline for 'fail-first' tiered medication policies. Inclusion of an objective third-party reviewer would be helpful, and such a party could potentially serve as validation for the business model, if they could adequately represent the payor perspective.

Proposal 12-454, Cincinnati Children's Hospital Medical Center, Neonatal Intensive Care Unit Magnetic Resonance Imaging (NICU MRI), $50,000 requested. **Amount recommended: $50,000**

Rationale: This proposal is to fund continued development of a magnetic resonance imaging (MRI) machine especially adapted for use in a neonatal intensive care unit (NICU). Though the overall market size for such a device is quite limited, there is nothing currently competing in that space, potentially allowing the

development team to capture a significant portion of that relatively small market, and the high margins and revenue per unit would support growth of a new company. The development team on the project represents a strong and well diversified cross-section of imaging and neonatology professionals. This diversity has clearly added to the development plan, as the team is not only focused on imaging, but also on refining a patient handling system. The holistic development plan gives the Review Team confidence that real needs are being addressed and increases the likelihood of success of the new technology. Given the overall growth and adoption of advanced imaging techniques in all other sectors of diagnostic medicine, the Review Team believes the unmet need within NICUs is significant enough to warrant continued development work and recommends funding the proposal. The only significant concern is that this proposal, like others from Cincinnati Children's, does not identify an independent third-party reviewer, but this concern alone does not preclude a positive funding recommendation.

Proposal 12-455, Cleveland Clinic, Smart Treatment of ADHD, $50,000 requested. **Amount recommended: $50,000**

Rationale: The Smart Treatment protocol is designed to optimize ADHD pharmacotherapy and reduce the incidence of negative therapeutic outcomes. The Review Team was impressed with the work that has been done by the protocol developer, using an impressive body of data, encompassing 15 years of data and 500 patient variables. In addition, the market opportunity within ADHD is tremendous, and medications are constantly being adjusted and modified in the pediatric ADHD population. Unfortunately, the compelling science behind the protocol does not necessarily translate into a compelling business model, based on the information in the grant request. It is unclear who the 'customer' for this technology will be, who will pay for it, or how the eventual start-up company would make money. As with any life sciences technology, the needs and interests of the payors may (and often do) diverge from the needs of caregivers and patients. For this to become a viable ongoing business, the Review Team assumes payors would need to purchase the technology and deploy it to their customers – physicians/caregivers and patients. However, the Review Team believes the overall size of the opportunity would still allow even a niche application the opportunity for commercial success, and broad-based payor adoption may not be necessary. It could potentially be argued that physicians would be the customer, as the robustness of the tool and the data set on which it's based could be sufficient to drive sales. Though insight on the business model would have been quite helpful, the Review Team is making a positive recommendation for funding based on the merits of the technology. Going forward the applicants will need to put significant focus on their business model.

Proposal 12-456, Kent State University, Bistable Switchable Liquid Crystal Window, $50,000 requested. **Amount recommended: $0**

Rationale: This proposal describes a Phase 1 path forward for further development and validation of a novel bistable liquid crystal (LC) glass/window technology. While the building block approach to the one-year development plan is sensible, the proposal does not identify who will be doing the work, leaving the Review Team with real concerns about the feasibility of the plan. Virtually all of the project budget (nearly $100k) will apparently be used to hire an unidentified post-doc. Even if the candidate were identified and credentialized,

the lack of budget narrative gives the Review Team concerns around what would appear to be a $100k compensation rate for one year. The applicant (Dr. Yang) would appear to be the sole team member currently committed to the project, but the level of commitment is unclear and unspecified. Though Kent State has a track record of commercializing analogous technologies, the proposal does not elaborate on Dr. Yang's contributions to those past efforts, or credentialize Dr. Yang's background in this space. Similarly, there is no project plan or timeline. The proposal identifies the TTO at Kent State as having responsibility for oversight of the project, which only reinforces all of the above concerns. Finally, the request makes no attempt to help the Review Team understand how development of this technology will contribute to economic growth in Ohio. Though potential licensees exist, two of them are based in other parts of the country. On balance, the sizeable information gaps leave too many areas for concern for a positive funding recommendation to be given.

Recommendations for Improvement: As noted above there are many areas for improvement. The most meaningful improvement would be for the applicants to review the OTF format for submitting grant requests and addressing all of the relevant sections. For grant approval, it is imperative the application address the specific information the OTF requires.

Proposal 12-457, Miami University, Device to Diminish Hypersensitive Gag Reflex Response, $41,750 requested. **Amount recommended: $0**

Rationale: This proposal is a resubmission of a prior proposal, #12-405, and addresses further development of a device to diminish the gag reflex often experienced by dental patients. The Review Team appreciates the efforts of the development team to improve the proposal based on past feedback, but this revised submission is still deficient in a number of areas. The development team did include some financials, which were omitted in the earlier submission. Unfortunately, the financials as submitted give even more reason for concern. There are several errors in the pricing/revenue plan which could potentially be overlooked. What cannot be avoided is the fact that significant revenue will be derived from a $5.00 'disposable' unit, to be supplied for sanitary reasons. No justification is provided for this price, which is a critical flaw in the plan, as dentists have an ample and ready supply of disposable latex exam gloves, which cost perhaps 1/10th what the applicants propose to charge for their disposables. According to the proposal, $36MM in revenue will be derived from one-time device sales, and $336MM will be derived from ongoing disposable sales. Since no pricing rationale or explanation of the unique utility of the disposable unit was provided the Review Team believes the disposables will not be purchased.

For the device itself, the proposal mentions a market research study conducted in 2009, indicating willingness to purchase at 'various price points' but supplies no data from that study to substantiate the $360 price point included in the proposal. If $360 is in fact the 'right' price point, the gross profit through 2016 (using the $190 cost per unit estimate in the proposal) would be $1.78MM, against a cost to bring the device to market of around $1MM. The Review Team simply cannot find an economic rationale that would warrant a positive funding recommendation.

Recommendations for Improvement: The Review Team has significant concern on the merit of the business model that may not be addressable. While the device may in fact reduce the incidence of gag reflex in dental patients, there is simply no evidence that a profitable ongoing business could emerge from this development process.

Proposal 12-458, Ohio State University, Electromagnetic Probe for Real-Time Identification of Surgical Margins during Removal of Solid Malignancies, $50,000 requested. **Amount recommended: $50,000**

Rationale: This request is for funding to continue development of an electromagnetic probe that has demonstrated the ability to distinguish cancerous tissue from normal tissue, lending itself to real-time determination of the extent of a tumor during surgery. One of the primary concerns of the Review Team is time to market, but the developers have identified an expeditious route to first revenue via the veterinary channel. The development team has also wisely chosen the current 'gold-standard' as their comparator, which is independent pathologists using established techniques for tissue classification. At the end of the project plan, the critical proof will be the accuracy of the method – if only certain types of cancers/tumors can be accurately identified the market for the device could be quite limited, even in the veterinary field. But the proposal is compelling enough the Review Team gives a positive recommendation for funding, and believes the opportunity to validate the technology is merited. One final note – as the development team moves forward it would be beneficial to include the perspective of the pathologists. They may resist the technology as it could take away part of their business, but more important, if pathologists do not believe this method is at least as accurate as current practice they may insist on their own histological examination of excised tissue, greatly impacting the value proposition for future customers.

