Final Report of the Committee for the Review of Proposals to Ohio's Third Frontier Program, 2012-2013: Innovation Platform Program 2013

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Aeronautics and Space Engineering Board

Division on Engineering and Physical Sciences

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Acknowledgments

This report has been reviewed in draft form by A. Thomas Young, Lockheed Martin (retired) in accordance with procedures approved by the Report Review Committee of the National Research Council. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

Although Mr. Young provided many constructive comments and suggestions, he was not asked to endorse the conclusions or recommendations, nor did he see the final draft of the report before its release. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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500 Fifth Street, NW
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Phone: 202-334-2858
Fax: 202 334 2482
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May 29, 2013

David Goodman
Director
Ohio Development Services Agency
77 S. High Street
Columbus, OH 43215-6130

Dear Mr. Goodman:

This letter details the work and transmits the final report of the Committee for the Review of Proposals to Ohio's Third Frontier Program, 2012-2013, for proposals submitted to the 2013 Innovation Platform Program (IPP). This activity was supported by a contract from the Ohio Development Services Agency (ODSA) with the National Academy of Sciences and was performed under the auspices of the National Research Council's (NRC's) Aeronautics and Space Engineering Board (ASEB). The NRC is committed to providing elected leaders, policy makers, and the public with expert advice based on sound scientific evidence. For this study, the committee appointed to conduct the review was asked not only to exercise scientific judgment, but also to focus on commercial viability as a key consideration. This is the eleventh year the NRC has reviewed proposals for the State of Ohio.

Program Objectives

As stated in the IPP's request for proposals (RFP), a major goal of the Ohio Third Frontier (OTF) is to "catalyze collaborations in technology commercialization, innovation, and product development between the State's colleges and universities and Ohio industry."[1] The specific purpose of the IPP is to "link the development and innovation capabilities and capacities of an already established Innovation Platform and all its resources . . . to specific late stage development and innovation needs of Ohio companies." [2] Critical to grasping the program's objectives is an understanding of what is meant by "Innovation Platform." The RFP defines an Innovation Platform as:

> An already existing capacity that incorporates unique technology capabilities and strengths, talent, equipment, facilities, engaged industry partners, a track record of research commercialization and innovation, intellectual property, and other resources in a particular technology area that collectively can serve as a vehicle for significant, industry-defined and directed opportunities through the development and commercialization of new products and innovations.[3]

[1] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), available at http://development.ohio.gov/files/otf/FY2013%20OTF%20IPP%20RFP%20-%20Final.pdf, p. 5.
[2] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), p. 5.
[3] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), p. 5.

The RFP also outlines several key objectives of the program:

- To support existing Innovation Platforms at Ohio colleges, universities, or not-for-profit research institutions that will serve specifically defined near-term commercialization objectives of two or more non-related Ohio for-profit companies;
- To support Innovation Platforms that will develop and launch new products, innovations, or services into the commercial market within three (3) to five (5) years of the Project start date;
- To kick-start the long-term, sustained use of the Innovation Platform by multiple Ohio industry partners;
- To support Innovation Platforms that will create wealth and employment opportunities within Ohio.[4]

Scope of Engagement

For the 2013 IPP, a total of 27 proposals were submitted and evaluated by the committee. Proposals spanned the eight technology areas identified in the program's RFP: Advanced Materials (AM), Aeropropulsion Power Management (APM), Fuel Cells and Energy Storage (FCES), Medical Technology (MT), Software Applications for Business and Healthcare (SABH), Sensing and Automation Technologies (SAT), Situational Awareness and Surveillance Systems (SASS), Solar Photovoltaics (PV), and Agribusiness and Food Processing (AFP) (see Table 1).

This report provides the committee's assessment of all of the received proposals. The committee recommends that the Third Frontier Commission (TFC) consider funding 6 of the 27 proposals; these 6 recommended proposals make a strong case that they would achieve the goals and purpose of the IPP. The total amount of state funds requested by the recommended proposals is $ 17,347,402.

Evaluation Methodology

Committee members were recruited based on their familiarity with the subject areas of the 27 proposals to be evaluated and for their experience with business practices, technology transfer, venture capital, and economic development. The committee is chaired by T.S. Sudarshan, president and CEO of Materials Modifications, Inc. The committee comprises a combination of working engineers, academics, and business executives; four members are also members of the National Academy of Engineering, and three members are members of the National Academy of Sciences. The committee roster appears on page v, and biographical sketches of the committee members can be found in Appendix E.

Based on criteria and proposal requirements specified in the RFP, ASEB staff developed an evaluation worksheet (see the section "Evaluation Criteria and Key Differentiators," below) to help guide the initial evaluation of the proposals. ASEB staff also developed a definition sheet of critical terms and key criteria, again based on the RFP (see Appendix D). Committee members were then assigned on average 4 to 6 proposals each to evaluate. For each proposal, committee members were designated as primary or secondary reviewers for the purposes of guiding committee discussions at the first meeting. Each proposal was evaluated in-depth by at least three committee members before the committee's first meeting.

The committee held its first meeting on March 28-29, 2013. Early at this meeting, the committee heard a presentation from ODSA staff and held a discussion regarding the IPP's objectives, requirements, and criteria, seeking clarification from ODSA as needed. Following this discussion, the committee held a round of "triage"—each member was asked if, in their view, any of their assigned proposals clearly and critically failed to meet the requirements of the RFP. Further input was sought from the other committee

[4] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), pp. 5-6.

members and, through consensus, the committee eliminated from further discussion those proposals it deemed critically flawed. Following the triage round, primary and secondary reviewers used their initial evaluations to lead the rest of the committee in a discussion of the strengths and weaknesses of the remaining proposals. Because of their subjective nature, the evaluation worksheets were used only to guide discussions.

TABLE 1 Innovation Platform Program Proposal Technology Areas

Proposal	AM	APM	FCES	MT	SABH	SAT	SASS	PV	AFP
13-301				X					
13-302	X								
13-304	X	X							
13-307	X			X					X
13-309				X					
13-312	X								
13-314	X								
13-316				X					
13-317	X		X						
13-318	X			X					
13-320					X				
13-322					X				
13-324				X	X	X			
13-325				X					
13-326				X	X			X	
13-327				X					
13-329							X		
13-330	X			X			X		X
13-332	X								
13-333						X			
13-336				X					
13-340	X								
13-341				X					
13-342						X			
13-344	X								
13-346		X	X						
13-350			X						
Total	11	2	3	12	4	3	2	1	2

NOTE: AM, Advanced Materials; APM, Aeropropulsion Power Management; FCES, Fuel Cells and Energy Storage; MT, Medical Technology; SABH, Software Applications for Business and Healthcare; SAT, Sensing and Automation Technologies; SASS, Situational Awareness and Surveillance Systems; PV, Solar Photovoltaics; AFP, Agribusiness and Food Processing.

Based on those discussions and through consensus, the committee selected 10 proposals for further examination at the committee's second and final meeting:

- 13-301: Innovative Technology Platform for the Development of Spinal Devices of the Future (The University of Toledo)
- 13-302: Innovative Technology Platform of Carbon Based Nanomaterials/Composites (The Ohio State University)
- 13-307: Intelligent Simulation Platform for Product Commercialization (The Ohio State University)
- 13-316: Commercialization of an Innovative Neuromodulation and Neurostimulation Technology Platform (Case Western Reserve University)
- 13-324: Concussion Management and Reduction Program (Cleveland Clinic)
- 13-327: Ohio Platform for Tomorrow's Industrial Medical Imaging Systems and Equipment (OPTIMISE) (Case Western Reserve University)
- 13-329: Trusted Situational Awareness (University of Dayton)
- 13-330: Electrochromodynamic Systems (Kent State University)
- 13-333: The Ohio Sensor and Semiconductor Innovation Platform (OSSIP) (The Ohio State University)
- 13-342: Smart Sensor System Design, Development, and Commercialization (University of Akron)

The committee also developed a list of follow-up questions that addressed areas of concern for each of these 10 proposals. These questions were sent to ODSA, who forwarded them to the lead applicants prior to the second meeting. Applicant teams were instructed to provide written answers approximately 1 week before the committee's second meeting. At the close of the first meeting, all committee members were asked to read each of the 10 proposals prior to the committee's second meeting.

The committee held its second meeting on April 19-20, 2013, and interviewed the applicant teams of the 10 proposals selected at the first meeting. Each applicant team was given 45 minutes to address additional questions from the committee. Each session was conducted in true "interview" format; no presentation materials were allowed. In addition, as needed, the committee met with the lead applicant separate from the clients for the individual proposals. Before the start of the interviews, the committee held a dialog with ODSA staff regarding the performance of applicant teams on prior OTF grants, as well as for further clarification on the requirements of the IPP. Following the interviews, the committee held an in-depth discussion on each of the 10 proposals and, through consensus, determined which proposals best satisfied the requirements of the RFP and their respective rank-order.

Evaluation Criteria and Key Differentiators

The IPP's RFP details the evaluation criteria utilized by the committee. The evaluation worksheet generated by ASEB staff to guide the committee's initial evaluation of the proposals groups most of these criteria into five broad sections (see Appendix C). Below are several of the individual criteria from the worksheet, rewritten and paraphrased here as questions to illustrate their overall breadth:

- *Technical Merit and Plan.* Can the technical challenges be met? Are the project goals and objectives realistic? How will these be met? Are there significant risk factors? Does the proposal align with the definition of a platform? Does the proposal include a plan for beyond the 3-year time period?
- *Commercialization Strategy.* What are the specific value propositions of the different commercial applications? Is sufficient evidence provided to support the contention that the market values these benefits? Has the Innovation Platform already achieved at least proof of principle? What are the

competitive advantages of the IPP's technologies or products over existing and alternative technologies? Does the team understand the total resource requirements for achieving market entry and full commercialization, the type of knowledge that must be produced at the identified positioning stage, and who will likely be the funding providers for the market entry stage?

- *Performance Goals.* What is the project's impact on Ohio in job creation, personal wealth, new sales of products, and follow-on investment? Does the proposal contain a realistic forecast of the economic impacts of the Innovation Platform (for 3 and 5 years after start of project)? How successful was the performance of the team on related prior OTF grants?
- *Experience and Qualifications.* Do the lead applicant and clients have the direct experience needed to perform both the technical and commercial work being proposed? Who are the key personnel (technical director and commercialization director)? Do they have the required skills and experience to serve in their capacities?
- *Budget and Cost Share.* Is the budget justified in a detailed narrative with the appropriate forms? Is it adequate to meet proposal goals? Is the cost share necessary and reasonable? Is the cost share in the form of cash? Are letters of commitment provided, and are they sufficiently detailed, including an explanation of cost share commitment?

During the course of the study, the committee prepared an Overview Table (see Appendix A) to summarize how well each proposal satisfied the evaluation criteria in each of the above groups. On the chart, "E" and the color green indicate that the proposal *exceeds* the RFP requirements, "M" and the color yellow indicate that the proposal *meets* the RFP requirements, and "D" and the color red indicates that the proposal *does not meet* the RFP requirements. The committee stresses that understanding the context of these determinations is somewhat critical. In some cases, a relatively strong proposal may have "does not meet" grades in several areas due to a single problem that relates across each of the areas, whereas another proposal could have an equivalent number of areas with "does not meet" grades, yet be a much weaker proposal, due to the number of failures in the individual areas.

The committee also generated Table 2 to illustrate how the proposals measured against several key RFP criteria relating to the budget and cost share and economic impacts of the proposals. The RFP has a large number of criteria concerning the budget and cost share of the proposals, but unlike previous programs reviewed by NRC committees, IPP RFP includes the following two provisions:

> 1. It is expected that a super majority of Ohio Third Frontier Funds remain with the Lead Applicant to support the Innovation Platform's work on collaborative projects for the Ohio for-profit companies.[5]
> 2. Proposals must have a minimum of fifty (50) percent of the Cost Share contributed by Ohio for-profit companies. Strong Proposals will have a super majority of Cost Share contributed by the client Ohio for-profit companies as evidence of their commitment to the value of the technology platform.[6]

[5] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), p. 7.
[6] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), p. 8.

TABLE 2 Comparison of Proposals' Key Budget and Economic Impact Numbers

	Budget and Cost Share			Economic Impacts			
				Jobs			**Revenue**
#	Cost Share Ratio	State Funds to Lead (%)	Cost Share from Clients (%)	**For-Profit**	**Non-Profit**	**Total—Year 3**	**Year 3 (million$)**
301	1.00	42.68	57.25	28	7	**35**	15.56
302	1.00	66.67	66.67	40+	10	**50+**	15
304	1.04	69.97	66.37	8	3	**11**	4.00
307	1.17	83.33	100.00	23	6	**29**	2.50
309	1.02	95.35	52.01	8	4	**12**	10.00
312	1.00	45.00	69.91	16	0	**16**	8.10
314	1.00	94.77	86.31	4	0	**4**	1.30
316	1.00	10.22	50.00	22	3	**25**	7.50
317	1.00	100.00	100.00	4	7	**11**	N/A
318	1.00	42.51	73.90	9 to 18	7 to 10	**16 to 28**	4.60
320	1.22	50.60	58.94	4	29	**33**	5.00
322	1.00	39.30	60.70	0	8	**8**	5.55
324	1.11	61.15	51.00	25	4	**29**	7.60
325	1.00	100.00	100.00	15	22	**37**	1.20
326	1.27	36.94	49.84	435	25.5	**460.5**	49.08
327	1.12	66.67	80.45	17	10	**27**	2.70
329	1.03	51.67	89.85	26	6	**34**	3.46
330	1.00	36.58	63.49	7	3	**10**	5.00
332	1.38	55.13	76.42	6	4	**10**	2.01
333	1.03	77.31	68.08	50	3	**53**	30.80
336	1.02	73.00	77.09	4	2	**6**	Unknown
340	1.00	65.60	82.69	15	4	**19**	3.60
341	1.08	51.08	71.63	23	9	**32**	1.35
342	1.00	69.54	61.98	7	0	**7**	28.50
344	1.01	70.00	69.41	9.5	71	**80.5**	35.00
346	1.27	57.32	57.12	20	0	**20**	3.00
350	1.02	63.64	77.68	58.4	1.2	**59.6**	5.47

Recommendations

The committee recommends that the Third Frontier Commission consider funding six proposals that make a strong case for achieving the goals and purposes of the Innovation Platform Program (see Table 3). In terms of the evaluation criteria presented in the RFP, the strengths of these proposals far outweigh whatever weaknesses may be present. Detailed reviews of all 27 proposals appear in Appendix B. For the benefit of the TFC, the committee has rank-ordered the six proposals in terms of their relative merit and compliance with the RFP.

TABLE 3 Proposals Recommended for Funding Consideration

Rank	Proposal	Title (Lead Applicant)
1	13-329	Trusted Situational Awareness (University of Dayton)
2	13-327	Ohio Platform for Tomorrow's Industrial Medical Imaging Systems and Equipment (OPTIMISE) (Case Western Reserve University)
3	13-301	Innovative Technology Platform for the Development of Spinal Devices of the Future (The University of Toledo)
3	13-307	Intelligent Simulation Platform for Product Commercialization (The Ohio State University)
3	13-316	Commercialization of an Innovative Neuromodulation and Neurostimulation Technology Platform (Case Western Reserve University)
3	13-333	The Ohio Sensor and Semiconductor Innovation Platform (OSSIP) (The Ohio State University)

Four of these six proposals are recommended with caveats: 13-301 warrants consideration for funding only if the infection sensor work is removed from the proposal; 13-307 warrants consideration for funding only if the platform makes a verifiable commitment to giving priority to Ohio firms; 13-316 warrants consideration for funding only if ODSA will require and can confirm that medical devices for both the U.S. and European markets are developed and manufactured in Ohio; 13-333 warrants consideration for funding only if the Syntonics element is removed.

The six proposals are summarized as follows:

(Rank 1) *Trusted Situational Awareness (13-329)* seeks to deliver to market a fully tested and operational situational awareness system and all of its components, both resident at IDCAST and in partnership with the City of Dayton Police Department, that can also be used by companies to demonstrate the capability of their technologies. Situational awareness is a huge market opportunity for Ohio and its "sensor-related" asset base. The medium-sized market this proposal targets, such as campuses, military, and similar government facilities, critical infrastructure, and medium-sized cities, appears to be an underexploited niche. IDCAST has strong technical credentials to support development of the proposed commercial Trusted Situational Awareness platform and product integration with their commercial partners. The commercialization strategy is quite credible, and the listed economic impacts are conservative relative to the market potential.

(Rank 2) *Ohio Platform for Tomorrow's Industrial Medical Imaging Systems and Equipment (OPTIMISE) (13-327)* combines intellectual property, software, consulting faculty, and facilities to provide commercial modeling services to late-stage products with particular depth in electromagnetic analysis applied to medical diagnostics and therapy. The proposal seeks funding to use the OPTIMISE platform to commercialize two next generation products: improved radiofrequency coils for breast biopsy systems to meet new radiology standards, and the use of magnesium diboride (MgB_2) to respond to the shortage of liquid helium for superconducting magnets for magnetic resonance imaging (MRI) machines. The innovative designs have global impact with major manufacturers of MRI equipment. Further, the resources acquired through this project by the lead applicant will bring the OPTIMISE platform to a level that will enable the platform to offer its services to a long list of prospective clients in exchange for sustainable revenue.

(Rank 3) *Innovative Technology Platform for the Development of Spinal Devices of the Future (13-301)* seeks to develop orthopaedic device product concepts, advanced analytical capabilities to support product development, prototyping, testing per ASTM and CE Standards, and applications required for regulatory [e.g., 510(k)] approval. Proposed products include spinal implants, an infection sensor, and a family of exercise machines. The platform described in the proposal is established and can provide important and critical assistance to the client companies to bring new products to the market and create jobs and revenue for the State of Ohio. The client companies all have experience with the design, development, or marketing of spine implants or machines to rehabilitate or prevent spine injuries. The technical plan is well outlined. However, the committee is concerned that the infection sensor work will not produce a product in the required timeframe and does not really fit into the described scope of the platform. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if the infection sensor work is removed from the proposal*.