Proposal 12-459, Ohio State University, Self-Administered Gerocognitive Examination (SAGE) Apple iPad application analysis and reporting engine, $50,000 requested. **Amount recommended: $50,000**

Rationale: This proposal is for conversion of an existing, paper-based cognitive impairment screening tool (SAGE) to an iPad application, allowing for broad-based rollout and utilization. The prevalence of cognitive impairment diseases like Alzheimer's create a ready market for any early-warning screening methods, and conversion to cloud-based analysis will allow for a very efficient (no trained personnel required) means of assessing the tests. At this point the main concern of the Review Team is why this is submitted as a Phase 1 grant request to the OTF, since a CEO of the start-up has been identified and SAGE has already proven to be effective through clinical evaluation. The business model at this stage is undefined, but the team recognizes it will be difficult to determine until user experience testing has been complete. As this is not a diagnostic tool it will not be reimbursed, but it is not difficult to envision backing or license from a pharmaceutical company. Overall, there is enough merit to warrant a positive funding recommendation.

Proposal 12-460, Ohio State University, Third-party Payor Reimbursement Maximization Platform, $50,000 requested. **Amount recommended: $0**

Rationale: This proposal seeks funding to further develop and code an advanced modeling and software toolset to assist health care systems better predict patient experience metrics. There would appear to be a real need in this area, as Medicare and Medicaid are basing a portion of their reimbursement to health care systems on these patient experience scores. The applicants offer little explanation as to how their technology works. They do offer results from a two-month study, which demonstrated a significant improvement in

patient experience scores using the technology under development. They also offer rough performance parameters, including staff communication with the patient, medication information, discharge performance, etc.

The Review Team believes, despite the early stage of the project, that not enough information is provided to make an informed recommendation for funding. Specifically, while the applicants mention several times there are no commercial products offering a predictive analysis of patient experience, they omit reference to the myriad analytical tools and techniques that, while not predictive in nature, could surely provide health care systems with the insights they would need to improve performance going forward. Similarly, no detail is provided on how the hospital uses the predictive information generated, or whether, from a user perspective, it is more helpful to have predictive information on a one-off basis, or more robust post-hoc analytical insights to make systemic improvements. Based on the above, the value proposition of this technology is capturing data to improve patient experience scores in the near term, but whether the additional work streams involved to achieve that outweigh the potential payoff is unknown.

Some of the above concerns may have been addressed through the inclusion of a relevant and independent third-party review as part of the development plan. This may have given the Review Team comfort that proof to advance the technology to commercialization would have been obtained. One final concern was the lack of sufficient detail in the budget narrative to help the Review Team understand how grant dollars would be used during the project.

Recommendations for Improvement: Simply put, the Review Team would like to know, 'why is this approach better'? Intuitively, fixing problems before they are recorded as a negative score is a good thing. But without a more objective assessment of this method against others currently in use by healthcare systems, it just isn't clear what the true value may be. If each predictive red flag takes a health care employee out of their routine to address it, the improved outcomes may not offer any value at all. An improved proposal would include an objective perspective on where this technology truly fits if taken out of the OSU healthcare system and how it compares with quality improvement systems currently in use.

Proposal 12-461, Ohio University, Advanced Catalytic Material and Supercritical Reactor for Cost Effective Treatment of Flowback/Produced Waters from Unconventional Shale Gas Wells, $50,000 requested. **Amount recommended: $50,000**

Rationale: This proposal seeks funding to validate performance of the IPSC Process to manage flowback fluids generated by shale gas wells. Though an earlier iteration of this proposal was not recommended for funding, the development team has sufficiently addressed the Review Teams concerns, and as such, a positive recommendation is given. Though the project plan is still aggressive, the active participation and oversight by a commercial partner (Hess) will greatly aid the effort and lends credibility. The applicants also improved their submission by clearly communicating the positioning of their technology in an increasingly crowded marketplace, giving assurance to the Review Team there is a ready market for their technology, if proven. There is continued concern about ongoing funding for the initiative, but this is outweighed by the other compelling elements of the proposal. The Review Team recommends funding this stage of the research to allow the development team an opportunity to seek that funding with data in hand.

Proposal 12-462, University of Akron, Robust Sensors to Detect Toxic Compounds in Water, $50,000 requested. **Amount recommended: $0**

Rationale: This proposal addresses continuing development of a potentially low-cost, easy-to-use sensor for monitoring contaminants in the drinking water analysis market. The basic technology concentrates contaminants for more efficient sensing and then uses various colorimetric processes to detect the specific contaminants. Evolving water quality regulations have raised focus on certain contaminants addressed in the proposal. The Review Team believes the technology itself is compelling, and has proved efficacious on a small scale. Low-cost and user-friendly would appear to be two quite compelling value propositions.

What is not clear is how this technology fits within already established federal (and potentially myriad state and local) requirements for approved testing methodologies. THM testing has been in place for at least a decade and many municipalities are actively measuring and controlling these levels. It is not clear from the proposal whether these municipalities would want, or even be able to use, point-of-use assays or whether they are obligated to use centralized lab testing facilities that have already approved analytical methods in place for THM levels. Without any insight on the regulatory pathway to have this technology incorporated into approved analytical methods, the pathway to market is unclear and uncertain. Absent this clarification and insight, the Review Team concludes that this technology may be adopted by conscientious water utilities, but would not replace current methods, despite reduced cost and improved ease-of-use. As such, a positive funding recommendation cannot be made. Some of the above concerns could have been addressed through identification and commitment of a third-party review of the technology. The only committed partner would appear to be a start-up company founded in part by the lead developer of this technology.

Recommendations for Improvement: If this proposal was to be resubmitted, a good narrative on the regulatory environment and behavior of potential customers would be quite beneficial. Is the intent to replace existing testing methods that are expensive and slow? Or is the intent to give water utilities real-time insight on quality? If the former, what is the plan and timeline to get this method approved by the appropriate regulatory body? If the latter, what insights can the development team provide as to why water utilities would, for lack of a better term, 'care'? Again, inclusion of an objective third-party to assess the technology as part of the project plan would help significantly.

Proposal 12-463, University of Akron, Polymer Solar Cells with a Low Temperature-Annealed Sol-Gel-Derived MoO3 Film as a Hole Transport Layer, $50,000 requested. **Amount recommended: $0**

Rationale: This proposal showcases an intriguing and innovative concept that could revolutionize polymer solar cell technology. Dr. Gong has significant experience in this field of research and within industry, and has made considerable contributions to the field through many patents and publications. Specifically, the proposed technology will substantially lengthen the life of a polymer solar cell while lowering manufacturing costs and maintaining current polymer solar cell performance.

While on the surface the proposal is compelling and focused on a high-growth area, numerous details in the proposal were lacking. The proposal states the advantages this new technology will bring to polymer solar

cells in durability, it does not compare the improved durability to that of existing silicon technology. If this new technology looks to overcome the market share of 80 to 90 percent (according to the proposal) for existing silicon technology, this lack of comparison is a significant omission. Similarly, the proposal shows a comparable efficiency to existing polymer technologies, but does not compare these efficiencies to silicon. Since polymer technology is currently more cost competitive and more pollution-friendly than silicon, the hurdles to overcome in durability, efficiency or other dimension must be addressed, as without these important comparisons to silicon it just isn't clear that the improvements will mean anything to the marketplace.

There are other concerns as well. The objectives of the year-long program are to 1) lower the annealing temperature to allow for printing on flexible substrates, and 2) to become the first to print this unique structure onto glass. Neither objective can be obviously tied to a market need, and it is not clear that at the end of the year-long project any meaningful business result will be realized, nor is a third-party identified who would confirm these results. Finally, Dr. Gong mentioned he "has the necessary equipment to carry out the stated objectives in the UA labs", but also requests $20,000 for purchase of equipment.

Recommendations for Improvement: An improved proposal would place much more focus and emphasis on the commercial elements of the technology. The science is clear and compelling and is not lacking. But the objectives for the project should tie directly to the unmet need in the market (they do not), AND the development team should be clear in their intent to either dominate the smaller polymer segment or to capture share from silicon. Either way, clear goals and metrics should be established and communicated so that, if achieved, a compelling path to market is laid out.

Proposal 12-464, University of Akron, A Highly Selective Pyrophosphate Sensor for Biological Applications, $50,000 requested. **Amount recommended: $50,000**

Rationale: This proposal describes a technology that can detect pyrophosphate in a faster, simpler, more sensitive way and at a potentially lower cost than current techniques. This sensor can be used to monitor polymerase chain reaction (PCR) and then be expanded in application to DNA sequencing and for other medical applications. The proposal addresses just the PCR application, a multi-billion dollar market, which keeps the effort more structured and manageable. The key researcher is Dr. Yi Pang, a University of Akron faculty member, who had led the sensor concept research. The project resources will be focused on developing efficient production methods, optimizing response, testing the sensor on a commercial PCR machine to show real world utility and finally contracting for an independent validation of the testing. At that point the technology could be licensed to an Ohio-based startup who would continue any optimization and source manufacturers for the sensor compound. It should be noted that the project timeline makes mention of 'third party validation' but does not specify the identity of that party.

The Review Team does have some concerns, none of which preclude a positive recommendation at this stage of the project, but which the development team will need to keep in mind as the project progresses. While the proposal was technically detailed, it lacked a description of the components in the sensor and specificity on functionality. As work progresses, the team should also work towards developing reasonable cost estimates and provide comparisons to other techniques, including a rough market landscape of developing/competing technologies. Finally, the team should be mindful of the significant additional funding required to achieve

commercialization and be ready to articulate a funding pathway that does not only include speculative grant funding.

Proposal 12-465, University of Cincinnati, Development of a New Use for an Old Drug; Probenecid for Heart Failure, $50,000 requested. **Amount recommended: $0**

Rationale: This grant request proposes an exploratory study in human subjects of intravenous probenecid for treatment of heart failure. This drug has been FDA-approved for 40 years in oral form, where it is used for treatment of gout and to elevate blood levels of antibiotics and antivirals. Recent discoveries by the applicants indicate that probenecid attaches to the Transient Receptor Potential Vanilloid 2 (TRPV2) receptor in the mammalian heart, where it acts as a calcium channel to enhance intracellular calcium release, an effect totally overlooked in prior studies.

On the surface, this new application is attractive, but neither the University nor the suggested start-up is qualified to carry out the steps after the one-year program in this proposal. The tasks necessary to bring the product to market are better carried out by a large pharmaceutical company. It remains to be seen whether such companies will show any interest in this prospect, and how licensing arrangements would benefit the State of Ohio.

Unlike many new discoveries, this application focuses on re-purposing an existing drug, widely available in generic form. At this point the Review Team agrees with the University's opinion that a patent for the novel application and formulation will be granted. However, no information was included in the grant request that would indicate the likely length of that patent protection. Typically, reformulated API or new indications will extend patent life for several years, but will not reset the IP clock to allow for a full 20 years' exclusivity. Given the lengthy time to market and the estimated $100MM needed to commercialize the product, it is extremely unlikely a qualified partner would step forward to bring this product to market without a lengthy period of exclusivity. As a result, the Review Team cannot make a favorable funding recommendation until the IP situation is clarified.

Recommendations for Improvement: As stated above, clarity on the potential patent life is critical. It is likely that information will dramatically alter the approach to research and development, and may make the participation of a large commercial partner unlikely, rendering the development team with very few options to bring the product to market. While the Review Team recognizes there is a possibility of a more compelling IP strategy, if such information exists it must be included in a resubmitted proposal. Without that strategy, it is unlikely a recommendation for funding can be made.

Proposal 12-466, University of Toledo, Injectable Bone Cement, $50,000 requested. **Amount recommended: $50,000**

Rationale: This proposal from the University of Toledo concerns a new, calcium phosphate-based injectable cement for use in orthopedic applications, in particular to secure implants such as screws and other devices inserted into bones of the spine and to fill spaces left by prior therapy. The proposal is a resubmission of a prior proposal, which was not recommended for funding on the grounds that, while the steps to be

undertaken in the program were necessary to demonstrate the alleged superiority of the new cement, they were not sufficient because they did not include measuring corresponding properties of existing cements. The new proposal does not include testing of existing cements, but it does make a reasonably convincing case that the new cement in its current state of development is actually superior to existing cements. It lists nine properties of the new cement and asserts that all existing cements are inferior in at least one of these properties. While these assertions do not fully convince the Review Team that the new cement will be able to rapidly penetrate a sizable but crowded market, they have been sufficient to draw the interest of two existing companies that manufacture orthopedic implants, X-Spine (an Ohio-based company) and Spinal Ventures (a Michigan company said to be exploring acquisition of space at the University of Toledo). An additional prior concern of the Review Team was the IP position of the technology. Clarifying language was added to this proposal regarding the IP position and the University's position on its strength – while not conclusive, this clarification is deemed sufficient for this early-stage project. Given this improved narrative, the Review Team is making a favorable funding recommendation.