(Rank 3) *Intelligent Simulation Platform for Product Commercialization (13-307)* builds upon an existing platform at The Ohio State University (OSU) Ohio Supercomputing Center and involves six client companies, AltaSim, Intel, Kinetic Vision, Nimbis, Procter & Gamble, and TotalSim. The project focuses on utilizing a cloud-based modeling and simulation technology to create six manufacturing design application systems. These apps would be sold through a new app store based on an enhanced e-commerce marketplace and used by small- to medium-sized manufacturers. These tools will facilitate the use of important competitive capabilities previously only accessible to large firms. The clients have the domain depth, and the initial suite of apps is "low-hanging fruit" identified as being in high demand. Long-term sustainability beyond the grant period is based on license and fee revenue from the initial suite of apps. The apps to be developed will be valuable to all manufacturers, and the committee expects that they will be deployed widely over time. The proposal claims that Ohio firms will receive priority. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if the platform makes a verifiable commitment to giving priority to Ohio firms.*

(Rank 3) *Commercialization of an Innovative Neuromodulation and Neurostimulation Technology Program (13-316)* will develop and market the OMNISTIM™ System—an implantable neurostimulation device and related software. The NNT Platform comprises years of sensor development and clinical data collection at Case Western Reserve University (CWRU). This proposal is the next logical step in CWRU's commercialization of NNT Program related technology. CWRU's attempt to maintain control of the Device Master File is highly unusual but is not contrary to the criteria of the IPP. The plan leverages NDI's demonstrated success as a manufacturer of record. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if ODSA will require and can confirm that medical devices for both the U.S. and European markets are developed and manufactured in Ohio*.

(Rank 3) *The Ohio Sensor and Semiconductor Innovation Platform (OSSIP) (13-333)* pursues cooperative projects among the lead applicant, OSU's Nanotech West Laboratory (NWL), and three client companies: Cincinnati Electronics (CE), for focal-plane detectors used in cameras in the infrared (IR) spectral range; Srico, for electrooptic modulators for use in transmission of information; and Syntonics, for remotely located surface-acoustic-wave (SAW) sensors for assessing operating conditions of jet engines, among other possible applications. Two of the projects, the development of new infrared-detector arrays and the

development of thin-film electro-optics modulators, clearly advance the state of the art, can be realized in the 3-year time frame, and have an excellent chance of providing the predicted revenue generation and job creation for the State of Ohio at the third year and beyond. The technology of the third project, the Syntonics remote sensor, appears to be in too early a state to be brought to market in any reasonable timeframe to be tied to this program. As such, the committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if the Syntonics element is removed*.

All of the remaining 21 proposals scored substantially lower than the 6 proposals listed above *when ranked against the criteria and requirements specified in the IPP's RFP,* and they are not recommended for consideration under the current year's program. This does not necessarily mean that the proposals lack merit or should not be funded as part of some other program sponsored by the TFC, the State of Ohio, or the federal government. The specific strengths and weaknesses of all the IPP proposals are included in the individual reviews in Appendix B.

The committee wishes to thank the State of Ohio for the opportunity to review these proposals and to provide its recommendations as to which of the proposals best meet the requirements set forth in the IPP's RFP.

Sincerely,

T.S. Sudarshan, *Chair*
Committee for the Review of Proposals to Ohio's Third Frontier Program, 2012-2013

cc: Michael H. Moloney, *Director, Aeronautics and Space Engineering Board*

Appendixes

A Overview Table
B Individual Summary Evaluations
C Evaluation Worksheet
D IPP Definitions, Goals, and Criteria
E Biographical Sketches of Committee Members

Appendix A
Overview Table

This table was prepared by the Committee for the Review of Proposals to Ohio's Third Frontier Program, 2012-2013 to summarize how well each proposal satisfied the evaluation criteria of the Request for Proposals (RFP) for the 2013 Ohio Third Frontier Innovation Platform Program.

Key	
E	Exceeds Requirements of the RFP
M	Meets Requirements of the RFP
D	Does Not Meet Requirements of the RFP

Proposal (Lead Applicant)			**Technical Merit and Plan**	**Commercialization Strategy**	**Performance Goals**	**Experience and Qualifications**	**Budget and Cost Share**
Recommended		RANK					
13-329	Trusted Situational Awareness (University of Dayton)	**1**	**E**	**M**	**M**	**E**	**M**
13-327	Ohio Platform for Tomorrow's Industrial Medical Imaging Systems and Equipment (OPTIMISE) (Case Western Reserve University)	**2**	**M**	**E**	**E**	**E**	**E**
13-301	Innovative Technology Platform for the Development of Spinal Devices of the Future (The University of Toledo)	**3**	**E**	**M**	**M**	**E**	**M**
13-307	Intelligent Simulation Platform for Product Commercialization (The Ohio State University)		**M**	**M**	**M**	**M**	**E**
13-316	Commercialization of an Innovative Neuromodulation and Neurostimulation Technology Program (Case Western Reserve University)		**M**	**M**	**M**	**E**	**M**
13-333	The Ohio Sensor and Semiconductor Innovation Platform (OSSIP) (The Ohio State University)		**M**	**M**	**M**	**M**	**M**
Not Recommended							
13-302	Innovative Technology Platform of Carbon Based Nanomaterials/Composites (The Ohio State University)		**D**	**D**	**D**	**M**	**M**
13-304	Advanced Materials for Next Generation Gas Turbine Engines (University of Dayton Research Institute)		**D**	**D**	**D**	**M**	**M**
13-309	Development and Commercialization of JVS-100 as a Regenerative Therapy Platform for Acute and Chronic Disease (Summa Health System)		**M**	**M**	**D**	**E**	**M**

Proposal (Lead Applicant)		Technical Merit and Plan	Commercialization Strategy	Performance Goals	Experience and Qualifications	Budget and Cost Share
13-312	Transparent Conductive Film Manufacturing and Commercialization of Flexible Electronics Devices (The University of Akron)	D	D	D	M	D
13-314	Multiscale, Multimode, Subsurface Analysis and Defect Detection for Advanced Manufacturing (The Ohio State University)	D	D	D	M	M
13-317	Commercialization of Metal Oxide Composite Manufacturing for Advanced Energy Conversion and Storage (The Ohio State University)	D	D	D	D	D
13-318	Akron Functional Materials Center (The University of Akron)	D	D	D	M	D
13-320	Interactive Visual Health Records Platform (Cleveland Clinic)	D	D	D	M	D
13-322	Commercialization of HealthLandscape Information Platform (The Health Foundation of Greater Cincinnati, operating through its subsidiary HealthLandscape, LLC)	D	D	D	M	D
13-324	Concussion Management and Reduction Program (Cleveland Clinic)	D	D	D	M	M
13-325	The Advanced Neuroplastic Imaging Center at Wright State University (Wright State Applied Research Corporation)	D	D	D	D	D
13-326	Interprofessional Immersive Simulation Center (The University of Toledo)	D	D	D	M	D
13-330	Electrochromodynamic Systems (Kent State University)	M	M	D	E	D
13-332	Center for Biomaterials Characterization and Innovation (Cleveland State University)	D	D	D	M	M
13-336	Clinical PET Biomarker Development Program (Case Western Reserve University)	D	D	M	E	M
13-340	Center for Advanced Nanocomposites (Case Western Reserve University)	D	D	D	M	M
13-341	Development and Commercialization of a Cellular Imaging, Analysis, and Processing Tool for Application in Regenerative Medicine (Cleveland Clinic)	M	D	D	E	D
13-342	Smart Sensor System Design, Development, and Commercialization (University of Akron)	D	D	D	M	M
13-344	Biobased Composites Innovation Platform (The Ohio State University)	D	D	M	M	M
13-346	Advanced Integration and Management of Electrical Power and Propulsion Systems (The Ohio State University)	D	D	D	M	D
13-350	Energy Storage Device Innovation Center (ESDIC) (The Ohio State University)	D	D	D	D	M

Appendix B
Individual Summary Evaluations

Summary evaluations of the 27 proposals to the 2013 Ohio Third Frontier Innovation Platform Program (OTF IPP) are given below. Proposals were evaluated according to criteria given in the Request for Proposals (RFP).

OTF IPP 13-329
Trusted Situational Awareness
University of Dayton

Proposal Summary:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,800,000	$2,273,188
Capital Funds	$200,000	$815,000
Subtotal	$3,000,000	$3,088,388
TOTAL	$6,088,388	

The University of Dayton's Institute for the Development and Commercialization of Advanced Sensor Technology (IDCAST) identifies its technology platform as situational awareness (SA) and the components that comprise a fully functional SA system, Trusted Situational Awareness. The primary project goal is to deliver to market a fully tested and operational SA system and all of its components, both resident at IDCAST and in partnership with the City of Dayton Police Department, that can also be used by companies to demonstrate the capability of their technologies.

- IDCAST will add sensor-interoperability and plug-and-play capabilities into the Trusted Situational Awareness platform and work with Woolpert to finalize the development of the United Views system into the fully functional trusted situational awareness (TSA) system.
- IDCAST will work with Tenent 3 to integrate anti-tamper and cybersecurity capabilities and demonstrate a security evaluation approach for trusted systems integration (based on the Three Tenets approach utilized by the Department of Defense (DOD) and Air Force).
- IDCAST will integrate and validate SA products from Ohio companies into the Trusted Situational Awareness platform (with Greenlight Optics's GLOCAT Lens as the early commercialization candidate). The proposal team will also integrate existing and new off-the-shelf cameras to be deployed by the Dayton Police Department.

Client companies include Optica Consulting, Inc., Woolpert, Greenlight Optics, Tenet 3, LLC, and the City of Dayton.

Detailed Review:

- **Technical Merit and Plan**

This is predominately a system integration proposal, assembling and updating existing software systems and components into a highly flexible and modular SA platform. The proposal focuses on transforming the Woolpert United Views system into the envisioned Trusted Situational Awareness platform. The current version of this software resides at IDCAST, and much of the work proposed would be integral to future Woolpert product releases as a fully integrated SA solution for commercial deployment.

The integration of an existing solution developed by IDCAST, the Terra Harvest Open Source Environment (THOSE), for the Army Research Laboratory and the Defense Intelligence Agency is particularly noteworthy. THOSE provides the sensor interoperability and plug-and-play backbone for the new United Views system. This open architecture solution, combined into the highly modularized structure of United Views, provides the ability to integrate products from multiple companies. Tenent 3 adds key cybersecurity and anti-tamper solutions that can be both integrated into the core platform and adapted as required for unique customer solutions, while Optica Consulting, Inc. provides existing capability in integrating and displaying sensor information.

Commercial cameras are being purchased as part of the Dayton Police deployment, but the GLOCAST Lens is a commercialization candidate. This an example of a sensor that IDCAST will use both to test the plug-and-play capability of THOSE as well as to develop tools for and integrate the two-way requirements for pan-tilt-zoom capabilities.

The technical objectives and deliverables are well articulated. The proposal team provided strong answers to the committee's technical questions. The proposal exceeds the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposal clearly identifies a middle market opportunity space between the large system integrators focused primarily on the DOD market and the targeted niche surveillance system integrators. Woolpert is already active in this market space, and the proposal makes a good case for the competitive opportunity of the United Views Trusted Situational Awareness platform in this middle market space.

The strongest near-term value proposition is selling upgrades to Woolpert's existing customers. Woolpert has the primary marketing role, first to sell to existing clients and second to sell into the wider market. All three of the smaller for-profit companies have a two-pronged commercialization strategy: working closely with Woolpert on pull through with their customers and using the successful demonstration in the TSA to sell to their own target customers.

The proposal has a strong focus on the law enforcement market. The United Views installation to be developed with the Dayton Police Department will be an invaluable operational asset for demonstration purposes. Woolpert will lead this outreach effort with their national network of contacts and existing procurement vehicles. Police department sales are a longer-term market and are not part of the 3- and 5-year sales and revenue projections.

In response to questions about the sustainability pipeline, the IDCAST team provided a good summary of discussions with additional Ohio-based companies potentially interested in integrating their sensor products into SA solutions. IDCAST sustainability beyond this grant is based on a continuing stream of licensing fees for the technology (mostly information technology products) developed by IDCAST and integrated into United Views and other client solutions, supplemented by fee-for-service projects for clients associated with integrating their products into the TSA platform.

Products will be ready for market release well within the 3- to 5-year window, and the sustainability case appears promising. The proposal meets the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The core strategy is primarily a system integration of existing tools and modules. The issues and challenges are well understood, and the schedule and deliverables reflect this understanding.
Past commercialization performance has been good. The proposal has a credible commercialization strategy. The projections of revenues and jobs are based on conservative estimates of Woolpert upgrade sales to existing clients and pull-through sales for the smaller for-profit clients involved in this proposal. The committee views this as conservative and achievable. The proposal meets the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The integrated multifunctional team for SA integration has a strong background and seems very well organized. The IDCAST experience creating THOSE and the relevant background and experience of the other clients create confidence that the team can achieve the technical objectives and potentially exceed the commercialization and sustainability goals. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The budget meets the 1:1 cost share requirements with approximately 90 percent being provided by the client companies. A very large proportion of Woolpert's cost share is permitted indirect cost. Just over 50 percent of the proposal's state funds go to the lead applicant, somewhat short of the supermajority requirement of the RFP. However, in discussions with the applicant team, it became clear to the committee that the platform is indeed deriving significant benefit from the proposal. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary and Recommendation:

SA is a huge market opportunity for Ohio and its "sensor-related" asset base. By focusing on the medium-sized market niche, such as campuses, military, and similar government facilities, critical infrastructure, and medium-sized cities, the Trusted Situational Awareness platform targets an underexploited market. IDCAST has strong technical credentials to support development of the proposed commercial platform and product integration with their commercial partners. The commercialization strategy is quite credible, and the listed economic impacts are conservative relative to the market potential. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-327
Ohio Platform for Tomorrow's Industrial Medical Imaging Systems and Equipment (OPTIMISE)
Case Western Reserve University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,880,000	$2,956,095
Capital Funds	$120,000	$400,000
Subtotal	$3,000,000	$3,356,095
TOTAL	$6,356,095	

CWRU's Ohio Platform for Tomorrow's Industrial Medical Imaging Systems and Equipment (OPTIMISE) platform combines intellectual property, software, consulting faculty, and facilities to provide commercial modeling services to late-stage products with particular depth in electromagnetic analysis applied to medical diagnostics and therapy. The proposal seeks funding to use the OPTIMISE platform to commercialize two next generation products: improved radiofrequency (RF) coils for breast biopsy systems to meet new radiology standards and the use of magnesium diboride (MgB_2) to respond to the shortage of liquid helium for superconducting magnets for magnetic resonance imaging (MRI) machines.

Two Ohio-based companies, QED and Hyper Tech, are the clients in this proposal, contributing to the commercialization of the products and the cost share of this proposal in collaboration with the lead applicant.

Detailed Review:

- **Technical Merit and Plan**

The proposal describes very well the technical contributions OPTIMISE will make to the two products. On the biopsy system RF coils for QED, the proposal lists four design and prototyping tasks that require technical expertise from OPTIMISE to support the design and commercialization of multi-channel MR Breast Imaging and Biopsy systems (BIBS) for enhanced biopsy access with both grid and post and pillar stereotactic needle guidance. QED believes that OPTIMISE has the capability to achieve an optimized design of RF pick-up loops that will give its BIBS coils a great advantage on the market. Regarding the MgB_2 magnets for Hyper Tech, the proposal lists the tasks OPTIMISE will undertake to optimize the imaging-guided (split solenoid) magnet design through analyses of the magnetic, quench, thermal, and stress aspects of the magnet and the fabrication of magnet systems. Although the proposal describes a helium-free design (to respond to the worldwide helium shortage), the interview with the lead applicant and clients disclosed the use of helium for the cooling of the magnet, although at lower quantities than current market magnets. Recognizing that the shortage of helium will continue, this design may be appealing to the market, but a helium-free magnet will continue to be the most desirable design, and not achieving such a design will leave the Hyper Tech magnet susceptible to competitors' advances. The proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The commercialization strategy of OPTIMISE relies on the breadth and depth and all of its past imaging work on MRI, PET, CT, and MR-guided radiation therapy systems in the past three decades. This past work and the work on Magnetic Particle Imaging, a recently developed modality for which there is an entirely new magnetic coil market, has positioned OPTIMISE to work with QED, GE, Philips, and Toshiba, among others entering this market. In addition, past and ongoing OPTIMISE work with many collaborators, such as Gould/Martin Marietta, Predict Technologies, the Cleveland Clinic, and University Hospitals, attracts large numbers of applications, commercialization opportunities, and clients. For the

two products specifically, QED has identified three original equipment manufacturer (OEM) customers for its coils, Siemens Health Care, Toshiba Medical Systems, and Samsung, and has engaged in preliminary discussions with other OEM clients interested in versions of BIBS adapted for their distribution. This strategy makes for a relatively inexpensive and rapid penetration with the upside of gaining significant market share in the MRI coil market very quickly. The Hyper Tech magnet system commercialization strategy also uses the OEM strategy beginning with ViewRay by replacing its NbTi background magnet with the MgB_2, which uses helium more efficiently. The proposal exceeds the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The performance goals in this proposal are reasonable, while acknowledging that OPTIMISE is helping the companies overcome critical technical challenges. The proposal describes mitigating technical paths for the QED coils and the Hyper Tech magnet even if the targeted designs are not achieved, such that the performance goals are still obtained. The proposal projects the generation of 100 jobs and $70 million per year in revenue after 5 years, with an average salary of at least $50,000, and the continued growth and sustainability of the OPTIMISE platform reinforcing Ohio's international imaging reputation. The proposal exceeds the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

OPTIMISE resides in the Department of Physics at CWRU and has a long history of success in various commercialization projects and collaborations with leading imaging companies. With respect to coil manufacturing, QED was incubated at CWRU and has grown to become a leading provider of MRI RF coils for major OEMs in the medical imaging field. With respect to magnets, Hyper Tech is the world leader for manufacturing MgB_2 superconductor wire, the only manufacturer of such wire in the United States, and one of the leading U.S. firms in manufacturing Nb_3Sn superconductors, having demonstrated the highest-performing MgB_2 and Nb_3Sn superconductors in the world. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The budget for the proposal is well organized and realistic. Of the $3.35 million in cash cost share, CWRU provides $656,095, QED provides $1.2 million, and Hyper Tech provides $1.5 million. Of the $3 million in state funds, $2 million is designated to support OPTIMISE work for its clients and is not needed to build any platform capacity. Neither QED nor Hyper Tech use state funds for capital equipment. The proposal exceeds the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The proposal will use the OPTIMISE platform to help QED and Hyper Tech overcome technical challenges to make their products gain rapid market share in the MRI market with innovative and optimized designs. The innovative designs have global impact with major manufacturers of MRI equipment. Further, the resources acquired through this project by the lead applicant bring the OPTIMISE platform to a level that will enable the platform to offer its services to a long list of prospective clients in exchange for sustainable revenue. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-301
Innovative Technology Platform for the Development of Spinal Devices of the Future
The University of Toledo

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,154,319	$2,259,335
Capital Funds	$201,000	$98,626
Subtotal	$2,355,319	$2,357,961
TOTAL	$4,713,280	

The University of Toledo proposes leveraging their Engineering Center of Excellence in Orthopaedic Research to develop next-generation spinal implants and therapeutic devices. The proposed activity will include developing orthopaedic device product concepts, developing advanced analytical capabilities to support product development, prototyping, testing per ASTM and CE Standards, and developing applications required for regulatory (for example, 510(k)) approval. Proposed products include spinal implants, an infection sensor, and a family of exercise machines. The client companies include X-Spine, Metro Medical Innovations (MMI), and Turning Point.