Proposal 12-467, University of Toledo, Facet Screw System, $35,500 requested. **Amount recommended: $0**

Rationale: This proposal concerns development of a facet fixation screw, which would be used in surgery of the spine to stabilize vertebrae made unstable by disk degeneration, injury, or other causes. This proposal was formerly submitted and was not recommended for funding on the grounds that no information was provided about the design of the new facet screw, which was alleged to be superior to screws currently in use without any indication of how or why it was superior. In addition, the former proposal included some revenue and expense figures that had no convincing rationale.

While this proposal does include a photograph of the new screw prototype, it is still lacking in detail to help the Review Team to understand precisely how the device works or whether the asserted advantages over other, existing technologies are real or could be proven. Specifically, it is still not clear how the implant is used or how it works – where is it inserted? It would appear it extends down to the next level of facets, but it isn't clear why or what benefits that brings. Where does the bone or bone graft material incorporated in the device (included in the prototype photograph) come from – is it autologous, artificial, or something else? How is it molded? How is this approach to bone grafting superior to other facet fixation screws already on the market, which allow for introduction of bone chips to strengthen the fixation? While the Review Team recognizes and appreciates the improved submission, the inclusion of the developed prototype led to additional questions as detailed above. The Review Team is certain the development team has ready explanations for all of these elements of their design, but is unable to recommend approval without this critical level of detail. One can also assume from the lengthy credentials of the development team and the commitment of an impressive third-party Review Team that there is real scientific merit behind the proposal, but again, without firm grounds for a positive recommendation, one cannot be given.

Recommendations for Improvement: It is possible this proposal could be improved a second time and meet with a favorable outcome. The main deficiency in both this proposal and the one previously submitted was an apparent assumption on the part of the development team that high-level assertions are sufficient to merit funding. Unfortunately, the Review Team is charged with assessing each grant request on the merits of the

information presented, and a clear justification for funding simply cannot be given with the information as presented. The narrative above lists numerous questions which would have to be addressed in any future submission, but the main gaps are a clear explanation of how the screw works, and how, based on this function, it is likely to be superior to other products on the market. For both of these gaps, detail should be provided that support the high-level assertions – merely stating superiority is not sufficient.

3. Proposal Recommendations - Phase 2

Summary of Recommendations

PROPOSAL #	Licensing Institution	PROJECT TITLE	Proof to Raise Additional Funds	Project Plan (one year)	Likelihood of Additional Funds at project end	Team	Business Model	Company Backing	IP Protection	Oppty./ Mkt. Size	Budget / Use of Funds	Start-up in Ohio	License with Ohio Institution
12-471	Ohio State University	Next Generation Illuminators for Imaging and Detection Applications											
12-472	Ohio State University	Advanced Language Performance Portfolio System (ALPPS)											
12-473	Ohio State University	Marine Jet Propulsion System											
12-474	University of Akron	New Low Cost, Small Diameter NGJ Carbon Fibers from NGJ, LLC											
12-475	University of Akron	Parallel Computation of the Fast Fourier Transform											
12-476	Case Western Reserve University	Development of Novel Tools for Health IT - COBALT											
12-477	Case Western Reserve University	Microparticles to Prevent Infection in Hernia Mesh Repair											
12-478	Cleveland Clinic	Portable Concussion Assessment											

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

Proof to Raise Additional Funds – The proposed proof needed to raise additional funds for commercialization

Project Plan – Proposed proof needed to move the technology can be generated during the one year project period with the proposed resources

Likelihood of Additional Funds at Project End – Likelihood of being able to raise additional funds for commercialization at the end of the project

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 – Degree to which the intellectual property is protected relative to both the technology and the proposed business model

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

Budget /Use of Funds-newly added for Round 2, description of how the entity proposes to use the funding if received

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

License with Ohio Institution – Company will execute a license with the Ohio institute of higher education within nine months of the date of the application

Details of Recommendations

Proposal 12-471, Core Quantum Technologies, Inc., with Ohio State University, Next Generation Illuminators for Imaging and Detection Applications, $100,000 requested. **Amount recommended: $100,000**

Rationale: This proposal from Core Quantum Technologies, Inc. envisions developing its business from a novel quantum-dot technology that the company calls MultiDot, developed with grants from the National Science Foundation. This grant proposal contains a well-thought-out business plan. Its success depends on the actual superiority of the CQT MultiDot product to competitive products and not infringing on existing patents. The company makes a convincing case that it has a superior product as well as a plan to establish and grow a company based on it. The patent question remains, but will presumably be settled by formal legal opinion, soon to be obtained.

The Review Team had a number of concerns coming into the interview phase, all of which were addressed sufficiently by a capable and fully-engaged team. As such, a positive recommendation for funding is made. Some concerns remain, which were discussed with the development team. None of the principals who attended the interview see themselves as committed long-term to the company, which is understandable and not a point of contention. They are currently seeking a CEO to lead the commercialization effort. However, great care should be taken that the new leadership will represent the best interest of the inventors and the company, rather than pursue a short-term exit strategy. The selected business leader should be capable of, and committed to, creating a viable and ongoing enterprise. There is enough promise in the technology and the rapidly-growing market space for it that the Review Team believes long-term growth and viability are achievable, as long as the right resources are in place to execute.

Proposal 12-472, ALPPS Ltd., with Ohio State University, Advanced Language Performance Portfolio System (ALPPS), $100,000 requested. **Amount recommended: $100,000**

Rationale: This project is a second stage offering that will provide, initially for the academic sector, software and a process to evaluate foreign national student applicants who seek to gain entry into a higher learning institution. The result of the use of such a system should be a better-matched student and institution, as well as a faster and more cost-effective selection process. This proposal was formerly submitted and was not recommended for funding, as the Review Team wanted to see substantiated market insights to support the opportunity, as only Ohio State had any meaningful input into the project at that point.

Based on that feedback, the development team has engaged with multiple universities to confirm their hypotheses and assumptions, and has received a collaboration commitment from those universities to evaluate the technology during the project period. With this more robust sample size, the Review Team believes a positive funding recommendation is merited.

Despite the positive recommendation, the Review Team has concerns. The development team believes a commitment to continued use of the technology, following the pilot, on the part of the targeted schools is sufficient to demonstrate value of the technology. However, they will face a lengthy and complex selling process going forward, as they may not have the ability to quantify or otherwise demonstrate value to new customers. Every effort should be made to collect meaningful metrics from the universities in the pilot, even if all data has to be aggregated and anonymized. During the project period the Review Team would like to see a resource added to the team who would be dedicated to sales and marketing, which would help the team better capture and articulate their value proposition.

Proposal 12-473, CGJ Ultramarin LTD, with Ohio State University, Marine Jet Propulsion System, $100,000 requested. **Amount recommended: $100,000**

Rationale: This proposal addresses the application of a non-traditional thermodynamic cycle for use in a marine reactive propulsion system. The proposal was formerly submitted and was not recommended for funding, as the prior application was severely lacking in detail, precluding an objective technical assessment. The current iteration of the application provides extremely helpful trade secret information that allowed the Review Team to fully understand and appreciate both the novel nature of the propulsion system and the mechanisms at work. Though the proposed pathway to market is decidedly non-traditional, the funding mechanisms described in the proposal and the interest of potential customers is logical. The Review Team believes that at the conclusion of the project period the development team will have, in their prototype, sufficient means of attracting immediate revenue. As such, the Review Team recommends funding this proposal.

The primary concern of the Review Team at this point is the significant lack of business acumen on the team, which was discussed in the in-person interview and recognized as a gap by the applicant, the university, and the Review Team. The university has pledged its support to provide immediate and robust business assistance. While the technology can succeed on its own merits, the longer-term growth of the company will be severely impacted without more developed pricing models, pro forma financial projections, sales and marketing efforts, operational planning around supply chain and manufacturing, etc. But, to be clear, the company will be able to operate on its own at the end of the project plan, assuming proof of concept is demonstrated. The

Review Team simply wants to ensure the company can maximize its growth and competitive advantage in the marine propulsion space.

Proposal 12-474, NGJ LLC, with University of Akron, New Low Cost, Small Diameter NGJ Carbon Fibers from NGJ, LLC, $100,000 requested. **Amount recommended: $100,000**

Rationale: This proposal provides a path forward for manufacturing scale-up and generation of sufficiently large samples of lower cost, pitch-based, extremely small diameter carbon fibers via a melt extrusion and blow-spun (gas jet) technology. Technically, the proposal is incredibly strong, and as such the technical merits of the proposal are not in question. This proposal was previously submitted and did not receive a positive recommendation from the Review Team, as it became apparent during the in-person interview that the true proof required to move the technology forward lay in the hands of an uncommitted (at least in a formal sense) partner, Nanosperse. The current proposal strengthens the apparent commitment of Nanosperse to NGJ, but does not specifically mention any formalized agreement between the two companies. To their credit, NGJ and Nanosperse both attended the in-person interview session with the Review Team, which alleviated much of the concern. The Review Team did request the two parties formalize the research commitment referenced in the grant request, and the two parties have done this with a memorandum of understanding and purchase order containing a scope of work. The Review Team gives a positive recommendation for funding.

Proposal 12-475, Akron Software, LLC, with University of Akron, Parallel Computation of the Fast Fourier Transform, $100,000 requested. **Amount recommended: $0**

Rationale: This proposal focuses on a novel use and application of the Fast Fourier Transform (FFT), to increase processing speed of bulky data such as imaging and audio files, via parallel computational methods. This approach could allow for more real-time processing of data, especially in areas where the infrastructure to transmit (broadband) is lacking or insufficient in capacity. The technology addressed in the proposal would transmit data in smaller packages, saving customers money and easing the infrastructure burden, in addition to faster processing times.

The Review Team sees real merit in the technology itself, and believes the team is capable of delivering on that front. The key gaps are in the business model, which may be a reflection of the current development team, consisting of technical and IP expertise, but very little commercialization expertise. The development team has placed a great deal of focus on one specific MRI technology, for which there is a good fit with their algorithm allowing for faster or even real-time processing of data. The problem with this approach is the partner identified, ViewRay, has yet to establish itself as a viable entity in the market, and according to the applicants, ViewRay is 'focused on other things' as they work to establish themselves commercially, and it appears unlikely they would focus on incorporating faster processing times into their devices in the near-term. However, the technology of the grant application could strengthen ViewRay in their niche portion of the MRI market.

If the team is unsuccessful in partnering with ViewRay they mention larger imaging partners such as Philips and GE, but no substantive discussions or negotiations have occurred with either. Traditional MRI applications

may have a need for improved processing times, but without a good understanding of the customer needs on that front, it isn't clear whether or not the FFT is relevant. For example, even if less data could be collected and the patient is required to remain in the MRI suite for less time, hospitals / physicians may not have a need for the improved speed depending on how those images are currently analyzed and processed. If images are not typically analyzed until next day, for example, there is little incentive for Philips or GE to invest in improving processing times. Simply put, at the end of the project period the team may indeed have an impressive data sheet to demonstrate the improvements in processing time, but no ready pathway to market.

In addition, the pricing model is rather complex and as yet undefined. The royalty component would presumably change dramatically depending on the application into which the algorithm is incorporated, and no royalty pricing structure has been validated for any market at this point. The team also offers a service model to build and maintain their algorithm into various applications, but that pricing model has not been established, either. The development team references other applications within the 1D and 3D markets, but absent those high-level references nothing has been done to validate the business model within them.

Recommendations for Improvement: The Review Team would like to see a broader consideration of potential commercial pathways and a greater sense of the opportunity within those paths. The selection of ViewRay as a first customer makes sense from a technology and relationship perspective, but it is clearly too early to consider ViewRay as a meaningful commercial partner. If imaging is really the target for the team, they must make efforts to understand how traditional MRI processes overlay with their technology and whether their improvements in processing time offer anything substantive to the end-customer. Similarly, the pricing model has to be refined, both on the royalty structure and the service fees. It just isn't clear at this point how the company will make money, and whether the markets they've targeted can sustain early-stage growth. If resources are unavailable to add a business development/strategy person to the team, the Review Team would like to see the development team bring on a well-tenured business advisor to help them work through some of these challenges.

Proposal 12-476, NeoProteomics, Inc., Case Western Reserve University, Development of Novel Tools for Health IT – COBALT, $100,000 requested. **Amount recommended: $0**

Rationale: This proposal requests funding to license and develop a new bioinformatics software tool known as COBALT. This would be a new addition to a small, but rapidly growing area of systems biology, and would aid in understanding of molecular mechanisms of disease, stratification of patients, and identification of biomarkers. Given the track record of both the applicants and Case Western in developing and commercializing similar tools, the Review Team is comfortable accepting the many assertions around the utility of COBALT, and will accept the assumption that technical proof of concept can be achieved within the prescribed project plan.

The primary concern at this point is return on investment for the State of Ohio and whether any grant funds awarded for this program would have a meaningful impact on the developing company. According to information provided by the development team in the in-person interview, significant grant funding from various sources has been received to date, and another approximately $2MM in grant funding is pending from the NIH. If the NIH funding is awarded, the requested funding through the TVSF is relatively insignificant. If it is

not awarded, the Review Team has real questions as to how the company will rapidly grow its business model away from smaller-scale consultative activities and into a scalable model. Without this NIH award the TVSF funds are only supporting a software tool for internal use in consulting and not developing a commercial product.