Detailed Review:

- **Technical Merit and Plan**

This proposal plans to utilize an existing engineering center of excellence to design, develop, and evaluate orthopaedic spine products to the point of regulatory approval for three Ohio client companies. The platform is actually an existing center, called the Engineering Center for Orthopaedic Research Excellence (E-CORE), which was established in 2001. Client companies have been identified and products outlined that will form the basis of the interaction between the platform and the for-profit companies, including spinal implants, an infection sensor, and a series of exercise machines to strengthen core muscles. The platform exists in a mature form and contains the technical and managerial expertise to provide the necessary services to the clients. For each of the client companies, there exists at least one product that is sufficiently developed to make it to market within the 3-year target timeframe, and the proposed methods for accomplishing this are reasonable. One of the products proposed by MMI, an infection sensor, is still in an early phase of research, and the committee is concerned that it will not result in a product in the required timeframe. Further, it is not seen as a cohesive part of the proposed platform, which otherwise focuses on orthopaedic spine implants and machines to measure and improve spine function. The proposal exceeds the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The commercialization plan for an interbody fusion device that can be inserted using a minimally invasive approach with X-Spine is reasonable and will likely produce a marketable device by 2016. The plan for commercializing a cadre of core-strengthening machines, in collaboration with Turning Point, will probably lead to at least one version of the lower-cost machines being available for market in the required timeframe. As MMI is a marketing/distributing company, they will require additional expertise in manufacturing and marketing to bring their products to market, but they indicated a reasonable plan to overcome these deficiencies. For these reasons, the proposal meets the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The goals of creating 35 new jobs and generating more than $16 million in revenue by year three are optimistic but achievable. These projected numbers at the 5-year timeframe are due in large part to the

proposed success of a new infection sensor, so these numbers may not be realized. However, the committee believes that each of the client companies can produce at least one product within 3 years, and, therefore, the proposal will result in both jobs and revenues by the end of the project period. The proposal meets the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The members of the lead institution have extensive experience in testing of spinal implants, biomechanical modeling of the spine and surrounding musculature, and design of medical implants. These researchers have a track record of working with orthopaedic implant manufacturers in general and X-Spine and Turning Point specifically. One of the client companies, X-Spine, has significant experience in developing spine products with the platform, gaining Food and Drug Administration (FDA) approval for those products, and marketing and distributing spine implants. Further, the platform has previously collaborated with a second client, Turning Point, and they jointly hold the intellectual property for a clinical exercise machine that can be used for research and therapeutic purposes. These prior successful interactions are strengths of the proposal. The third client, MMI, is a marketing/distribution company and will require additional experienced personnel to help with both manufacturing and regulatory approval issues for any developed products. They have hired a consultant to fulfill this role. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The allocated monies in the budget for the proposal are reasonable for the work proposed. The University of Toledo will provide $909,335 in cost share, MMI will provide $600,000, X-Spine will provide $450,000, and Turning Point will provide $300,000. Seemingly inconsistent with the RFP's supermajority requirement, only 43 percent of the state funds are going to the platform. However, the budget forms alone do not explain the complete story, because the table included with the budget justification indicates that 60 percent of the state funds allocated to the clients will actually stay with the lead institution, thus satisfying the requirement of the RFP for the supermajority requirement. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The platform described in the proposal is established and can provide important and critical assistance to the client companies to bring new products to the market and create jobs and revenue for the State of Ohio. The client companies all have experience with the design, development, or marketing of spine implants or machines to rehabilitate or prevent spine injuries. The technical plan is well outlined. However, the committee is concerned that the infection sensor work will not produce a product in the required timeframe, and it does not really fit into the described scope of the platform. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if the infection sensor work is removed from the proposal*.

OTF IPP 13-307
Intelligent Simulation Platform for Product Commercialization
The Ohio State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,999,936	$3,500,000
Capital Funds	$0	$0
Subtotal	$2,999,936	$3,500,000
TOTAL	$6,499,936	

The Intelligent Simulation Platform for Product Commercialization (IntelSim) proposal builds upon an existing platform at The Ohio State University's Ohio Supercomputing Center (OSU/OSC) and involves six client companies: AltaSim, Intel, Kinetic Vision, Nimbis, Procter & Gamble, and TotalSim. The project focuses on utilizing a cloud-based modeling and simulation technology to create six manufacturing design application systems. These apps would be sold through a new app store based on an enhanced e-commerce marketplace and used by small- to medium-sized manufacturers.

Detailed Review:

- **Technical Merit and Plan**

OSU/OSC, in conjunction with six clients, proposes a cloud-based modeling and simulation-driven design platform for manufacturing applications to be used by small- to medium-sized manufactures. Nimbus, in particular, will provide enhanced e-commerce marketplace services related to hosting, software licensing, and manufacturing expertise as well as supporting testing of newly developed applications. The intent is to reduce physical product prototyping, effectively shortening the time to market, improving quality, and cutting costs for users of the software. The lead applicant and the selected clients seek to work on all elements of the problem, making the writing of knowledge-based systems easier, training users to apply knowledge-based applications, and marketing developed knowledge-based applications. Most small companies do not typically have the necessary technology or expertise to run simulations, and it will be valuable if such knowledge and technology can be effectively and affordably transferred to them, along with a clear understanding of the inherent limitations of simulation. The clients have identified a suite of "low hanging fruit" applications to develop and deploy under this grant. OSU/OSC will provide application development and run-time support as well as cultivate additional customer base above and beyond the identified set of clients (to include the Honda supply chain). The proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

Developed applications will be sold through an e-commerce marketplace, supported by a systematic outreach by all team members to their existing client base. Commercialization strategy covers all necessary channels to market, training of the users, OEM pull of suppliers, and e-commerce sites. The six clients have a broad manufacturing client base, and each client has committed to leverage its "sphere of influence" to promote the products to other users. The IntelSim platform will simplify the use of supercomputing by reducing barriers to adoption of modeling and simulation by small- to medium-sized manufacturers by reducing overall time to market, costs of adoption, and expertise required. The primary entities involved in the IntelSim commercialization include OSC, providing HPC resources, app kit and app runtime, the engineering simulation providers domain expertise, and app development; and Nimbus, building its existing portal, which will be significantly enhanced to meet the need of the industry users. Nimbus will use the funding to develop and support the IntelSim platform and market it to Ohio

companies during the initial 3 years. Beyond the initial 3 years, Nimbus's costs to support and maintain the platform will be included in the business model and pricing structures for services provided by IntelSim. The app-related training and training materials applicable to respective manufacturing needs will be developed by the clients as well as being transferred to and conducted at Loraine and Sinclair Community Colleges. The proposal meets the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

Based on market studies, the proposal provides estimates of 115 new jobs by the end of 5 years "to support the platform, develop applications, and utilize them to design products." IntelSim projects $1.4 million product revenue by year three and $3.9 million by year five. The proposal is explicit about the performance goals of OSU/OSC and each of the client partners. They are reasonably detailed and realistic. The proposal meets the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The project team is highly qualified. The proposal lists an impressive group of current and previous clients associated with each of the team members. OSU/OSC has previously completed a trial set of knowledge-based applications to demonstrate the feasibility of creating simulation apps and as the basis for building the tool kit and runtime model. "By leveraging an inter-organizational team developed over previous seven years, IntelSim has an established proof-of-principle prototype, resources, and network of experts to facilitate a self-perpetuating funding model." The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The proposal meets the cash match requirements. For-profit clients are providing 100% of the cost share, and more than 80% of the state funds are going to the lead applicant. The proposal exceeds the requirements of the RFP on Budget and Cost Share.

Summary and Recommendations:

The Intelligent Simulation Platform for Product Commercialization proposal begins the process of creating a suite of simulation tools available to a large population of small- to medium-sized manufacturers. These tools will facilitate the use of important competitive capabilities previously only accessible to large firms. The ability to simplify complex manufacturing problems into "apps" has been demonstrated. The clients have the domain depth, and the initial suite of apps is "low-hanging fruit" identified as being in high demand. Long-term sustainability beyond the grant period is based on license and fee revenue from the initial suite of apps.

The apps to be developed will be valuable to all manufacturers, and the committee expects that they will be deployed widely over time. However, the goal of this grant program is to enhance the Ohio economy. The proposal claims that Ohio firms will receive priority. The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program, *only if the platform makes a verifiable commitment to giving priority to Ohio firms.*

OTF IPP 13-316
Commercialization of an Innovative Neuromodulation and Neurostimulation Technology Program
Case Western Reserve University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$3,000,000	$3,000,000
Capital Funds	$0	$0
Subtotal	$3,000,000	$3,000,000
TOTAL	$6,000,000	

The proposed Neuromodulation and Neurostimulation Technology Platform Program (the NNT Program) will develop and market the OMNISTIM™ System, an implantable neurostimulation device and related software. Through a newly created Ohio medical device marketing company, the NNT Program will leverage Ohio's well-established neurodevice manufacturing base to drive follow-on investment of private equity and sponsored research and create a total of 30 new jobs in 5 years.

The lead applicant is CWRU. Two of the client companies, NDI Medical (Cleveland) and Valtronic Technologies (Solon), have a strong presence in Ohio. The third client company, SPR Therapeutics (a subsidiary of NDI), was formed in 2010 to commercialize selected CWRU neuromodulation and neurostimulation technologies. The proposed budget includes support for each of the participants to enhance their capabilities to fund the creation of new cGMP (current good manufacturing practice)-compliant medical device manufacturing capacity and the new marketing entity.

Detailed Review:

- **Technical Merit and Plan**

CWRU faculty and staff, together with the technical and marketing expertise in the client companies, should be able to support credible new offerings for the targeted range of clinical applications. NDI maintains a proprietary technology platform of neurodevices consisting of implantable pulse generators, external pulse generators, leads, surgical deployment tools, external programmers, and patient controllers that can be applied to many different therapeutic applications or adapted for new devices. While the committee agrees with the prioritization of products for motor control of the hand and arm (Omnistim-UE) and pain following limb amputation (Omnistim-AP), it should be noted that CWRU's plan to retain ownership and control of software updates and the Device Master File (DMF) is highly unusual, because the DMF is usually owned and controlled by the manufacturer of record. In this case, NDI will be the manufacturer of record using Valtronic to design and produce electronics, and Delta Systems (Streetsboro) is the planned contract manufacturer of these medical devices. While this desire to control the DMF is of concern because it could serve to delay an already-compressed timeline, it is not contrary to the criteria of the RFP. Assuming aggressive pursuit of 510(k) approvals based on clinical data, much of which has already been developed at CWRU, the proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The project team is on track and appears to be making good progress toward commercialization of products for the first two of the targeted applications. The description of the project team's value proposition and access to the capital required is impressive; CWRU's commitment to the use and continuing generation of NNT data is also positive. Sales of Omnistim-UE are projected in 2015 and Omnistim-AP is scheduled for launch in 2017; both are seen as optimistic but achievable with aggressive pursuit of 510(k) approval and solid marketing support. On the other hand, the committee is concerned

that technology licensees might choose to manufacture components and/or assemblies outside of Ohio. For these reasons, this proposal meets the requirements of the RFP on Commercialization Strategy *only if the medical devices for both the U.S. and European markets are actually developed and manufactured in Ohio*.

- **Performance Goals**

Projected economic impact, job creation, and enhancements of Ohio's NNT platform are realistic if project objectives and timelines are achieved. On the other hand, the uncertainty inherent in required regulatory approvals and proposed clinical trials could substantially delay any success. The goals are optimistic but may be achievable within the 3- and 5-year parameters of the RFP. This proposal meets the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

CWRU faculty and staff and the proposed project team have strong credentials in the areas of neuromodulation and neurostimulation device development and testing in a clinical setting. Two of the proposed client companies, NDI Medical and SPR Therapeutics, have received numerous grants and DOD contracts in these areas, and they appear to have real traction. This, in combination with CWRU's commitment to continued collection of neuromodulation and neurostimulation data and development of NNT-based medical devices is noteworthy. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The cost share ratio is 1.0. All of the state funds are going to the operating costs. Consistent with the RFP, 50 percent of the cost share is coming from the clients. Seemingly inconsistent with the RFP's supermajority requirement, only 10 percent of the state funds are going to the platform. However, in this particular situation, the platform needs the services of a private sector partner (NDI Medical) to develop a quality management system in order to overcome a significant hurdle to commercialization and maintain the DMF, which is a valuable asset and important for the sustainability of the platform. Thus, a large portion of the funding will be spent on services the platform needs and is unable to receive within the CWRU research environment. The committee determined that this is consistent with the spirit of the RFP. Use of funds from Ohio and clients' cost shares is described clearly. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The NNT Program comprises years of sensor development and clinical data collection at CWRU. This proposal is the next logical step in CWRU's commercialization of NNT Program-related technology. CWRU's attempt to maintain control of the DMF is highly unusual, but it is not contrary to the criteria of the RFP. The plan leverages NDI's demonstrated success as a manufacturer of record.
The committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if ODSA will require and can confirm that medical devices for both the U.S. and European markets are developed and manufactured in Ohio*.

OTF IPP 13-333
The Ohio Sensor and Semiconductor Innovation Platform (OSSIP)
The Ohio State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,592,147	$2,872,653
Capital Funds	$400,000	$200,000
Subtotal	$2,992,147	$3,072,653
TOTAL	$6,064,800	

The Ohio Sensor and Semiconductor Innovation Platform (OSSIP) proposal describes cooperative projects among the lead applicant, OSU's Nanotech West Laboratory (NWL), and three client companies, Cincinnati Electronics (CE), for focal-plane detectors used in cameras in the infrared (IR) spectral range; Srico, Inc., for electrooptic modulators for use in transmission of information; and Syntonics, for remotely located surface-acoustic-wave (SAW) sensors for assessing operating conditions of jet engines, among other possible applications.

Detailed Review:

- **Technical Merit and Plan**

The proposal makes good use of the different strengths and capabilities of the participants. CE is a major supplier of cameras operating in the IR spectrum, and plans to advance its capabilities first to high-definition (HD) and second to resolutions greater than 16 Mbytes. NWL will make available its compound-semiconductor expertise and capabilities to assist CE in producing a working 100 mm focal-plane indium antimonide (InSb) detector array of pixel size 10 μm × 10 μm. The result will be a 2× size reduction compared to the present 15 μm × 15 μm technology. With the larger size already in production, fabrication should not create insurmountable problems. The identified challenge is that with smaller pixels, the sidewall area is more important and improved sidewall passivation will be necessary. NWL is well positioned to provide relevant advances. CE is also interested in developing a camera for midrange IR. The realization of a short-wavelength infrared detector aimed at atmospheric windows will be based on indium gallium arsenide (InGaAs) and will use a multi-quantum-well structure. This is a more difficult challenge and will require more involvement by NWL. This last project will be investigated, but its development is not far enough along to be considered a part of the current project. Srico already has a major presence in low-voltage thin-film electrooptic devices based on lithium niobate ($LiNbO_3$) and lithium tantalite ($LiTaO_3$). It seeks to bring to market thin-film modulators with demonstrated 10× better performance overall and 100× better performance in the terahertz (THz) spectral range that is used, for example, in airport scanners. This carries to completion work that has already been done in connection with NWL. Finally, Syntonics is currently developing a wireless sensor technology based on SAW devices and seeks to bring to market sensing devices capable of providing information about the status of engines under extreme conditions, for example, those encountered in military jet aircraft. The proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The commercialization strategy for CE and Srico is well specified and reasonable. The major customers of CE are military systems subcontractors, to which typical commercial measures do not apply. However, CE also has commercial customers, and their strategy here is reasonably based on the two markets. Srico is already well established in the modulator field and will be offering improved capability at a competitive price. The primary concern of the committee involves Syntonics. Their current technology is in too primitive a stage for them to be able to bring a product to market in the 3-year (or even 5–year) timeframe

of the program, especially when validation times for incorporation of new technology into aircraft are taken into account. The proposal meets the requirements of the RFP on Commercialization Strategy *only if the Syntonics element is removed*.

- **Performance Goals**

The jobs and revenue goals of the proposal are reasonable, and the mileposts clearly specified. The major players here by far are CE and Srico. Given the relatively primitive state of the Syntonics technology, the committee does not feel that their proposed goals can be met. The proposal meets the requirements of the RFP on Performance Goals *only if the Syntonics element is removed*.

- **Experience and Qualifications**

The principal investigator (PI) of this proposal is Dr. Robert F. Davis, the current director of NWL. He has extensive management experience both in this position and in industry, coupled with more than 29 years of experience in semiconductor device materials fabrication and test, which make him an excellent choice for this task. Dr. Mark Greiner, Chief Technical Officer of CE, also has approximately 29 years of experience in the field. Dr. Sri Sriram, President and CEO of Srico, has won four R&D100/IR100 Awards for innovative optical sensor and modulator products and has been active in the modeling, design, production, and testing of electro-optically active components since 1980. Dr. Eugene Y. Lee, project Manager, Syntonics Columbus Research Center, obtained his Ph.D. from OSU and currently leads electromagnetic modeling of advanced antenna concepts at Syntonics. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The clients are giving substantial funding to the program: $1,230,000 from CE and $230,400 from Srico. Approximately $400,000 of this will go into capital equipment to be located at NWL. The budget narrative clearly spells out how funds will be spent, and the letters of commitment are specific and detailed. The remainder of the cost share is being provided by OSU. Consistent with the RFP's supermajority requirements, approximately 77 percent of state funds will go to the lead applicant and 68 percent of the cost share is being provided by the clients. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The OSSIP proposal is well written, and the minor ambiguities were resolved during the team's interview at the committee's second meeting. Two of the projects, the development of new infrared-detector arrays and the development of thin-film electro-optics modulators, clearly advance the state of the art, can be realized in the 3-year time frame, and have an excellent chance of providing the predicted revenue generation and job creation for the State of Ohio at the third year and beyond. The Nanotech West Laboratory has the necessary expertise and is well suited to work with these clients. The technology of the third project, the Syntonics remote sensor, appears to be in too early a state to be brought to market in any reasonable timeframe to be tied to this program. As such, the committee recommends that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program *only if the Syntonics element is removed*.

OTF IPP 13-302
Innovative Technology Platform of Carbon Based Nanomaterials/Composites
The Ohio State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$1,315,057	$1,500,000
Capital Funds	$184,943	$0
Subtotal	$1,500,000	$1,500,000
TOTAL	$3,000,000	

This proposal builds upon an existing platform at OSU with three client companies, Owens Corning, Omnova Solutions, and Nanomaterials Innovation Limited, with additional support from Honda and CK Solutions. The project focuses on utilizing a method to prepare nanopaper and lightweight foams using graphene and nanocarbon. Ultimate end-users of the products are in the automotive and energy industries.

Detailed Review:

- **Technical Merit and Plan**

The intent of this program is to scale up the production of carbon nanoparticles and graphene and then use them to make foams and nanopaper by modifying the surfaces and dispersing them within polymer matrices. The proposers expect that the extrusion foaming of parts containing these surface-modified nanoparticles will improve their mechanical and physical properties. However, no convincing data was presented to support this claim. A second product base is to produce and convert nanoparticles into thin nanopapers/films first and then integrate the nanopaper with polymer products, either during or after polymer molding through mass-production techniques like injection molding. The methods developed at OSU can produce multifunctional nanoparticle films or nanopapers with either mixed or alternating nanoparticle layers from 1 to 1,000 μm thick. The proposers expect this control over the structure will allow the nanopaper to perform optimally in many desired applications, such as wear resistance, electrical and thermal conductivity, electromagnetic interference (EMI) shielding, and even as a gas-diffusion barrier. However, no convincing evidence was provided to substantiate these claims. The lead applicant will work on all elements of the problem, making the synthesis and fabrication easy to scale up and adapt to the needs of several customers, especially in the automotive and wind energy industries. There is no data provided on the impact or fatigue properties, which will be very important and key for implementation in the automotive and energy applications. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The developed applications are expected to be sold primarily to the automotive and wind energy markets, although some of the nanopaper-based products could also be used in EMI-shielding applications. The proposed commercialization strategy covers all necessary channels to market, training of the users, original equipment manufacturer (OEM) pull of suppliers, and e-commerce sites. The clients are broad-based, and there is the promise that each client will leverage its "sphere of influence" to promote the products to other users. Applications in aerospace, electronics, and sporting-goods are also planned to help the platform sustain itself in the long term. This platform technology is also expected to enhance the existing business for Owens Corning ("Green" thermal insulation foams) and OMNOVA Solutions (conductive in-mold coating resins). The sustainability of the platform and its ability to expand into many new markets are questionable at this time because there are numerous competing products in the automotive, EMI shielding, and energy markets, and it appears that the proposers have not listed carefully all the markets and their current market shares. The cost factor and the difficulties involved in displacing products with known performance and history will remain a huge obstacle to all the optimistic forecasts

that have been provided in their commercialization revenues. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The team plans to create 40 for-profit jobs and 10 nonprofit jobs with $15 million of revenue by the end of the third year. This would become feasible only if the dispersion and functionalization are uniform, resulting in superior or equivalent mechanical and electrical properties. But insufficient details were provided to convince the committee that this is feasible. Therefore, the proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The key personnel have sufficient qualifications and background to conduct this effort. The proposal also lists a mature group of clients, and OSU completed some pilot trials on these materials. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The proposal seeks state funds at the lower end of what is allowed by the RFP ($1.5 million). Consistent with the RFP's supermajority requirements, approximately 67 percent of state funds will go to the lead applicant, with a similar percentage of the cost share being provided by the clients. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The proposal addresses an important topic that has many technical applications. However, the lack of mechanical-fatigue or impact properties will limit the ability of this group to commercialize and create jobs within the 3-year timeframe. The committee suggests that the applicants consider addressing these issues so that they can resubmit to a future version of this program. The committee does not recommend that this program be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-304
Advanced Materials for Next Generation Gas Turbine Engines
University of Dayton Research Institute

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$1,158,508	$1,356,844
Capital Funds	$140,000	$0
Subtotal	$1,298,508	$1,356,844
TOTAL	$2,655,352	

The University of Dayton Research Institute (UDRI), along with three client test laboratories located in Ohio—Cincinnati Testing Laboratories, Element Materials Technology, and Ceralink, Inc.—proposes to conduct material testing and develop material characterization capability at UDRI on ceramic matrix composites (CMCs) to be transferred later to clients. A substantial component of this effort is to develop a comprehensive CMC material property database focused on the long-term behavior and durability of the CMCs under conditions representative of operational environments. The ideal end-user is the aviation industry, with GE Aviation having been identified as the immediate end-user.

Detailed Review:

- **Technical Merit and Plan**

From the proposal narrative, GE Aviation would define the test requirements for CMC samples, and UDRI would then conduct these tests to GE Aviation specifications. To confirm and validate these test results, UDRI would then have the three client test laboratories conduct round-robin tests to ensure that there is agreement among the clients. It appears that a key motivation is coming from GE Aviation for the development of the LEAP Engine. However, the schedule as laid out in the proposal is insufficient to address the needs of CMC design for the GE LEAP Engine. The proposal lacks a clear explanation of how the schedule of this proposal activity would lead to key inputs into the GE LEAP Engine development at the appropriate time and a description of where the CMC samples will come from and what types of samples are envisioned. The greatest weakness of this proposal—both technical and otherwise—is that it is unlikely to lead to direct application and commercialization in the timeframe of interest. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The intended aviation market is highly specialized both within the United States and abroad, with high barriers to entry. Presumably, GE Aviation would be the key commercialization partner and would adopt this technology first. However, the strategy toward that end is unfocused and suffers greatly from the lack of explicit support in the letter from GE. Although GE says that it endorses the research program being undertaken by UDRI and its clients in a letter contained within the proposal package, the committee finds fault with many aspects of the letter and GE's overall involvement: GE does not indicate that it will adopt the testing capability being developed; GE would appear to be the primary customer for the proposed product, yet it is not an actual client on the proposal; and despite mention of in-kind contributions, the committee is wary that GE is not making a cash contribution to the project. GE does not make a strong enough case that it is a part of the commercialization path. Instead, GE gives a rather vague goal of commercially introducing CMC technology in the 2016 timeframe but does not strongly tie this goal back to the proposal at hand. Combined with the aforementioned skepticism about the timeline for product development, the committee is wary of the commercialization potential within the parameters of the IPP. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

Technology goals for UDRI and the clients are defined. The internal goals as a research project are clear, but the commercialization part within the timeframe is vague and unrealistic. The proposal does not fail on the basis of its own internal goals, but rather on how it coordinates proposal goals with the critically important RFP goal of timely commercialization. The key issue is that GE Aviation will not develop a new engine within 3 years and thus will not materialize as the primary customer for the output from this project. Given the technical and commercialization challenges involved, it is unlikely that the job and revenue creation goals can be met in the specified timeframe. The job creation goals are modest, as the proposal specifies creation of eight jobs in for-profit and three in non-profit sectors in 3 years. In addition, the jobs created would seem to be highly dependent on the progress of GE in incorporating CMCs into the next generation of engines. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

UDRI and the client testing laboratories are currently involved in materials testing and are well qualified to execute this work. Bios should contain better information on scholarly accomplishments, especially for UDRI staff. The management plan is well thought out and includes representatives from UDRI, clients, and end-users. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

UDRI excess overhead is included in the cost share. Clients are providing appropriate cost share, which represents 67 percent of the total cost share. The budget seems to be realistic for the work proposed. Consistent with the RFP's supermajority requirements, approximately 70 percent of state funds will go to the lead applicant. The proposal meets the requirements of the RFP for Budget and Cost Share.

Summary and Recommendation:

A key issue in this proposal is the far-too-aggressive development timeframe from a technical standpoint, which in turn casts doubt over the commercialization strategy. The team of UDRI and testing clients is a strong team. The proposal would be much stronger if an explicit articulation with GE Aviation's engine developments was included, along with a letter that supports the commercialization path and schedule. In addition, the platform for this proposal is somewhat embryonic at this time, and neither the availability nor the source of ceramic matrix composites has been identified. Thus, it is unclear how the platform will be sustained beyond the Ohio Third Frontier effort. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-309
Development and Commercialization of JVS-100 as a Regenerative Therapy Platform for Acute and Chronic Disease
Summa Health System

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,436,285	$2,747,342
Capital Funds	$250,000	$0
Subtotal	$2,686,285	$2,747,342
TOTAL	$5,433,627	

JVS-100 is currently being developed for commercialization by two Ohio companies: Juventas Therapeutics and SironRX therapeutics, for three disease indications: heart failure (HF), critical limb ischemia (CLI), and post-surgical wound repair. The project described in this proposal is focused on accomplishing tasks required for manufacturing and FDA approval of JVS-100 products prior to market entry. These objectives include developing potency assays to measure the biological activity of JVS-100 that are required for establishing manufacturing standards and regulatory approval, generating new formulations to optimize product delivery and create new product opportunities, and evaluating multiple dosing strategies to increase therapeutic benefit and market share. Accomplishing the goals set out in this proposal will position the JVS-100 platform to achieve market entry in the near term and strengthen the platform to expedite the cycle of new product generation, approval, and commercialization in the long term.

Summa Health System, the lead applicant, plans to work with two client companies: Juventas Therapeutics, to expedite the development of JVS-100 therapy to treat chronic heart failure (CHF) and critical limb ischemia (CLI); and SironRX, to develop topical formulations of JVS-100 for the treatment of dermal wounds.

Detailed Review:

- **Technical Merit and Plan**

To date, regenerative medicine technologies have been stem cell or implant-based, so the proposal is exciting because of its drug approach to regenerative medicine. The technology described in this proposal, JVS-100, is a biologic consisting of a non-viral DNA plasmid encoding a naturally occurring factor, stromal derived factor -1 (SDF-1). SDF-1 expression upregulates in response to injury and stimulates a variety of protective anti-inflammatory pathways, down-regulates pro-inflammatory pathways, induces blood-vessel formation, prevents cell death, and promotes tissue preservation. SDF-1 also induces the migration of stem cells, locally and from the bone marrow, to the site of injury to contribute to the anti-inflammatory and protective response. These activities have been shown in many studies by multiple independent laboratories to produce results in therapeutic benefit in animal models of a wide variety of diseases.

The technical plan described in the proposal includes (1) the development, optimization, and implementation of a potency assay to measure the biological activity of JVS-100 to support the goal of near term FDA approval, commercialization, and market entry for JVS-100 for HF, CLI, and wound healing; (2) the development and optimization of new formulations of JVS-100 to help in the commercialization and market entry of JVS-100 for surgical wound healing and to help in the development of an intravenous formulation that would be less invasive and safer than catheter delivery for heart failure and that would increase the eligible patient population to include those currently excluded due to ventricle wall thickness or the presence of replacement valves, thereby offering the potential to

treat other organ systems, in particular the brain following stroke; and (3) the demonstration of the feasibility of multiple dosing for JVS-100 to expand the market opportunities for JVS-100 therapies offered by both Juventas and SironRX to increase the potential therapeutic benefit available per patient; explore the development of JVS-100 for the treatment of chronic conditions such as angina, chronic obstructive pulmonary disease (COPD), and scar revision; and facilitate proper per unit pricing of the product.

The technical goals that will be undertaken, their challenges, and the potential solutions to those challenges are appropriate and are spelled out in detail in the proposal. The intellectual property (IP) portfolio that was licensed in 2007 to Juventas from the Cleveland Clinic includes 24 patent applications, and establishment of a GLP QC lab at SironRX (still a relatively early-stage company) is an impressive achievement. The platform, but not the IP portfolio, resides in The Penn Lab at the Summa Health System and is so focused on JVS-100 that its use is limited to development of that drug, and thus, it is not broadly applicable to other efforts, thereby limiting its sustainability. The proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The market drivers relate to the need for JVS-100-based regenerative medicine therapies for numerous indications for the short term (CHF, CLI, and post-surgical wound repair) and for the long term (chronic angina, stroke, etc.). The description of the company's value proposition and competition, cell therapy approaches, is good, and the company's fundraising success ($36 million) with the venture capital community is impressive. With the proposal's objectives focused on shoring up the critical areas related to the manufacturing process and developing formulations to increase the market opportunities for the drug, it is clear that the team is thinking ahead. However, since it is unlikely that obtaining insurance reimbursement approval for a new approach, a drug, to regenerative medicine will be straightforward, some explanation about the plan and challenges for overcoming that hurdle, a key step to treating enough patients to achieve significant revenue growth, would have provided more support for the commercialization plan proposed. The proposal meets the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The committee does not believe that the team will be able to achieve the RFP requirement of market entry by the fifth year from the start of the product period for even its CHF therapy, its first product, because of a slower rate of patient recruitment than expected or other problems related to the development of a totally new approach to regenerative medicine, the often delayed completion of clinical trials, or the possibility that JSV-100 could fail to meet the goals of its Phase II or III. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The proposal's participants from Juventas Therapeutics and SironRX Therapeutics are well qualified for the roles described. Dr. Marc Penn, the inventor of the JVS-100 technology and a founder of both client companies, is the technical director for the program, the director of research for the Summa Cardiovascular Institute, and a professor at Northeast Ohio Medical University. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The cost share ratio is 1.023, and the use of state funds for indirect operating cost equals 20% of the operating cost subtotal. Use of funds from Ohio and clients' cost shares are described clearly. A strength of the proposal is that 95.35 percent of the state's money will be given to and used by the lead applicant. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The JVS-100 technology is a very innovative approach to regenerative medicine, and the timeline to achieve the three development objectives proposed is realistic; however, there are two major flaws with this proposal: (1) since Juventas and SironRX have at least one common founder, investor, and board member, SironRX is a spin off/licensee of Juventas specifically for JVS-100's use in dermal delivery, and SironRX's post-surgical scar reduction clinical trial is shown on Juventas' website, the proposal does not meet the RFP requirement that its "client service relationships be with at least two *unrelated* Ohio for-profit companies;" and (2) given the development and regulatory (and possibly reimbursement challenges) that will have to be overcome to bring JSV-100 based therapies to market, it is unlikely that market entry of even the first product, that for treatment of CHF, will be achieved by the fifth year, let alone by the third year, from the start of the project period, a requirement of the RFP. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-312
Transparent Conductive Film Manufacturing and Commercialization of Flexible Electronics Devices
The University of Akron

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,555,751	$2,705,353
Capital Funds	$444,000	$295,000
Subtotal	$2,999,751	$3,000,353
TOTAL	$6,000,104	

This proposal builds on an existing platform at the University of Akron (UA) that involves five clients: Akron Polymer Systems (APS), AlphaMicron, Inc. (AMI), Cubbison Co (CC), Kent Displays, Inc. (KDI), and NorTech (NT). The project focuses on utilizing transparent conductive and flexible (TCF) films by using an innovative roll-to-roll (R2R) process. APS has interests in novel resins, KDI proposes to integrate it into flexible displays, CC intends to use the films to replace tin indium oxides in resistive touch screens, and AMI is interested in visors and automotive windows.

Detailed Review:

- **Technical Merit and Plan**

This program focuses on the use of a continuous processing machine that embeds electrospun nanowires into a flexible polymer substrate via a R2R process. It seeks to develop alternative transparent, conductive, and flexible (TCF) surfaces to replace indium tin oxide (ITO) for use in display applications. It is a good area for further development because the limited supply of indium is going to become a major concern soon. The technology plan seems to include a wide variety of materials and processes as an exploratory effort. The deliverables proposed are primarily a number of TCFs providing the specific transparency, flexibility, stretchability, and electrical conductivity required for each market. Thus, the proposal does not represent an existing platform but rather a research program. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

There is a widely recognized need for flexible conducting polymers for a wide variety of applications. Markets are very near term, particularly in the case of KDI's Boogie Board and CC's touch screens. However, it is unclear how the proposed effort will help these products become more competitive in the marketplace or within a business framework. Furthermore, the pathway to commercialization is not well described, and while the value proposition is descriptive, it is rather weak. The proposal does not clearly provide an explanation for why this platform is critical for these clients in gaining market share. The planned "Newco" activity could provide significant jobs and sales, but it is not clear what it is or what the commercial path is. The abstract suggests that it will "spin off a manufacturing company to produce these TCFs." The proposal discloses a number of companies that could use this technology, yet it does not explain how these companies can succeed in an already competitive market. Ultimately, the proposed commercialization strategy is highly problematic and lacks critical details. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

With only 16 jobs and $7.3 million in revenue, the projected economic impacts are not especially significant, and most of the jobs are assigned to the not-yet-defined entity, Newco. The project appears to be more focused on supporting graduate students and postdocs than on commercialization of the products and economic impact for Ohio. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The University of Akron and its various entities offer a very capable team of experts and have a long history of working with some of the clients. UA, KDI, and APS together have worked extensively in commercializing functional polyimide and nanocomposites, while UA and KDI have worked on electronically changeable skins for consumer electronics. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

Much of the client cost share, particularly that by KDI, is in the form of unrecovered facilities and administrative costs rather than support with tangible resources. The other cost share seems adequate and, to the proposal's credit, nearly 70 percent of the cost share is being provided by the clients. For the most part, the companies that are contributing cost share are also receiving funding from the program, so the clients have very little "skin in the game." The lead applicant only retains 45 percent of the project's state funds, a percentage that is somewhat below the RFP's requirement for a supermajority of state funds remaining with the lead applicant. As such, the committee is unsure of the real benefit the proposal would provide for the platform or how the platform would be sustainable. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

With the exception of the experience and qualifications of the team, the proposal does not fully meet the requirements of the RFP on multiple categories. A critical concern is that the proposal does not represent an existing platform but rather a research program that may lead to a platform in the future. Furthermore, it is not clear that the state funds going to develop the platform would even be sufficient. Finally, the economic impact of the proposal is modest at best, and too many of the projected jobs are for the not-yet-formed new company. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-314
Multiscale, Multimode, Subsurface Analysis and Defect Detection for Advanced Manufacturing
The Ohio State University

Proposal Summary:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$819,816	$1,911,816
Capital Funds	$1,092,000	$0
Subtotal	$1,911,816	$1,911,816
TOTAL	$3,823,632	

This proposal seeks to expand an existing platform for materials analysis, imaging, and defect testing, both in capability and scope, to include three-dimensional X-ray micro-tomography (XMT). The approach involves materials analysis at various length scales to enable the enhancement of existing materials and products. The clients and proposed products that OSU will be able to provide as a result of the materials analysis using XMT are as follows: (1) HyperTech, improved composite MgB_2 and Nb_3Sn wires; (2) Jackson Tube Service, Inc., small diameter welding tubes without defects; (3) Hobart Brothers, low-hydrogen-flux-cored welding wire; (4) HyperTech, bi-metallic small-diameter tubes; (5) Zyvex Technologies, optimized carbon nanotube composite materials; and (6) Honda R&D Americas, Inc., assessment and improvement of porosity defects in metals. The proposal projects that four new jobs will be created by year three (all at HyperTech) and 23 jobs by year five in the state of Ohio, with projects revenues of $1.3 million by year 3 and $14 million by year five.