The current business model, according to the proposal, relies on "sales revenue supplemented by grants". Because the company is currently generating revenue from the existing suite of algorithms, the Review Team believes more time and effort should be dedicated to executing against the existing IP portfolio and driving commercial revenue, and less on seeking continued grant funding. The applicants intend to add COBALT to their existing suite of products, which include four previously-licensed algorithms from CWRU. The applicants believe they have a real opportunity in the market, and the Review Team sees evidence of that as well, based on the existing suite of algorithms and the current and projected revenue streams. What is not particularly clear is why grant funding from this Program should be provided and what true impact that would have on the company. The Review Team cannot make a positive recommendation for funding, as it is left with the impression that the application does not meet the intent of the TVSF Program.

With regard to return on investment to the state, the applicants would appear to be building an impressive IP portfolio which could be sold in relatively short-order. The proposal states that the acquisition of COBALT can move the company 'closer to acquisition', which is a logical end-point, but not one that achieves the true intent of the program to drive economic development within the State of Ohio.

Recommendations for Improvement: The Review Team has significant concern whether this application could be improved to fit the intent of the TVSF Program. To be clear, this is not an indictment of the company or its leadership. The development team should be free to pursue whatever commercial pathway they wish. Nonetheless, the model of software development to support consulting does not fit with the intent and design of this OTF program.

Proposal 12-477, Affinity Therapeutics, LLC, with Case Western Reserve University, Microparticles to Prevent Infection in Hernia Mesh Repair, $100,000 requested. **Amount recommended: $0**

Rationale: This proposal addresses an improved means for encapsulating antibiotics in a hydrogel that permits timed-release of significant quantities of an antibiotic over a period of a month or more. The improved delivery in both time and target should allow for a greatly reduced incidence of infection, commonly associated with hernia mesh. Overall, the Review Team found the technology to be compelling.

Unfortunately, there were significant concerns on the commercial side that preclude a positive funding recommendation at this point. The business model would appear to be licensing and using the resulting royalties to fund additional R&D and new indications. Though it is premature to expect the team would have a definitive answer to all the variables involved in their business model, their responses to the questions in the in-person interview were sometimes inconsistent or even contradictory, leading the Review Team to believe they trust the strong science will trump the need for a strong business model. For example, the team is hopeful that once the first indication/license is obtained they can continue to offer their product in other areas. But without control of manufacturing, distribution, the sales force, etc., they will be challenged. In addition, the team assumes the first licensing partner will not attempt to constrain their freedom to operate in

any way, when in fact it's quite possible the licensee will demand exclusivity in a number of areas. The product itself is now separate from any implantable device into which it would be inserted, but the first indication is for a specific device – hernia mesh. Though the team wants to see the product as separate from the indication, in reality the licensing model will make that difficult to achieve.

One final note – the development team included a request for personnel in their application, which is not allowed for Phase 2 applications. As clearly stated in the TVSF RFP process, funds granted by the state cannot be used for salaries for company employees. If the team considers a resubmission they will need to revise that part of their proposal.

Recommendations for Improvement: Quite simply put, the team is in need of a strong business person. Again, the Review Team does not expect the applicants to have definitive and validated answers for the business model questions, but the Review Team is looking for awareness of gaps, thoughtful consideration of options, and strong rationale for business decisions made. Overall, this awareness was lacking. The Review Team believes this is critical, not necessarily because their product would fail/not reach market without improved business acumen. Rather, the Review Team believes future growth will be significantly constrained, potentially to the point of the company ceasing to exist, unless the business strategy is worked out prior to entering into licensing negotiations.

Proposal 12-478, I-Comet Technologies, Inc., with Cleveland Clinic, Portable Concussion Assessment, $100,000 requested. **Amount recommended: $100,000**

Rationale: This proposal addresses a high-profile area of medical need within the sports arena at all levels – quick and accurate assessment of concussion and traumatic brain injury. The technology under development would appear to address this unmet need from a technical perspective, and based on the size of that unmet need and strength of the technology, it is likely to meet with at least some degree of commercial success. As a result, a positive funding recommendation is made.

To be clear, the strength of the technology, which would appear to be a significant improvement over any existing assessment tool, and the strength of the Cleveland Clinic presence and support will make this a viable business, even on just a regional basis within Ohio and surrounding states. The Review Team's primary concern is that the development team, made up largely of technologists, is greatly underestimating the competitive response of the existing service provider in this space, as well as the sales and marketing efforts that will be required to turn this into a successful business on a nation-wide basis. The rough pricing assumptions that are in place do not take into account a competitive pricing reaction from the established player, who presumably, with an inferior product, may take an aggressive pricing stance to preserve market share. As the sales process has been somewhat overlooked by the development team, it isn't clear how or if they could counteract such a move, nor if the potential customers within school athletic departments would be able to appreciate the advantages of their technology without a well-thought-out marketing and selling approach.

Again, despite those concerns it is apparent there is a ready market for the tool, especially in areas that are influenced by or currently use medical services offered by the Cleveland Clinic, and the virtual model for the

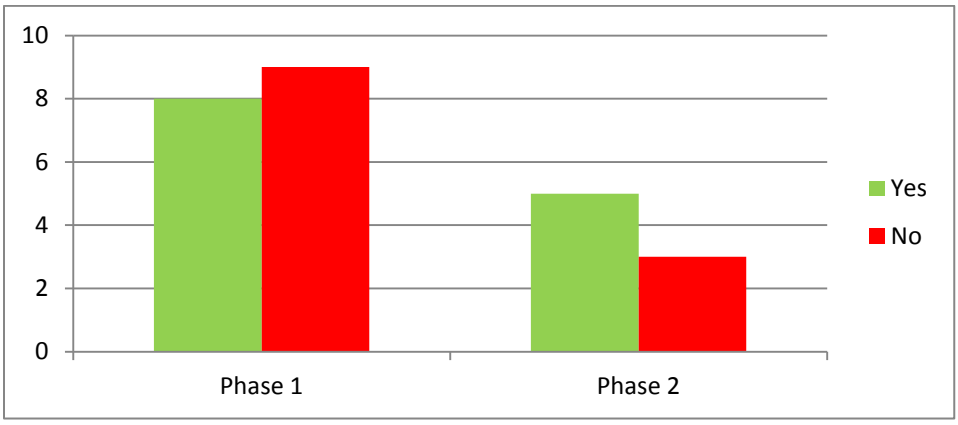
tool would allow commercial success even at a much smaller scale than is currently envisioned by the development team.