Detailed Review:

- **Technical Merit and Plan**

The project goals, objectives, milestones, and deliverables are all focused on using 3D XMT to improve the composite MgB_2 and Nb_3Sn wires developed by HyperTech. However, the proposal's problem statement and the technical approach cover additional materials and products to be evaluated using XMT, such as welded seams for small-diameter HSLA tubing (Jackson Tube), hydrogen content of flux-cored welding wire (HyperTech with Hobart Brothers), copper/steel bimetallic tubing (HyperTech), and carbon nanotube composite materials (Zyvex). The role of Honda is described as finding the proposed project interesting and beneficial to their product development. The proposed work essentially consists of acquiring XMT equipment to analyze existing materials and products. However, the proposed activity as written is disjointed and lacking synergy between most of the clients. The proposed work does not result in the commercialization of any new products, nor does it adequately detail the milestones that will be used to measure developmental progress.

The composite MgB_2 and Nb_3Sn wires were developed by HyperTech under a prior Ohio Third Frontier award. The basic assumption in this proposal seems to be that more detailed information via XMT will improve these products so much that the technology will be taken to new heights, thereby more than paying back the investment. The committee does not see this working for the hollow-core welding rods, which are probably fine as-is.

In essence, this proposal appears to be a capacity-building project that is loosely aligned with some interesting private companies, but it lacks a clear platform, which is one of the most important prerequisites for the IPP. Most of the interesting work to support commercialization is being done by HyperTech, not OSU, and is funded by federal awards. The work with Zyvex and Honda is so ill-defined as to offer little to review. Staff time in the OSU budget is all focused on students and student oversight, not testing. This suggests that very little Zyvex or Honda work would actually be executed by OSU, unless it would be embedded in student research. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposal appears to fit the criteria of an industry-led leveraging of a platform. The role of OSU is to provide testing services to a variety of commercial enterprises, designed to help support the development of improved or new products. The proposal discusses the potential market/revenue size of multiple products but does not deal with costs. That is one of the purposes of the analysis for the clients: first see if it can be done, then look at the costs of doing it. The products identified appear to fit in the 3-year commercialization window, assuming that the resulting products are cost effective. In the suite of products under review, some are likely to be economically viable. Although not discussed in any detail, there are many manufacturers across Ohio that could potentially leverage the enhanced platform, but the proposal misses an opportunity to identify those future clients or explain how additional clients and resources will be attracted. This section of the proposal lacks required information, such as demonstration of an understanding of the commercialization process and total resource requirements for achieving market entry and full commercialization. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The proposal provides no discussion of their fee-for-service business model or of the sustainability model for the platform. The clients are all companies providing virtually all of their own research and development (R&D) and product development. While they all support the project, very little of their cost share actually benefits OSU, with the possible exception of HyperTech. The HyperTech budget does not identify what, if any, cost-share will go to OSU for materials analysis. Furthermore, the economic impact at year three is limited, and given the technical and commercialization shortcomings of the proposal, the committee does not see how the proposed platform can be sustained after year three. Thus, the committee is skeptical of the revenue and job creation numbers put forth in the proposal. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The PI and his colleague at OSU are well qualified to lead and manage the project. Even though, biographical information is only provided for two of the clients, HyperTech and Zyvex, no biographical information is provided for Jackson Tube, Hobart Brothers, or Honda. However, the information that is provided for the clients suggests that they are well qualified to oversee their respective proposed duties. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The cost share meets the 1:1 match requirement, but there are some concerns. Out of a total $1.91 million requested, $1.09 million is for a new capability that, as mentioned previously, is not the purpose of the IPP. In addition, the $1.29 million cost share provided by HyperTech is all from two existing federal awards. Although this is not grounds for disqualification, the committee is not in a position to verify if the funds are truly available and represent a new commitment. Consistent with the RFP's supermajority requirements, approximately 95 percent of the state funds will go to the lead applicant, and 86 percent of the cost share is being provided by the clients. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

There is no question that OSU has an existing world-class platform for commercially relevant materials analysis, imaging, and defect testing. However, the primary use of requested funding is to add capability, which is outside the scope of this RFP. $1.09 million out of a total $1.91 million requested is for this new capability. The proposal makes a case for why filling this identified gap is important, but this does not meet the definition of platform development. The technical plan for the project consists of acquiring equipment (XMT) to analyze existing materials and products, but the proposed work plan does not result in the commercialization of any new products. The commercialization plan is lacking in required information such as demonstration of an understanding of the commercialization process and total resource requirements for achieving market entry and full commercialization. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

IPP 13-317
Commercialization of Metal Oxide Composite Manufacturing for Advanced Energy Conversion and Storage
The Ohio State University

Proposal Summary:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$1,000,000	$2,700,000
Capital Funds	$1,700,000	$0
Subtotal	$2,700,000	$2,700,000
TOTAL	$5,400,000	

OSU has developed an Innovation Platform for synthesizing cost-effective composite metal oxide materials. The platform involves a combination of formula research, material synthesis, and equipment/process development capability. Development of these materials supports a metal-oxide-based chemical looping process that supports the conversion of coal and natural gas to electricity, hydrogen, syngas, and liquid fuels and chemicals. The only client company identified is the Dominion Capital Innovation Fund.

Detailed Review:

- **Technical Merit and Plan**

The program supports activity that targets the further development and implementation of metal oxide materials in a chemical looping application. However, the proposal does not identify with any specificity the depth of metal oxide materials development that provides the foundation for this proposed activity or the plan for platform implementation that leverages the properties of these materials that are identified as the basis for this proposal. Although defined goals are provided for the chemical looping application, it is unclear whether there is significant advantage to this approach over competitive technologies. The plan is to scale up to a 50 kg/day production capacity based on the current capacity of 1 kg/day with an objective of achieving 100 hours of successful operation. The technical plan in the proposal seems disjointed from the commercialization activity in that very little ties the specific technical foci with that which is needed in order to achieve product success in the market. Furthermore, the proposed platform appears to be more of a capability or collection of capabilities than a true platform per the definitions of the IPP, and thus does not meet that definition. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The project leverages the development of intellectual property for particle manufacturing with little initial investment with the goal of licensing this technology into larger plants and processes in which this technology can play a significant role. The technology is protected through six patent applications and one awarded patent. One pathway for commercialization identified by the proposal team is to license the technology to boiler/reactor companies, with the goal of creating a metal oxide manufacturing plant in Ohio. The plan for commercialization, however, is sparse with no specificity as far as the linkage between the value and utility of the proposed platform and the pathway to market. Perhaps most importantly, there are no industrial/commercial clients involved in the proposed activity as specifically required by the RFP. The RFP calls for a minimum of two clients to be involved in a proposal, but this proposal only lists Dominion Capital Innovation Fund as the sole client. Despite mention of a consortium of other companies that are interested in the proposed platform, this is no substitute for a client company providing cost share per the requirements of the RFP. As such, the committee cannot see any realistic path to commercialization. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The objectives and performance goals for the proposed program are reasonably specific, particularly with regard to the materials being further developed. The proposal projects up to 6 years from project award to market, placing the development and commercialization path at or above the upper limit of that requested by Ohio. The proposal would be strengthened by linking objectives and performance goals to the needs of specific industrial/commercial clients. In addition, because of the aforementioned deficiencies in the commercialization strategy, the committee is highly skeptical of the job and revenue statistics provided in the proposal. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

It appears that the technical team has significant experience in the research activities supporting metal oxide development as well as the chemical looping process itself. Mr. Lloyd brings strength to the team by virtue of his experience in finance and deal-making. However, the team appears to be missing an industrial partner with demonstrated capability in implementation of similar materials and/or scale-up of production processes such as the ones proposed, despite Dominion Capital's involvement. The proposal does not meet the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The cost share on this proposal is 1:1, but despite Dominion Capital's generous cost sharing, it is the only client listed and thus the only client providing any kind of contribution. Although the narrative itself is not unreasonable, the lack of a second (or more) clients is too large a failing. The proposal would have been greatly strengthened by the inclusion of another client. The proposal goes beyond the RFP's supermajority requirement, as the lead applicant will receive 100 percent of the state funds, and 100 percent of the cost share is being provided by the client. Ultimately, however, the proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The proposed platform that supports the central theme of this proposal appears to be a collection of capabilities focused on cost-effective synthesis of metal oxide materials identified as being important for a chemical looping process for conversion of coal and natural gas to electricity, hydrogen, syngas, and liquid fuels, as well as other chemicals—a very important set of applications. However, the proposal does not make the case for how this platform will be instrumental in helping two or more committed clients achieve enhanced market share in the near term, especially since only one client company, Dominion Capital, is specifically listed. While Dominion Capital's involvement can be a very important catalyst in achieving commercial success, there are no bona-fide clients participating in the proposed activity based on the requirements of the RFP. Combined with the fact that this project seems to be at too early a stage in its research to be a good match for the IPP, the committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-318
Akron Functional Materials Center
The University of Akron

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$3,000,000	$2,340,346
Capital Funds	$0	$600,000
Subtotal	$3,000,000	$3,000,346
TOTAL	$6,000,346	

The purpose of this proposal is to overcome many of the barriers for translation of basic research discoveries to the clinical arena. Such barriers include the technical and biological complexities inherent in any such endeavor, as well as the long timeframe for master file development and final regulatory approval that is more often than not met with failure. The combination of these barriers has tempered corporate research and investment in developing new approaches and materials for unmet medical needs and fostered a risk averse research environment. The proposal focuses on overcoming these product development barriers through the Akron Functional Materials Center's (AFMC) partnerships with client companies Viscus Biologics, SNS Nano Fiber Technology, and PolyOne Inc. to use the AFMC's platform, which is comprised of small-scale chemistry, meso-scale formulations, and a combinatorial approach, to increase the rate and efficiency of materials optimization with accompanying improvements in the technology readiness level (TRL) of materials when presented for regulatory approval, and to collaboratively leverage resources into rapid, cost effective product development that will stimulate job creation in Ohio.

The University of Akron, the lead applicant on this proposal and the residence of the AFMC, has an established, internationally recognized expertise in polymers, biomaterials, and engineering and will lead the formulation, characterization, and optimization efforts. It will work with the aforementioned clients to expedite the development and commercialization of radiopaque (RO) (lead- and tungsten-free) polymers (X-ray shielding materials) for use in minimally invasive devices (MID), medical and antimicrobial materials for wound healing and advanced hemostats, and nanofiber-based products for bandages, dressings, and hernia repair. The Austen BioInnovation Institute in Akron (ABIA), a subcontractor to the AFMC, will utilize its award-winning iSIX process to identify medical needs directly from patients and clinicians and match these needs with the product development capabilities of the AFMC. ABIA will also provide regulatory expertise to shepherd the new products and innovations through the entire regulatory and commercialization process.

Detailed Review:

- **Technical Merit and Plan**

For AFMC's work with each of the three client projects described, the problems that need to be addressed, their potential solutions, and the related challenges to success are clearly elucidated. While the project goals, objectives, expected deliverables, parties responsible for each of them, and the schedule for achievement of each are stated clearly and efficiently, the combinatorial methods described are not the best approach to meet the objectives described. Instead, the solutions to the technical problems will require several methods (not just combinatorial or high-throughput alone). Some of what the ABIA will do for the effort is not critical to the success of the effort (recruitment of R&D personnel and creating educational opportunities). Since the technologies that make up the platform are not described in detail, it is difficult to judge the platform's sustainability, and the committee is concerned that the technical portion of the proposal is too early-stage for the purposes of the IPP. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The potential products described for all three of AFMC's clients are in the incubating stage, so there is some question about whether the timeline for deliverables is realistic, particularly for Viscus's products, given that 510(k) regulatory approval could take longer than expected and may not be achievable in the 5-year market entry point required by the RFP. The extensive, sometimes repetitive market information presented is very general and from market research reports, CPT-code related documents, and other publicly available sources, so it is questionable how well the participants really understand their markets and their competition, which is not a total surprise, since all the potential products described are in the incubating stage. The management of intellectual property is acceptable. Importantly, since the products being developed by Viscus and SNS Nano Fiber Technology are unique, and thus new to their markets, sales through established partners only does not seem to be the best way to go for these product launches. Instead, Viscus' and SNS Nano's branding of their products and co-marketing and pull-thru efforts with established partners would more likely facilitate the successes of those product launches. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

PolyOne has a record of success with product development/launches and its radiopaque materials are more developed than the other two offerings described, so it is likely that it will meet its performance goals on time with or without receipt of funding from Ohio. The overall projections of sales and jobs created are realistic if the projects are not hampered by development and/or regulatory challenges. However, a much more likely scenario is that Viscus and SNS Nano Fibers will encounter development and/or regulatory challenges that cannot be overcome with a minimum of effort and that they will not be able to achieve market entry for their products within the 5-year timeframe required by the RFP. The reports about OTF awards granted previously are well written, and performances on those awards were good. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The Centers of Excellence in Biomedicine and Health Care and in Enabling Technologies: Advanced Materials and Sensors at the University of Akron—an academic institution recognized nationally for its excellence in polymer science/polymer engineering, chemistry, and biology—attract millions of federal, state, and foundation dollars, and the experience and resources (i.e., materials processing and characterization equipment, modeling/simulation laboratories, etc.) at the university's College of Polymer Science and Polymer Engineering are impressive. All the people on the leadership team are well qualified for the roles described, and the overall project's management plan is good. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The ratio of cost share to state funds from the OTF IPP is 1:1. Use of state funds for indirect operating cost equals 20 percent of operating cost subtotal. Use of funds from Ohio and clients' cost shares are well described, and the clients are providing 74 percent of the total cost share. Use of state funds for indirect operating cost is 20 percent of operating cost subtotal. Only 43 percent of the state funds go to the lead applicant, somewhat short of the supermajority requirement. The proposal provides no explanation for this deviation of the RFP. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

While AMFC's technical goals and plans are well defined, three issues about the proposal are troubling: (1) the platform alone is not sufficient to resolve the challenges described; (2) the product descriptions for the products envisioned by SNS Nano Fibers and Viscus are in the incubating stage and thus very vague at this point, and since FDA 510(k) regulatory approval will be required for their commercial launches, it is very unlikely that their market entries can be achieved even within the 5-year time limit required by the OTF IPP RFP; and (3) SNS Nano Fibers' and Viscus' first-hand understandings of their target markets are very limited and will continue to be so if they pursue sales through large multinational partners, since they will have neither the ability to change sales strategies quickly if necessary nor the continuous pro and con feedback that comes with having direct contact with the users of their products. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-320
Interactive Visual Health Records Platform
Cleveland Clinic

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,997,982	$3,652,886
Capital Funds	$0	$0
Subtotal	$2,997,982	$3,652,886
TOTAL	$6,650,868	

This proposal seeks funds to accelerate the development and time to market of the Interactive Visual Health Records Platform (iVHR Platform), a technology that aims to improve documentation accuracy for better patient care and reduced patient average length of stay and to increase hospital revenues through properly coded clinical documentation.

The lead applicant, Cleveland Clinic, has engaged iVHR, Inc., and Avantia, Inc., as client companies, and both have committed cost share to the proposal.

Detailed Review:

- **Technical Merit and Plan**

The proposal describes the technology necessary to integrate the iVHR product with multiple hospital systems and the components needed for the IVHR Platform POC. The proposal, however, makes a poor case of defining the platform. Rather than describing a platform, it describes the development of a product (iVHR) with several modules. It does not describe existing technology from which other products beside iVHR can be built using the described technology. In addition, the technology will be exclusively licensed to iVHR, Inc., which leaves no technology with which to continue a platform. In addition, the statements about the tasks to be done are vague, and no details about the use of the technology for cardiac conditions, its first application, are stated. No metrics (levels A thru C) were indicated in the project goals and objectives section. Due to its inability to meet the definition of a platform as defined by the RFP, the proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposal describes a limited commercial release of the product through pilots at Cadence Health in Winfield, Illinois, and Novant Health in North Carolina, but it does not present any letter of support or commitment from these institutions. Moreover, the proposal makes no mention of any positive results obtained with the Cleveland Clinic pilot to support its value proposition. The lack of detail on the current pilot indicates that the technology is too early to give assurance of solving the market problem, not to mention adoption. Furthermore, the proposal argues that despite its claim of improved patient quality and safety, the technology will be sold for its economic value, giving the impression that the lead applicant does not believe the market would accept the stated value proposition. The time to market for this product seems to be beyond what the RFP requires; the pilot is scheduled to last 2 years, with market launch in the third year. It seems likely that development delays will occur, bringing the commercialization beyond the third year, even assuming a successful pilot. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The jobs created seem reasonable, even though it is not clear why they will be slanted towards non-profit jobs rather than for-profit jobs if IVHR, Inc. will lead the commercialization of the technology. The

forecasted economic impact is not realistic. The revenue stated for year two ($2 million) does not align with the rollout in the schedule in which the product is still in a pilot stage. The schedule has year three as the commercial roll out year, but the revenue forecast is $5 million, an unrealistic goal given the long sales cycles expected at potential client hospitals. Better explanations for the jobs and revenues projected would have greatly facilitated understanding these forecasts. Because of the lack of clarity on how the performance goals can be accomplished, the proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The lead applicant and clients have the right experience to perform the technical work described in the proposal but may need additional resources for the commercialization component, even though the Cleveland Clinic has a good history of commercializing technology. With the hiring of a CEO for iVHR, Inc., the team has increased the leadership experience to move the proposal forward. Combined with the proven expertise of the Cleveland Clinic and Avantia, the proposal demonstrates strong leadership that would succeed in leveraging resources, including acquiring additional capital funding and commercialization knowledge. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

It is unclear how iVHR, Inc., a new company without any revenues, can fulfill its commitment of $1,403,456 without funding. Just over 50 percent of the state funds go to the lead applicant, somewhat short of the supermajority requirement. The proposal provides no explanation for this deviation of the RFP. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

Although the technology described has merit, several sections of this proposal do not meet the requirements of the RFP. There is no clear definition of a platform that aligns with the requirements of the RFP. Instead, the proposal describes the development of one product. Additionally, the commercialization strategy is inadequate, relying on pilots for a limited commercialization but no commitments from the targeted hospitals. Furthermore, it is unclear how iVHR, Inc., a newly formed company without revenues and stated funding, can fulfill its cost share commitments. Therefore, the committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

IPP 13-322
Commercialization of HealthLandscape Information Platform
The Health Foundation of Greater Cincinnati
(operating through its subsidiary HealthLandscape, LLC)

Proposal Overview:

This proposal builds on a software platform under development since 2004. It consists of a suite of common and customizable tools designed to assess and visualize geospatial community heath and related data.

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,873,841	$2,873,841
Capital Funds	$75,000	$75,000
Subtotal	$2,948,841	$2,948,841
TOTAL	$5,897,682	

The plan is to develop and commercialize three commercial products based on unique configurations of the HealthLandscape software platform combining public with client-specific data, and sometimes client-specific tools:

1. Meaningful Use and Accountable Care (MUAC). MUAC would combine a unique configuration of the HealthLandscape platform with a suite of HealthBridge (a project client) analytical tools that can be used to leverage client medical records and other data to create a tool that permits healthcare providers to respond the demands of payment reform and accountable care.
2. Location Exploration and Site Selection (LESA): LESA is designed to integrate firm-specific information into a configuration of the platform focused on collecting, monitoring, and analyzing information about employee work and living environments across multiple locations.
3. Community Health Needs Assessment (CHNA). This product is a natural evolution of the core platform into a tool for hospitals to meet the Affordable Care Act, IRS Section 501(r)-specific compliance objectives, while providing valuable management and business decision-making information.

The lead applicant, the Health Foundation of Greater Cincinnati, is working with client companies GE Aviation, Our Kids Network, MDVIP, and HealthBridge.

Detailed Review:

- **Technical Merit and Plan**

The targeted solutions focus on important challenges, given the current pressures to decrease waste in healthcare, adopt electronic records, and comply with wide reaching new federal mandates.

MUAC: HealthBridge, one of the nation's leading health information exchanges, will lead this effort, although the proposal provides little information on the specifics and no technical work plan. It appears that HealthBridge will focus on tailoring a solution for one of their large clients, MDVIP (a subsidiary of Procter and Gamble with a network of primary care physicians). The design goals are to make the solution easily adaptable to other members of the HealthBridge network and beyond. The HealthBridge leadership role gives credibility to the proposed solution, but the proposal provides limited technical detail.

LESA: Development of this product appears to be based on an IT consultant model, with HealthLandscape being paid to build a custom solution to meet GE Aviation requirements. The proposal describes this as a prototype for easy deployment to any large multisite firm. Except for some high-level design objectives, the proposal does not provide much technical information or a project plan.

CHNA: Development of this product also appears to be based on an IT consultant model, with HealthLandscape being paid to build solutions for multiple clients. The difference is the role of BKD as a designated partner for commercialization. The role of BKD in technical development is very unclear, but the goals are very BKD-specific.

Despite statements to the effect that most of the pieces are in place to develop the defined products, the level of maturity remains unclear. The proposal refers to extensive use of the platform by multiple clients but provides no detail. Much of the discussion suggests that the components for the new products are at the prototype stage and not ready to launch. However, the timelines suggest initial commercial deployment for the clients in this proposal would occur in the first 9-15 months for all three products.

There are few details on the platform and the target commercial products. The proposal provides no flow diagrams, system architecture, detailed feature sets, screen shots, etc. The proposal does not meet the requirements of the RFP on Technical Merit and Plan

- **Commercialization Strategy**

All three proposed solutions address important market challenges and could have significant market potential, but the business case, go-to-market strategy, and revenue model are vague and offer limited concrete detail for evaluation.

HealthBridge appears to hold primary responsibility for marketing MUAC. It is suggested that GE may (with no commitment) be responsible for LESA. And BKD is the go-to-market partner for CHNA, although it is providing no match. The proposal offers little substance concerning any of these arrangements. The proposal provides no assessment of how willing the target clients will be to pay for the identified products and how much. Competitors are only mentioned once, and then only for one of the products. This whole area of health informatics is a maelstrom of activity across the nation and deserves considerable attention in any discussion of new IT solutions. The proposal only makes passing reference to intellectual property rights (clients keep rights to all of their own data, HealthLandscape keeps all code). This may work for LESA and CHNA, but this appears to be inadequate for MUAC because of the extensive role of HealthBridge in product development. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The performance goals are not well supported. The projections are not based on any presented market analysis or customer interaction. What data is provided is based on projected license revenue to HealthLandscape. Even optimistically, this platform will not be a significant net generator of jobs in Ohio. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The Foundation has experience in developing and commercializing data decision tools for public and community health purposes. HealthBridge is a leader in the heath IT space. All of the remaining team members providing funding are essentially paying customers and are not part of the development team. The committee is concerned that BKD is a major beneficiary of the results of the project, but offers no match and provides a relatively weak letter of support. Nonetheless, BKD is an important service provider in the hospital and healthcare delivery market and has strong capability to help design a quality analytic product of significant value. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The Foundation does not appear to understand Ohio Third Frontier budget procedures. The budget forms are not consistent with the committee's reading of the support letters and the apparent roles and responsibilities of the specific parties.

The proposal has strong cash cost share as expressed in the commitment letters. However, some clients are shown providing a 1:1 match for state dollars, when in fact the plan does not appear to include providing any state dollars to these clients. The committee's interpretation of the budget forms is that the client is providing cash match to state funds received by HealthLandscape as purchased services to develop the designated product. For example, the committee assumes that Australia National University is not receiving any state funds (which is not allowed), but rather is providing $90,000 to Health Landscape to develop CHNA, for which they will receive an offset to future licensing fees. However, making this change triggers multiple other changes in the reported budgets that are hard to interpret without a much more detailed roles and responsibilities discussion and correction of errors. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The team is developing interesting products. However, the proposal does not meet the requirements for technical merit and plan, technical commercialization, performance goals, and budget and cost share. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-324
Concussion Management and Reduction Program
Cleveland Clinic

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,941,031	$3,081,392
Capital Funds	$0	$180,000
Subtotal	$2,941,031	$3,261,392
TOTAL	$6,202,423	

This proposal seeks funding for the Concussion Management and Reduction Innovation Platform Project (CMRIPP) to develop products to improve the detection and management of concussion. The three key questions are: When is it safe for athletes to return to activity after a concussion? What are safe limits of sub-concussive impacts? How do we protect children from brain injury? The three key products to be developed to address the above questions are the Cleveland Clinic Concussion Application (C^3 App), the Intelligent Mouthguard (IMG) impact dosimeter, and a line of helmets for youth sports, to be manufactured by Riddell Sports, Inc., an Elyria, Ohio-based company. The two client companies on this proposal are iComet Technologies, Inc., and Sportsguard Laboratories, Inc. While Riddell Sports is mentioned as a potential partner on the youth helmets, they are not a client per the definition of this proposal.

Detailed Review:

- **Technical Merit and Plan**

The goal of this proposal is to further develop technologies around detecting, measuring, preventing, and improving decision-making related to traumatic brain injury. Further development will be done on the existing C^3 App to improve data analysis to provide real-time results. In addition, they will develop a Health Insurance Portability and Accountability Act-compliant interface with electronic medical records. The IMG product measures linear and rotational motion impact from sub-concussive and concussive injuries. There will be further development on the electronics, battery, sensors, and connections. Studies are currently being done to validate efficacy on human subjects. Based on data collected from the above two initiatives, Cleveland Clinic will also design helmets to specifically meet the unique needs of youth athletes. The committee feels that an insufficient amount of data has been collected and validated via peer review, relative to supporting product development. The utility of the C^3 App and the IMG mouth guard will depend upon clinical data demonstrating some correlation of the measured parameters to functional outcomes, and significant market penetration will not occur without this data. This proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The commercialization plan for the C^3 App starts with addressing the needs of high school athletics programs. Following launch into this market, college, professional, and organized youth leagues will be targeted next. The application will be sold on a subscription basis at a cost of $20 per student per year. The second product offering will be C^3 Clinical, targeting physicians and healthcare system employees. In this market, the end-user will pay $20 per test. The third market will be C^3 Military. This market will be charged a $20 per service member per year fee. The fourth product is the Sportsguard IMG. This intelligent version of Sportguard's existing line of mouth guards will target high school, college, and professional athletes initially. Boil-and-bite IMGs are expected to sell at $50 for regular models, $150 for custom, and $500 for research IMGs. The fifth product will be concussion research tools, combining the IMG product and the C^3 product for research purposes. Access to the database built for the C^3 will be sold for $10,000, in addition to the annual subscription fee and the IMG products. The final product will be the

youth football helmets. Helmets will be designed by the Cleveland Clinic based on knowledge and data collected from the above activities, and manufacturing and distribution will be partnered with Riddell Sports. The committee feels that commercialization in earnest cannot be achieved without collection of sufficient levels of data. Both the iComet suites of products and the Sportsguard mouth guards are reliant on baseline data and the development of the interpretive clinical data in delivering their value proposition. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The performance goals of this proposal may be challenging to meet, given the stage of development for the two main client company products. The project expects to generate $7.6 million of revenue by year three, as well as creating 25 for-profit jobs and 4 non-profit jobs. The project is addressing a market need that seems to be receiving significant levels of press in recent times. They will initially target athletics programs at all levels and have numerous additional markets to expand into over time. The technology is still under development, and market acceptance prior to obtaining supporting data is premature. There is less clarity around the development and potential success of the youth helmet products, but the project seems to have identified a market leader as a partner for manufacturing and distribution. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The Cleveland Clinic is a well-known medical center with deep research capabilities. The Cleveland Clinic CMRIPP has access to expertise from other areas of the Cleveland Clinic, including the Neurological Institute, the Orthopaedic and Rheumatological Institute, Biomedical Engineering, and the Center for Sports Health. The leadership at the center has world-class knowledge and expertise in their field. The president of Sportsguard has a background in dentistry and a relatively long operating history. iComet is a start-up but is a spin-off from the Cleveland Clinic. iComet is a relatively new company but seems capable and has demonstrated experience in generating outside funding. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The budget for the proposal is well presented and reasonable. The Cleveland Clinic Concussion Center will provide $560,851 in cost share. iComet will provide $1,545,450 in cost share, while only receiving $695,453 in support. Sportsguard will contribute $298,000 of cost share, none of which comes from any other state funding program. A supermajority of the state funds in this proposal will be going to the platform. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The proposal is generally sound and addresses an important and well-publicized problem. The experience and resources within the different areas of the Cleveland Clinic are a key strength of this proposal. That said, there are several sections of this proposal that do not meet the requirements of this RFP. The main issue is that most of the success of the client companies hinge on the ability to take concussion data and translate that into actionable information to the target markets. Before the iComet and Sportsguard products are able to achieve their stated goals, sufficient baseline data and statistical data on concussive events need to be collected and analyzed. While the committee feels that the team is capable and should be able to achieve their goals, the path is not clear relative to the timelines required by this RFP. The committee suggests that the members of this proposal draw upon the resources of Lawrence Livermore National Laboratory, where significant levels of complimentary work are being done. The committee suggests that this proposal be resubmitted next year when more data have been collected and validated via

peer review. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-325
The Advanced Neuroplastic Imaging Center at Wright State University
Wright State Applied Research Corporation

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$0	$2,400,000
Capital Funds	$3,000,000	$600,000
Subtotal	$3,000,000	$3,000,000
TOTAL	$6,000,000	

This proposal seeks to commercialize the acquired brain injury neuroplasticity therapy that can restore lost brain functions by establishing an advanced imaging center at Wright State University (WSU). In addition the applicants propose to commercialize a new combination drug therapy utilizing two FDA approved drugs, simvastatin and fluoxetine. Hardware tools and software toolkits will be developed as outcomes for the three projects that will be undertaken. The lead applicant is Wright State Applied Research Corporation. The therapy methods developed by the platform will be translated into service offerings by end-users with commercial interests Premier Health Partners and the Clinical Trials Research Alliance, followed by worldwide commercialization by Advratech and Infoscitex. The proposers estimate generating 26 new highly skilled R&D jobs, 12 graduate assistantships, 21 research internships, and 5 infrastructure/construction jobs, in just 5 years of operation. The client companies are Advratech, LLC; Infoscitex Corporation, a DCS Company; WSU; and Premier Health Partners.

Detailed Review:

- **Technical Merit and Plan**

Three types of therapeutic approaches are being developed as projects through the platform. The first is neurofeedback induced plasticity therapy; the expected outcomes are hardware and software tools. The second is transcranial magnetic stimulation induced plasticity therapy, resulting in the development of software products, and the third is drug induced neuroplasticity therapy, where a drug combination will be evaluated in animal models and eventually translated into a drug combination suitable for clinical trials and FDA approval. All three projects are in very early stage of R&D and do not have the maturity required by the RFP. The third project is the riskiest, with no line of sight towards achieving FDA approval in the proposed time period. The proposers seek to buy the 3T MRI equipment which is the basis of the platform. The platform first needs to be developed, hence funds are being sought to develop the platform, which is not receptive to the RFP. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The commercialization strategy is the demonstration of the framework, proprietary aspects of the software and hardware systems implemented in the treatment control system. This will then be protected via intellectual property mechanisms. The proposers do not plan on submitting an investigational device exemption (IDE) before clinical trials, because they anticipate classification as a non-significant risk device. The testing for this phase will be done with Premier Health and CTRA. The commercialization strategy hinges on first purchasing the 3T MRI scanner equipment and then building the OTF platform. The current commercialization strategy is a cost savings plan for capacity building. The OTF funds will enable the acquisition of the 3T MRI scanner at a reduced cost. This strategy is not in line with the guidelines of the OTF. Given that the objective of the proposal is capacity building, it does not seem feasible to achieve FDA approval for the pipeline of products (software and hardware) in years two and three. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The performance goals of creating and retaining graduate assistanceships and internships and publishing journal articles reflect the research stage of the technology. Creating graduate assistantships is not sustainable job growth for the Ohio economy. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The team led by Dr. Parker has the technical capabilities for achieving core areas 1 and 2, neuro-feedback-induced plasticity therapy and transcranial magnetic stimulation (TMS)-induced plasticity therapy. Core area 3, drug-induced plasticity therapy, is still in the nascent stage of R&D and will require significant skills in the areas of drug development and clinical trial experiences. The team is not realistic regarding the expectations and requirements for objective 3, i.e., drug-induced plasticity therapy, because the drugs at this point are potential candidates for therapy and pre-clinical and clinical trials that need to be designed to evaluate the efficacy of the therapy, which may be beyond the scope of this proposal. The proposal does not meet RFP requirements for Experience and Qualifications.

- **Budget and Cost Share**

The overall 1:1 cost share requirements have been met. Advartech will do software development and evaluate opportunities for drug development and are committing to $1.5 million cost share, primarily in personnel salaries. Infoscitex, located in Massachusetts with a local subsidiary in Dayton, Ohio, is interested in the commercialization of the TMS simulation protocols. They do not have a cost share. WSU has a cost share of $1 million for transition from laboratory to market, primarily in personnel salaries. Premier Health has a cost share of $0.5 million, primarily as equipment. The entire state funds are being used for purchasing equipment, which in the committee's view is ultimately just capacity building. Thus, the proposal does not meet RFP requirements for Budget and Cost Share.

Summary of Review and Recommendation:

The proposal is primarily a capacity-building proposal that seeks to purchase a 3T-MRI scanner. The projects detailed for the platform are in very early stages of R&D, thus, they fall outside of the scope of the IPP. Moreover, the proposers have an unrealistic timeline given the maturity of their technology. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-326
Interprofessional Immersive Simulation Center
The University of Toledo

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,033,914	$1,838,671
Capital Funds	$966,086	$1,966,086
Subtotal	$3,000,000	$3,804,757
TOTAL	$6,804,757	

The proposal seeks funds to acquire a "virtual reality cave" that uses visual imagery technology to accelerate products to market for three client companies, Homeward Health, BARCO, and Isofoton North America. The equipment to be acquired is intended to create an extension of the Interprofessional Immersive Simulation Center (IISC™), an existing platform at the University of Toledo, the lead applicant. The IISC™ platform is a unique tri-center concept designed to create a transformational model for education, research, and technology commercialization.