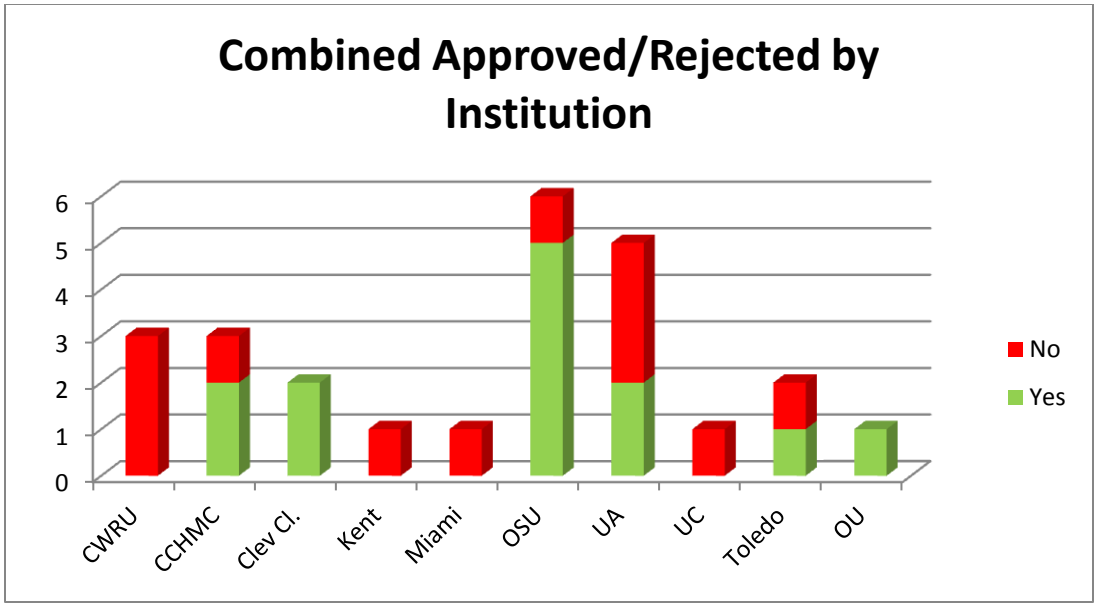
4. SUMMARY

The Review Team is recommending 13 of the 25 submitted grants for review (52%) which is a significant improvement from round 1, in which 35% of grant proposals were recommended for funding. For this current round, eight of the 17 Phase 1 proposals are recommended for funding (47.1%). For Phase 2, five of the eight submitted grants are recommended for funding (62.5%) With the Ohio Third Frontier accepting grants on a quarterly basis, the Review Team expects that many of the grants will be revised to address the concerns of the review team.

For both Phase 1 and Phase 2, grants 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





Ohio State University did very well with five of six grant applications being accepted. It should be noted that two of these were repeat applications where it was very clear that considerable effort was expended to improve the business cases and other deficiencies highlighted in the last round. Cincinnati Children's Hospital and the Cleveland Clinic were first time applicants for this program and each had two grants approved as did the University of Akron. Ohio University submitted a single grant which was approved.

Case Western Reserve had all three grant proposals not recommended for funding. Generally, the theme was deficiencies in the business models.

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

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

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 (Software Application and 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
ADVAL 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

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

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 Senior Manager-Camille Rechel, Director, Consumer Practice.

In addition to being a degreed chemist, Camille has over 25 years of Business Management experience. She holds several pioneering patents for polymeric coatings for optical fibers. She brings experience from the chemical industry and industrial electronics industry. Her core competencies include customer service and business development.

YourEncore Project Manager-Kevin Broida

Kevin Broida is a certified Project Manager (PMP) 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. He earned his MBA from Miami University.

If a proposal fell outside the technical experts core capabilities, the Project Manager engaged an Expert from YourEncore's network with deep expertise proposal's specific technical area.

Number of YourEncore Experts per Technology Area

- *Advanced Materials: 63*
- *Aero Propulsion and Power Management: 19*
- *Fuel Cells and Energy Storage: 80*
- *Medical Technology: 86*
- *Software Applications: 109*
- *Sensing and Automation Technologies: 28*

- *Situational Awareness and Surveillance Systems: 31*
- *Solar Photovoltaic and Photovoltaic: 31*

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	*Evaluate the commercial viability of protected technology developed by Ohio institutions of higher education*	*Determine whether a company has the resources, acumen, and market opportunity to successfully commercialize licensed IP*
Activities	1. Assess protected technologies from higher education institutions 2. Suggest technology development alterations to improve feasibility 3. Provide funding recommendations	1. Assess companies' plan for commercializing licensed technologies 2. Discuss improvement programs to unfunded Applicants 3. Interview strong candidates 4. Recommend funding candidates

Assumptions	▪ Submissions Per Year: - *2012: 50-80* - *2013: 100-160* ▪ 6 Page Grant Form ▪ Grant Size: $50K ▪ Available Funds: $3M	▪ Submissions Per Year: - *2012: 20-40* - *2013: 40-80* ▪ 6 Page Grant Form ▪ Grant Size: $100K ▪ Available Funds: $3M

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*
- *Fuel Cells and Energy Storage*
- *Medical Technology*
- *Software Applications*
- *Sensing and Automation Technologies*
- *Situational Awareness and Surveillance Systems*
- *Solar Photovoltaic and Photovoltaic*

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:

- 7,000+ Experts
- Avg. 25+ years Experience
- 67% have advanced degrees
- Representing 1000+ different companies

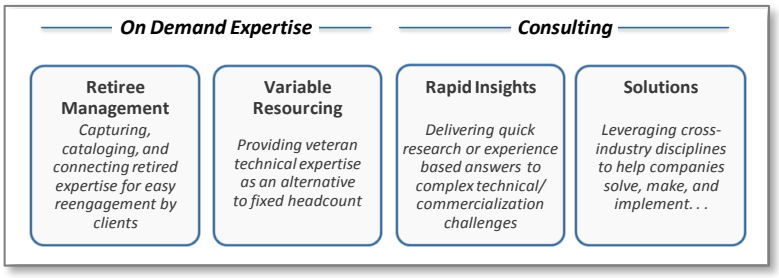
YourEncore understands the unique needs and challenges startups face since, 8 years ago, it was one. YourEncore was founded in 2003 by John Barnard of Barnard Associates. Barnard Associates is composed of a cross-functional team of highly experienced executive leaders, who advise start-ups on launching 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 7,000 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*



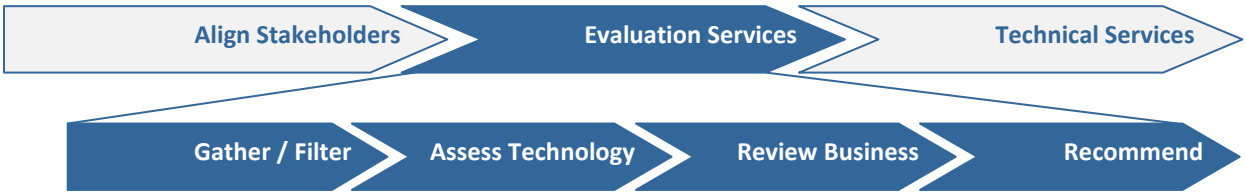
SUMMARY OF QUALIFICATIONS

APPENDIX D-EVALUATION PROCESS

APPROACH AND MANAGEMENT PLAN

YourEncore engaged an Expert team comprised of a Project Manager, Business Reviewer, and eight Technical (i.e., Subject Matter) Reviewers along with 2 of its senior managers 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, YourEncore senior managers reviewed for consistency and quality.