Detailed Review:

- **Technical Merit and Plan**

The proposal does not clearly articulate how "the world's first" 3D immersive "virtual reality cave" can be built within the stated 2-year time frame. There does not appear to be an allowance for the typical delays in a project of this kind. Even if delays were accounted for, Homeward Health and Isofoton would not have access to the "cave," the most critical element of the proposal, at least for the building period. The proposal does not explain how the job creation in year one and two for Isofoton and Homeward Heath will be accomplished if the cave is not ready until year three. In addition, although the IISC™ infrastructure is substantial and a valid platform, the proposed Virtual Reality Center is not using the platform. The proposal is requesting funds to add a new platform—clearly not the intent of the RFP's stated goals of using existing platforms. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposal does an adequate job describing the commercialization strategy of the added platform. However, the proposal does not credibly present the Isofoton entry into the small rooftop solar market and does not consider significant industry market barriers that this market segment may face. The proposal does consider the installed-cost price reductions that are critical to market acceptance, as stated in the proposal, but which are ultimately significant external market activities beyond Isofoton control. Moreover, the committee questions BARCO's true commitment to the proposal because they have not committed to creating any jobs, and the funds they are requesting would effectively serve to discount the selling price of the final product, which the committee does not consider a sustainable business model. As a further note, UL-approved Plug and Play (with integrated inverters) was introduced to the market in the fall of 2012. It is unclear whether Isofoton's definition of plug and play is equivalent to or compatible with what has already become available on the market. We do encourage Homeward Health, which is a good cluster fit for the Medical Center to raise funds by other means and continue on with assistance of the existing platform and staff. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

BARCO has no jobs commitment even though they are asking for $1,104,430 in state funds. Isofoton's commercial strategy is critically flawed by its lack of consideration of intense market barriers. In addition, it is highly unlikely in the solar manufacturing industry—where component costs are a large percentage of the total finished costs and where assembly is typically highly automated—that creating 400 jobs is possible and for the company to still be competitive. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The University of Toledo's team is well credentialed and experienced in the medical field. It is probable that they could well manage these non-medical applications as a goal of extending the value of the Center to the State of Ohio. The inclusion of commercialization staff members from the university is also a plus. The individual teams from Homeward Health, BARCO, and Isofoton all are competent in their individual domains, but adding these staff to the organizational chart only complicates a complex and unclear set of goals for the entire project. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The cost share to state fund ratio is 1.27:1, with a hefty portion of the cost share coming from BARCO. However, BARCO has not provided, as required, a signed letter of commitment for its cost share of $1,104,430. Although the cost share percentage would still be met, the product discount amount of $150,000 is not considered as cash. Furthermore, a mere 37 percent of the state funds will go to the lead applicant, far short of the RFP's requirement of a supermajority. The proposal does not justify this deviation from the program requirements. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

It appears that the inclusion of BARCO in this proposal is more for a purchase benefiting a non-Ohio company, which has made no commitment to create jobs in Ohio. It allows them to demonstrate a product for sale using Ohio funds with no commitment to Ohio. Furthermore, the lack of a signed letter of commitment is in itself enough to not recommend this proposal for funding. The Isofoton commercial plan also demonstrates a significant lack of understanding of the rooftop solar market niche. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-330
Electrochromodynamic Systems
Kent State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,965,938	$2,719,718
Capital Funds	$30,000	$277,000
Subtotal	$2,995,938	$2,996,718
TOTAL	$5,992,656	

The proposal targets four market opportunities based on liquid crystal (LC) technology applied to light transmission/reflection. The lead applicant is Kent State University (KSU). Two client companies are involved with this proposal, AlphaMicron, Inc. (AMI) and Kent Displays, Inc. (KDI). These two small companies are located in Kent, Ohio, have commercial products in LC technology, and are closely aligned with the LC program at KSU. Recent technology developed at KSU is being considered for commercialization in eyewear, greenhouse, and wall-covering applications by the commercial partners.

Detailed Review:

- **Technical Merit and Plan**

KSU has established a strong technical position in LC display technology. New technology has been developed for electrochromic systems offering absorbing, tinting, and scattering modes in a single device. They have defined future needs and limitations of technology in this field and have defined four distinctly different opportunities that could have commercial merit with resolution of the technology hurdles. These areas include laser protective eyewear for surgeons, adaptive eyewear for visual abnormalities, greenhouse coatings/systems for control of sunlight to maximize yield/minimize energy requirements and "smart" coatings for interior building walls and ceilings. The intellectual property position for KSU, AMI, and KDI is strong in this field. The proposal notes that there is a pending patent covering the technology to be employed in the products of this proposal. The core strength of the proposal is the reputation/expertise of the three main participants as well as their history of successful collaborations on previous projects. The proposed technology for these projects is based on development of an electrochromic system with three distinct optical states (transparent, absorbing, and opaque). Existing technologies are not capable of providing both absorbing (tinting) and scattering (opaque) operational modes. The key technical hurdles, which the team is well suited to overcome, are the development of specific liquid crystal formulations and the encapsulation systems for each applications. The proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The elements of the commercialization strategy are in place for scaling-up and commercializing several of these concepts once the technical goals have been achieved. The proposal's clients are well equipped to commercialize technology successes. The eyewear application markets appear to have the ability to generate revenue within 3 years, whereas the other applications (greenhouse and smart coatings) are further from revenue generation. It became clear after further discussions with the applicant team that the area in the proposal described as dynamic vision therapy eyewear shows significant commercial promise. The proposal emphasizes amblyopia (lazy eye) and diplopia (double vision) in children as initial opportunities with testing/development at Akron Children's Hospital. The potentially negative feature of this proposal involves the timescale for commercialization. From the projected jobs/revenue, it appears that these projects are more intended to succeed in the longer time range, and the economic impact within the 3-year period will be minimal. The eyewear applications appear to be commercially viable in a shorter

time period, while the greenhouse and "smart" coating applications have a long time-to-market. Overall, the proposal meets the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The performance goals of job creation and revenue are quite low, but appear to be realistic. The number of jobs created at year three was 7 (for profit) and 3 (nonprofit) with revenue of $5 million. The planned timetable does not see any significant commercialization until late in year three. Thus, the projects envisioned here (and probably properly so) are longer range in scope. A review of the multitude of prior Ohio-supported projects showed an overall good performance for the lead and partners of this proposal relative to job and revenue creation in the state of Ohio. However, due to the extremely low projected impacts in year three, the proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The personnel and their respective organizations are highly qualified to conduct the proposed research, development, and commercialization of the technology discussed in the proposal. The project director is the chairperson of the physics department at KSU and has significant experience in this field. The proposal commercial partners are well aligned with KSU, and the management of the project should be straightforward. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The funds requested are approximately $3 million, to be almost equally split between KSU, Alpha Micron, Inc., and Kent Displays, Inc. The cost share funds are also approximately $3 million, also equally shared by the partners with approximately 64 percent being provided by the clients. KSU has a litany of cost share items noted (director release time, staff time, graduate assistant position, Akron Children's Hospital contribution, and other items noted in an attached letter from KSU). The other partners' cost share contributions primarily involve overhead or indirect costs. Far short of the RFP's supermajority requirements, only 36 percent of the state funds will go to the lead applicant, and it was not clear to the committee what benefit the platform would actually receive from the program. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

This proposal offers new concepts for electrochromic applications allowing for opening up new product offerings. Four distinctly different applications have been defined with this technology platform, and all are technologically feasible. All four applications also appear to be commercially viable. The lead applicant and the partners have an excellent record of achievements, and the technology to be developed will likely be sustainable. The major negative aspect of the proposal is the timescale to commercialization and the impact it will have in jobs/revenue for the State of Ohio at the end of 3 years and even at the end of 5 years. Additionally, the distribution of state funds (only 36 percent to the platform) does not fit with how the RFP envisions these projects, and the applicant team fails to adequately explain the benefit being provided by the proposal for the platform. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-332
Center for Biomaterials Characterization and Innovation
Cleveland State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$1,848,475	$2,688,979
Capital Funds	$150,000	$60,000
Subtotal	$1,998,475	$2,748,979
TOTAL	$4,747,454	

The proposal seeks funds to bring together a variety of expertise in materials characterization at Cleveland State University (CSU) under the umbrella of the Bioactive Materials Institute (BMI). The goal is to provide a wide array of specialized technologies to aid Ohio companies in understanding the properties of various biomaterials. The initial clients are Momentive Performance Materials (for advanced particle technology for chromatography) and PolyOne (for antimicrobial and anti-biofilm polymer formulation).

Detailed Review:

- **Technical Merit and Plan**

It is unclear what the BMI actually consists of—it cannot be easily found on the CSU website, and details on this matter in the proposal are sparse. As such, the platform is not clearly defined and seems to be a loose collection of methods and equipment. There is no proof-of-concept data in the proposal, making the types and quality of services they are providing uncertain. While there are clearly outstanding scientists involved in the project, the proposal lacks specific details on the characteristics of the platform they are commercializing. Overall it is not clear that this is an existing platform with demonstrated value.

Both products are being developed without clearly defined cost parameters. It is not clear how competitive these products will be at the end of this project nor what their advantage would be over other products, either in terms of performance, price, or quality. For example, Momentive indicates that high yields are not achieved with current technologies, but the proposal fails to address why the BMI process will be any better. Furthermore, while some of the approaches to characterization are described, it is not completely clear how these will be carried out or whether the BMI offers a unique suite of tools unavailable elsewhere. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

Momentive seems very early in its product development. Gen1 sample is rather vague; it does not appear to be suitably developed to fit the RFP's requirement for significant impact in a 3- to 5-year timeframe. It is also confusing that the Gen1 sample optimization is complete in year two, but there does not appear to be any commercialization until year four.

The PolyOne project is also at a very early stage; the proposal does not state their current presence in biocoatings and, indeed, one of their tasks is to review the state of the art of antimicrobial and antibiofilm compounds, implying a substantial time to market. No clear regulatory path for the antibacterial coatings is stated, and the 3-month window allocated to it for PolyOne seems insufficient.

A key element of the RFP is for there to be strong client pull based on a strong current need for the platform. Given how early-stage the two proposed projects appear, it is not clear that this is the case. Furthermore, the investment section states that once Momentive's product development is completed and market demand is verified, they would look to gain approval for corporate-level funding. Imbedded in this

statement is a fair level of doubt as to whether the funds presently being sought will be sufficient to actually generate revenues and jobs for the state of Ohio. Insufficient details are provided for what further funding will be required. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The goals for development are clearly stated, although at a very high level. For both products there are tasks that must be completed by the client before the platform will be used. Neither is ready to immediately use the platform. For the PolyOne project, BMI is involved in only two of the five tasks. It is unclear why some tasks are for "BMI" and others for "CSU BMI". The proposal contains some inconsistencies. For instance, there are two different values where there should be only one for the revenue to be generated by the Momentive project. Additionally, the proposal indicates that without OTF funding, PolyOne expects to reach substantially less in sales by 2019. Understanding the difference is somewhat important, but no data are offered to back this up. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

CSU has a strong reputation in biomaterial characterization and significant infrastructure required for this project. The PI, Prof. Yan Xu, has an impressive academic track record: he has published more than 170 scientific articles and has experience managing both program and facility grants. It is also positive that CSU has a dedicated commercialization headcount committed to the project. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The overall budget seems fair for the work proposed, and the high cost share committed by Momentive and PolyOne shows impressive commitment to the project. CSU is providing $648,216 in cost share ($445,950 direct and $202,266 indirect), Momentive is providing $1,387,834 in cash cost share ($842,282 direct and $545,552 indirect), and PolyOne is providing $712,929 in cost share ($544,107 direct and $108,822 indirect). However, the financials and budget are hard to follow and need better clarification in the narrative. For example, why does CSU need to purchase three pieces of capital equipment if the platform already exists? It is stated that they already have a wide array of spectrometers in the Platform Information section, and there is no further mention of this equipment until the budget. Only 55 percent of the state funds will go to the lead, which is in the gray area between a majority and a supermajority, but on the plus side, 76 percent of the cost share is being provided by the clients—significantly more than the RFP's 50 percent requirement. Despite the overall lack of details, the proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The committee feels this proposal is a little too vague in describing the platform, leaving uncertainty about whether the platform is ready and being used or if it is still a work in progress. Furthermore, there is a lack of details for the projects with the first two clients, and they appear to be at a too early-stage to fit this RFP. While there is significant expertise at CSU, it is not clear exactly how it would impact the development of the proposed products for Momentive and PolyOne and whether these projects will come to fruition in 3 to 5 years as required under the IPP. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-336
Clinical PET Biomarker Development Program
Case Western Reserve University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$3,000,000	$1,382,625
Capital Funds	$0	$1,684,080
Subtotal	$3,000,000	$3,066,705
TOTAL	$6,066,705	

The proposal expands and commercializes CWRU's existing Positron Emission Tomography (PET) program to allow clinical biomarker development. It includes building a GMP facility for the production of radiopharmaceutical imaging reagents and then conducting late stage clinical trials. This will be a platform for clinical biomarker development. PETNET and ImageIQ are the Ohio client companies providing cost share to this proposal.

Detailed Review:

- **Technical Merit and Plan**

This proposal appears to be the development of a new platform (albeit based on current infrastructure) rather than the application of an existing platform. There is significant new equipment and lab build-out included in the budget and timeline. This is driven by the need to meet cGMP standards as required by the FDA in order to conduct clinical studies.

PETNET/Siemens seems a viable commercial partner with the reach to push the products to market. ImageIQ's engagement to develop image analysis software is important to future PET Biomarker development, but it almost appears to be an add-on simply to meet the RFP's requirement for proposals to include two for-profit clients. ImageIQ seems less an Ohio client than it is a collaborator in developing the platform.

The proposal contains some ambiguity as to why, if PETNET has a manufacturing facility at the Cleveland Clinic, they need to build another at CWRU. There also seems to be parallel GMP facilities at CWRU—one for their own production and the other for PETNET. The proposal states "dispensing of all PET biomarkers will be performed by PETNET." This is unclear.

While the clinical trial makes scientific sense, it is unlikely to have a significant impact in the 3- 5-year timeframe required. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposed commercialization aims to focus on Phase II markers that have already been tested. This strategy reduces the time-to-market and decreases the risk of failure, although there would still be the need for a Phase III trial to prove the predictive power. However, it is not entirely clear how many PET markers are at this stage. The proposal also was not clear if the reason for picking late stage markers was to fit the RFP rather than driven by client demand or scientific reason.

To reach market, at least $20 million is needed for the clinical trial. The proposal is unclear regarding where this money comes from, and PETNET is not committed to this because it will be contingent on results of the trial. All clinical development has high risk of failure and, as such, it is not apparent how

likely it is that this will have impact on the State of Ohio in the 3- to 5-year time frame required under this RFP. The proposal projects 6 jobs by year 3, with revenue reported as "unknown." The ImageIQ commercialization discussion is weak. The projection of revenues to begin by the end of year five for RGD-K5 for prognosis and monitoring of angiogenesis is nearly $150 million annually, is not supported by any detailed analysis, and seems overly optimistic. In addition, if the RGD-K5 clinical studies fail to achieve their objectives, the applicants intend to switch to an alternate tracer (HX4), which has its own inherent set of risks. If they go down this path, they would have already spent a significant amount of Ohio Third Frontier funds on the (unsuccessful) RDG-K5 trial. Therefore, their commercialization strategy would not be based on late stage development and commercialization, but rather on early stage, riskier clinical development.

The sustainability is also unclear, and the section on "future biomarkers" lacks details. As the applicant mentions, PET biomarkers is a small market. While there is a good description of the overall market, there is little discussion of the number of ongoing clinical trials or the potential for a pipeline of clinical studies and how this will impact Ohio. There is really only one client at this stage and it would have been reassuring to see that there were more potential users of the proposed platform. The proposal does not meet the requirements of the RFP on Commercialization Plan.

- **Performance Goals**

While the merits of a PET biomarker platform are well explained, it does not appear to be strongly driven by demand arising in Ohio. Indeed, the number of potential customers based in Ohio seems limited – there are relatively few companies in the PET biomarker development space. The proposal states the goal to, "offer streamlined services to other commercializing partners for FDA approval of their new PET Biomarkers" but does not list Ohio-based companies that are potential commercialization partners beyond PETNET. Furthermore, since the reagents must be produced locally, there is limited scope for centralizing in Ohio. Certainly there seems potential for revenue and jobs for CWRU and PETNET, but the case is less convincing that it will lead to jobs in Ohio at companies that are customers of the Innovation Platform.

The sustainability of the program is not explained in detail. In particular, it is not clear if failure of the initial biomarkers would reduce the demand for the platform. Furthermore, it is not detailed where future biomarkers would come from and how many of the companies would be from Ohio or elsewhere. Despite this, the proposal meets the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

Professor Avril and the CWRU group clearly have significant expertise in the area and have been involved in a number of first-in-man studies using PET biomarkers. As such, they are certainly a viable team for building the infrastructure and for clinical development. PETNET is a global leader in the space and so is certainly a strong partner as they have the resources and experience to bring these products to market. While there is some uncertainty as to whether ImageIQ is a true client, they are clear experts in the type of image analysis needed for this project. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The overall budget seems reasonable for the proposed work, and the cost share is in line with the requirements of the RFP. The bulk of the cost share comes in the form of capital equipment. In particular,

Siemens is providing a cyclotron, although it was unclear whether this system placement will happen even without OTF funds. The budget and cost share for ImageIQ also are not sufficiently detailed. Their letter refers to $360,000 "in the form of significant discounts for professional services and access to software engineering, etc. . . ." These discounts are not explained in detail. Despite the overall lack of details, the proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

While this is a strong proposal, it is not a good fit with the Ohio Third Frontier RFP. The costs and timelines for clinical trials are not a natural fit with the grant size or the 3- to 5-year timeline for creating jobs in Ohio. There is also some concern that there is not a clear pipeline of clients looking to use the platform, and so there are questions of how sustainable the platform will be. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-340
Center for Advanced Nanocomposites
Case Western Reserve University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,148,138	$2,328,138
Capital Funds	$400,000	$220,000
Subtotal	$2,548,138	$2,548,138
TOTAL	$5,096,276	

The proposal seeks to develop composite materials possessing properties characteristic of the constituent components through advanced materials design, processing, and characterization using the Center for Advanced Nanocomposites based on functional polymers and boron nitride nanomaterials at CWRU. The proposal combines the academic capabilities of CWRU with two Ohio-based client companies: Momentive Performance Materials, which has the capability to develop and commercialize the composites; and PolyOne, which has the ability to process the composites.

Detailed Review:

- **Technical Merit and Plan**

This proposal combines the academic capabilities of CWRU with two Ohio-based companies, however, the description of the Innovation Platform is rather vague, and conflicting statements in the proposal cast doubt on the existence of a working Center for Nanocomposites. It appears that the center will need to be assembled and created during the project and is not currently available to address the technical objectives of the proposal. Essentially, a credible Innovation Platform does not exist as of now, and the project goals and objectives appear to be initially centered on the center development rather than on addressing the near-term commercialization goals.