	Gather / Filter	Assess Technology	Review Business	Recommend
Activities	▪ Receive proposals from OTF ▪ Perform initial review to remove unfeasible proposals ▪ Document findings	▪ Disseminate proposals ▪ Reviewers perform detailed technology assessment(s) ▪ Recommend proposals for consideration ▪ Document Findings using co-developed Scorecard	▪ Gather Reviewers' Recommendations ▪ Review business case of recommended proposals ▪ Interview Phase II Applicants ▪ Refine Recommendations	▪ Finalize Funding Recommendations ▪ Develop detailed report for OTF Consumption ▪ Create summary presentation ▪ Present findings and recommendations to OTF Committee ▪ Brief removed Applicants on decision
Outputs	▪ Refined Proposal List ▪ Documented Findings	▪ Assessed Technology ▪ Prioritized Candidates	▪ Refined Recommendations	▪ Detailed Report ▪ Substantiated Funding Recommendations ▪ Briefed Applicants on decision

Align Stakeholders

Shortly after selection, YourEncore held a half-day grounding session with YourEncore's stakeholders (i.e., Account Director, Project Manager, 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:

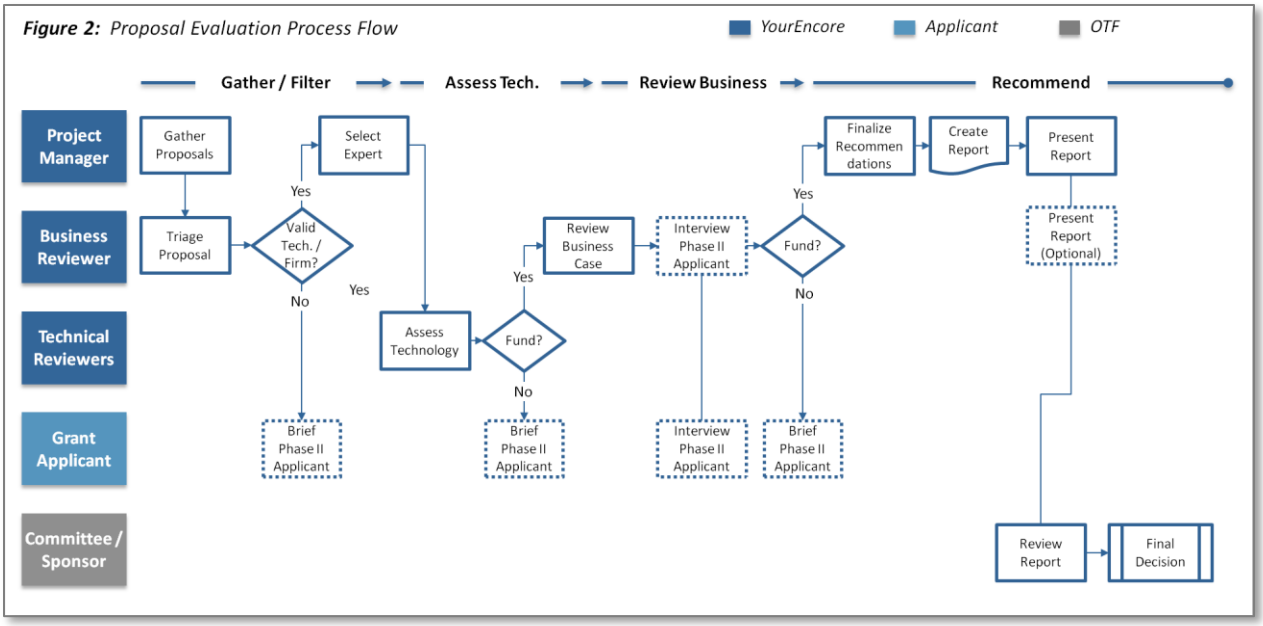
Key Evaluation Scorecard Components

- *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 a 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 grant 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 Managers 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.

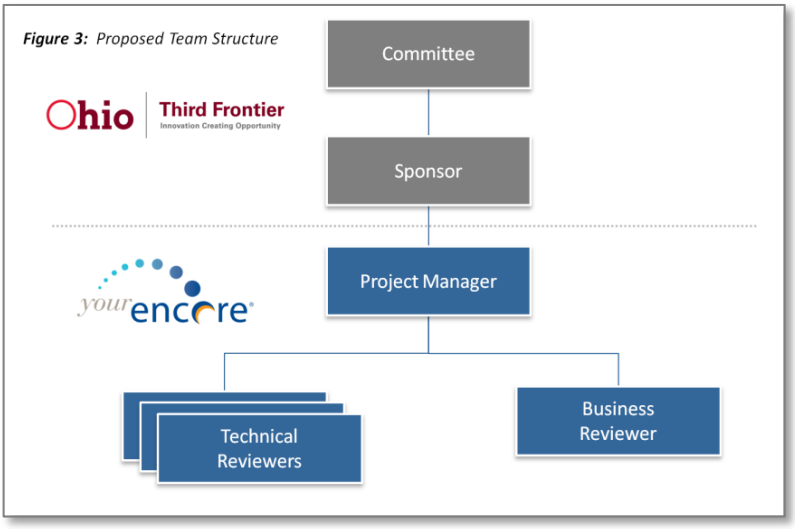
Assess Technology: Upon receiving the proposal, the YourEncore Technical Reviewers' leveraged the co-developed evaluation scorecard to perform assessments for the Phase I / Phase II submissions they were provided. Upon completion of the assessment the Technical Reviewers documented their recommendations.

Review Business Case: The Project Manager compiled the technical assessments and disseminated recommended Proposals to the Business Plan Reviewer. The Business Reviewer then reviewed the business case and analyzed the market potential of each recommended proposal. For all recommended Phase II applicants, the Business Reviewer, the Project Manager and YourEncore Senior Managers 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 Managers 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 Dr. Andrew Hansen from Development 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, Dr. Hansen 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 Reviewer

To validate the Experts' recommendations YourEncore engaged a strategic business development, entrepreneurial expert to perform review of all Proposals. Furthermore, this individual participated in all Phase II onsite interviews.

Technical Reviewers

YourEncore identified and selected a team of nine 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 following areas.

- *Advanced Materials*
- *Aero Propulsion and Power Management*
- *Fuel Cells and Energy Storage*
- *Medical Technology*
- *Software Applications*

- *Sensing and Automation Technologies*
- *Situational Awareness and Surveillance Systems*
- *Solar Photovoltaic and Photovoltaic*

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.