The proposal is primarily directed at boron nitride nanotube and nanosheets targeted at applications where carbon-based analogs (nanotubes, graphene) are not adequate due to electrical conductivity. In order to realize the potential of these newer boron nitride nanomaterials, the dispersion and surface adhesion to the polymer matrix will need to be improved. The lead applicant will investigate solutions to these two deficiencies. The technical approach is less clear at the front end of the development. The proposal notes the objectives of dispersion and functionalization but does not give any insight on how these problems would be solved or what technology/expertise is in-place to solve these problems. The thermal conductivity of nanotube and nanosheet composites will be highly dependent on the orientation relative to heat flux. Nothing is discussed on how the desired orientation may be achieved, and the thermal conductivity goals will not be achieved without proper orientation. Dispersion is not an easy problem to solve; it still has not been solved with carbon nanotubes or graphene after years of trying. The technical plan (once the dispersion/functionalization problems are resolved) is reasonable. However, the timetable requires the project to achieve breakthroughs in exfoliation (dispersion), functionalization, and orientation problems within year one, which is simply not realistic. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The project has Momentive focusing on thermal management and insulation and PolyOne on resins. Both clients are well qualified and have their strengths; Momentive is in a unique position already supplying composites into these markets. PolyOne has the capability to produce these composites and the ability to handle low- to modest-volume products; PolyOne claims to introduce over 1,000 products per year. Even though the project shows promise, there are many questions related to what PolyOne is attempting to

commercialize and whether Momentive is actually developing new applications unique to the market or just developing intellectual property in an area of its interest. There is minimal innovation because much of this kind of work is already being done elsewhere, and there are already many suppliers of boron nitride nanopowders. It is surprising that Momentive has not already taken this market, considering that they have been involved with boron nitride for a very long time through their previous company, Advanced Ceramics (prior to being purchased and spun out by GE).

Specific customers who want these products and their specifications and requirements are not clear at this point. The proposal also seems to be overestimating the market considering that there are already many other types of thermal management materials and resins being sold for all aspects of electronics. The revenues for years three and five appear realistic, but only if the technical issues can be resolved first.

It seems like the platform and its clients are geared more toward intellectual property generation than true commercialization, job creation, or the sale of new products. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

Since the proposal is heavily client-focused and directed, there might be issues in sharing the intellectual property generated during the course of the project. These potential issues are not sufficiently discussed in the proposal.

The jobs to be created appear to be modest. PolyOne seems to view this project as a research proposal and states that it will hire people over the course of the project period, but none of these jobs appear to be for commercial purposes. Overall commercial gain to Ohio appears to be rather limited. The letter from Seoul Semiconductor (a non-Ohio, foreign company) raises the question of where most of the job creation will actually occur.

Overall, it appears that the lead applicant is not fully focused on developing a technology or helping to develop new products for the two clients. Performance on two prior awards is difficult to judge as they are still in progress. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

CWRU has good experience in developing nanocomposites. Prof. Liming Dai, the PI, has considerable experience in leading multidisciplinary programs, both technically and administratively. The clients, Momentive and PolyOne, are both Ohio-based companies and are well qualified with strengths in their respective areas. Both have qualified key personnel assigned to the proposed program. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The budget appears appropriate and adequate to perform the work of the project. Momentive has firmly committed a cost share of $1,077,436 and PolyOne a cost share of $1,029,709. The cost share commitments by these two clients appear more than adequate and firmly committed in letters. Over 80 percent of the total cost share is being provided by the clients, and approximately 65 percent of the state funds will go to the platform. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

This proposal combines the good academic capabilities of CWRU with two credible Ohio-based companies; Momentive Performance Materials has the capability to develop and commercialize the composites, and PolyOne has the ability to process the composites. However, there are questions as to whether the Innovation Platform really exists at present or if it is being developed as a part of this proposal. There are also significant, unanswered technical questions regarding how the team plans to resolve functionality issues of the materials. There is also minimal innovation in the proposal, because much of this kind of work is already being done elsewhere, and there are already many suppliers of boron nitride nanopowders. The jobs to be created are only modest in number, with one of the clients (PolyOne) only hiring three research-oriented people over the course of the project period. In addition, the lead applicant does not demonstrate how the Center for Nanocomposites will be sustained over time after this project is over. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-341
Development and Commercialization of a Cellular Imaging, Analysis, and Processing Tool for Application in Regenerative Medicine
Cleveland Clinic

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,999,979	$3,249,465
Capital Funds	$0	$0
Subtotal	$2,999,979	$3,249,465
TOTAL	$6,249,444	

This proposal seeks to develop two tools to fill critical gaps for cell-based diagnostic, drug development, and cell therapy companies: a robotic platform to manipulate cell colonies called Smart Cellector™ and an imaging and imaging analysis package called Colonyze™. Both products are already under development, and this proposal includes funding to further their development, test the products, and create a new company to market and support them. The client companies are OSU, Parker Hanifin, and Athersys. Committed end-users include the Cleveland Cord Blood Center, the National Center for Regenerative Medicine, OH-Alive, Biospherix, and the FDA.

Detailed Review:

- **Technical Merit and Plan**

The plans for developing future generations of both Smart Cellector™ and Colonyze™ are well outlined in the proposal and are logical in progression. The strategy to develop both products in stages is a strength of the proposal. Colonyze is currently in the second-generation stage, and two of the tasks for this proposal are to upgrade the system to produce a third- and then a fourth-generation version of the imaging and image analysis system. Smart Cellector is still in the first-generation phase. Tasks outlined in the proposal will complete the second-generation system (prior to award, by July 2013) and then to develop the third-generation system, which will be the first product to be sold in this line. As both products have already been built and tested in at least the first stages, they are sufficiently well developed to indicate that the timelines proposed are possible. The proposal meets the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

Since both products are already under development, it is possible that some versions of each may be ready for sale during the proposed project period, and this is a strength of the proposal. However, the market for these systems is limited. The team's own data project that they will sell one Smart Cellector 4.0 unit and eight Smart Cellector 3.0 units by the 5-year mark. The projected revenue for the sales of the two products is unrealistic. Although the estimated price for the proposed products is provided in the proposal, there is no information on the cost to make, sell, and support the products; so even if the market penetration numbers are realistic, there is no way to estimate profits. The creation of NewCo, which is an integral part of the commercialization strategy, is listed as the first deliverable of this proposal. However, in the proposal it is stated that one of the goals on a previously awarded Wright Center Innovation Program project was the formation of a new Ohio company to commercialize Colonyze and that the project goals were successfully met. Thus, it is not clear if a new company has already been created to commercialize Colonyze. Finally, although the proposal does have letters from committed end-users, there is only one client (Athersys) listed in the commercialization strategy portion of the proposal. The RFP requires the involvement of two clients. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

All of the performance goals outlined in the proposal rest on the creation and success of the to-be-created company, NewCo. The goal (under deliverables) that NewCo will obtain research agreements and grants by year two is overly optimistic. In addition, it is not clear how NewCo will generate revenue from services for Colonyze and Smart Cellector 3.0 in years one and two since the proposal indicates that the first sales of these products will occur in the middle of year three. NewCo is projected to create 12 new jobs before the first sales occur, and it is not clear from where the money to pay the salaries will come. Once NewCo is established, there is no indication how the platform will be sustained at the lead institution. The proposal states that Parker Hanifin *may* provide manufacturing for NewCo, but the proposal does not state the plan for manufacturing these products if Parker Hanifin does not provide this service. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The team has experience in working together to develop past generations of the products and has demonstrated the expertise to develop future generations. Dr. Muschler is well qualified to be the PI on this proposal, and he has many years of experience in both R&D and administrative leadership. Drs. Muschler and Powell have worked together previously to develop the current generation of the Colonyze product, and Dr. Muschler has worked with members of the Parker Hanifin team to develop and test the current version of Smart Cellector. The proposal exceeds the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

In the budget section of the proposal, Parker Hanifin and Athersys are listed as clients, and OSU is listed as a collaborator. The allocation of state funds is to Cleveland Clinic, Parker Hanifin, and OSU, with 51 percent of state funds going to lead applicant, somewhat short of the supermajority requirement. The proposal provides no explanation for this deviation of the RFP. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The platform consists of the technologies contained in the Colonyze and the Smart Cellector hardware and software systems. These technologies are not housed within a single non-profit research institution, but rather their design and development is being undertaken by a collaborative group of people from Cleveland Clinic, OSU, and Parker Hanifin. It does not appear that this collaboration fits the goal of the Ohio Third Frontier program, as described in the RFP: "The specific goal of the Innovation Platform Program is to support commercial partnerships involving an Innovation Platform at a single Ohio college, university or other not-for-profit research institutions, and Ohio for-profit companies." The fact that OSU and Parker Hanifin are not clients is acknowledged on page 19 of the proposal, where it is listed that the single client is Athersys. The RFP clearly states that there must be at least two for-profit clients listed with each proposal. Furthermore, once the technologies are licensed to NewCo, it is difficult to see how the platform is sustained at either the lead institution or any of the other groups involved in the platform development, as required by the RFP: the work described in the proposal should "kick-start the long-term, sustained use of the Innovation Platform by multiple Ohio industry partners." Thus, this proposal does not meet the criteria defined in the RFP. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-342
Smart Sensor System Design, Development, and Commercialization
University of Akron

Proposal Summary:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,442,539	$2,442,543
Capital Funds	$0	$0
Subtotal	$2,442,539	$2,442,543
TOTAL	$4,885,082	

This proposal seeks to leverage and build upon existing expertise in sensor technologies at the University of Akron's Engineering Research Center (UA ERC). The proposal seeks to develop two types of sensor technologies with Ohio clients. The first is the smart sensor technology for monitoring (a) energy pipeline integrity and (b) data systems integrity by partnering with Therm-O-Disc. The second is the development of advanced braking systems that can determine brake integrity by designing the "intelligent brake chamber" with Bendix Commercial Vehicle Systems. The proposed projects are expected to bring in a combined revenue of $70 million. Both of the clients propose to utilize the technical expertise at UA ERC for sensor fabrication and testing.

Detailed Review:

- **Technical Merit and Plan**

The proposal is divided into three projects. The first is a corrosion sensor being developed by Therm-O-Disc that will be able to monitor a variety of conditions beyond just corrosion, including moisture, pH, pressure, oxygen content, velocity, and quality. This project will also develop software capabilities for monitoring the outcome of the sensor. Such sensing capability will be of significant value to the energy industry that needs to perform pipeline infrastructure evaluation and maintenance. The committee has some concern regarding the sensor's performance in monitoring in real time the pipeline integrity using the radio frequency (RF) technology. RF technology is extremely sensitive to environmental pertubants, and it undergoes attenuation. Using RF technology may not be the most suitable modality of measurement for this application. A number of other issues regarding the sensor's performance, such as failure rate, false positive, and false negative detection, are not sufficiently addressed in the proposal. Interference of the sensor signal due to the additives present in the gases travelling in the pipeline is also not addressed. There is a second part to this project that focuses on power optimization of data centers through power management sensors, which will leverage the data center capabilities of Emerson. This second project is feasible, but the value proposition for the UA ERC platform has not been laid out. This project is likely achievable with in-house Therm-O-Disc capabilities.

The proposal's final project focuses on developing sensor systems for designing intelligent brake sensors for monitoring brake health. As with the second project, the client Bendix CVS can potentially achieve the objectives laid out for this project in-house. There does not appear to be a need to utilize the UA ERC platform. This project essentially focuses on retro-fitting existing brake chambers designed by Bendix with an additional functionality to monitor brake health.

Due to the lack of a clear need for UA ERC's involvement with the projects as well as technical concerns for the projects, the proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposed research for the first project will be to add to the offerings of Therm-O-Disc, which delivers a broad range of sensing capabilities and solutions to the heating, ventilation, air conditioning and

refrigeration; transportation; consumer products; oil and gas, and power and environment industries. The committee believes that Therm-O-Disc has the infrastructure and experience to deliver the pipeline and data center sensor platforms to market. Therm-O-Disc is providing significant cost share through their sensor business and is leveraging the electronics design and analysis, RF wave propagation, corrosion mechanisms, and surface coatings expertise at UA. However, the committee is concerned about the data provided for market penetration for the in-line pipeline monitoring. While the need for such a technology has been demonstrated, the roadmap for adoption of the candidate technology is absent.

The market opportunity for the second project for designing in-line brake monitoring systems with the client Bendix seems absent. It appears that Bendix will be essentially upgrading their existing product market with the brake sensor. It also appears that Bendix can design and integrate this technology to their current product line without using the UA platform. If successful, the project will generate only one job by year three. Although the market for these types of sensors exists, it is unclear what percentage of this market can be expected from the proposed products, when many other companies are already selling comparable materials. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The proposal indicates that this work would have modest impact on job creation, with 16 jobs created by end of year five, but a more sizeable impact on new sales of products, with a projected revenue of $68.9 million (also by year five). The impacts by year 3 are somewhat lower, with only 7 jobs created and $28.5 million in new revenue. While the new revenue is a good figure, the number of jobs is simply too low. The proposal would be strengthened by the inclusion of a more detailed analysis on long-term job growth, along with details pertaining to the nature of the jobs. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

Drs. Garcia and Ida have expertise in sensor design and fabrication at UA. They will be managing the platform, which is the UA ERC. Mr. Graff from Therm-O-Disc will be managing the strategic development of the smart sensors project and Mr. Beyer will be managing engineering for Bendix CVS. The team has the qualifications to address the design and manufacturing objectives. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The cost share meets the 1:1 match requirement. Therm-O-Disc and Bendix are putting in cost share of $1.25 million and $264,000, respectively. The cost share is primarily in the form of personnel wages. Consistent with the RFP's supermajority requirements, approximately 70 percent of state funds will go to the lead applicant. The state funds at UA ERC will cover the costs associated with research, engineering, and technical personnel directly supporting the proposed projects. Similar usage has been targeted for the state funds going to the clients. The majority of the cost share (62 percent) is being provided by the client companies. The proposal meets the RFP requirements on Budget and Cost Share.

Summary of Review and Recommendation:

The team is experienced in sensor development. The application of the first project for infrastructure quality management in terms of designing gas pipeline in situ sensors is novel but will have only a modest economic impact to Ohio if successful. There are concerns on the sensor performance that need to be addressed. The power management sensor with Therm-O-Disc is feasible and the technology is mature

for implementation. The pipeline integrity sensor with Therm-O-Disc has significant technical issues with the use of the RF signal. The Bendix brake sensor can be developed in-house at Bendix and would be a replacement product to some of Bendix's existing product line. Cumulative job creation is extremely modest. Both the projects can potentially be developed by the clients without using the UA ERC platform, which raises the question of how the platform is providing a real need for the clients. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-344
Biobased Composites Innovation Platform
The Ohio State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$2,720,000	$2,380,288
Capital Funds	$280,000	$652,500
Subtotal	$3,000,000	$3,032,788
TOTAL	$6,032,788	

This proposal is directed at biobased additives to conventional polymers to deliver products desired by customers seeking to partially replace synthetic polymers with renewable bio-based composites. Two specific biobased additives were discussed: a wood-based bast fiber and a soybean-based nanofiber. The lead applicant, OSU, has a large and highly leveraged center and platform (Ohio Bioproducts Innovation Center [OBIC]/Biobased Composites Innovation Platform [BBCIP]) which will provide the technical support for this proposal. The client companies are Engineering Mechanics Corp. (bast fiber) and Biobent (soybean-based nanofiber). A significant number of potential customers are listed with various levels of commitment to this proposal.

Detailed Review:

- **Technical Merit and Plan**

The proposal discusses the need for additional R&D on solving the smell, color, and stability issues with the proposed biobased composites. It is not noted how the team expects to resolve these problems other than empirical formulation studies. These sorts of studies are typically done by the partner wishing to commercialize the composite; not the university partner. In this sort of interaction, the academic partner is typically best suited to address the basic science related problems. The color, smell, and stability problems are inherent to natural product modified conventional polymer systems. The bast fiber appears to at the stage of development where commercialization could be tested. Data on a bast fiber modified polypropylene composite is presented. The expected strength and modulus improvements are noted along with a loss in toughness (these composites would be significantly more brittle than polypropylene and even polypropylene fiberglass composites). However, there is a lack of information on the soybean-based nanofiber. No data are presented on the nanofiber (size, modulus, strength, etc.), and no data are presented on composites containing these "nanofibers." Polyethylene film for fertilizer bag applications is noted to be a potential application for the nanofiber at 30 to 40 percent addition level, but no data were provided on this composite. In the absence of data, it is very hard to envision how a large amount of an immiscible, incompatible additive to polyethylene will allow for success in the blown film application. It is quite clear that the film application is in the early stages of research, and the status is too immature for the IPP. Overall, the major deficiency with the technical merit and plan is the lack of information on the proposed solutions and definition of the products they are planning to commercialize. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The proposal's commercialization strategy is stronger. The proposal appears to have defined a reasonable number of potential applications where customer acceptance may be possible in several of the cases. The film application does not appear viable, but several of the bast fibers composites do appear to be at the stage where commercial viability can be tested in areas where smell, color, and stability are not critical. These applications/markets do exist where the customer is willing to utilize a lower-performance material containing a renewable constituent due to governmental regulation and environmental pressure. The Biobent commercial potential is less well defined, at least partly due to the lack of critical details. The

Innovation Platform has achieved proof of principle for the bast fiber projects, but the biobased nanofiber lacks sufficient information for the committee to judge whether the proof of concept has been achieved. The polymeric exfoliants for cosmetics looks (superficially) promising, but, again, insufficient details are provided on its competitive advantage.

It is not clear to the committee whether one of the clients, Emc2, will be able to scale-up to produce the necessary quantities for all of the envisioned products. They do not appear to have secured a pathway for critical financing, and if they are not able to provide the advanced nanofiber composites, then the rest of the clients cannot execute their commercialization. While there are some positive features of the commercialization strategy, there remain considerable questions on the ability to meet RFP goals. A major issue is that the testing of commercial viability does not appear to depend on the ability of the technical part of the program to be successfully completed. Commercial viability of some of the products can be tested now, specifically the applications where smell, color, and stability are not crucial to product acceptance. The proposal does not meet the requirements of the RFP on Commercial Strategy.

- **Performance Goals**

The performance goals are 80.5 jobs created and $35 million in revenue at year three. These are significant numbers. However, the immediate value appears to be based on projects already in progress (instead of what this proposal would incrementally bring in). A detailed listing of impacts from performance on prior OTF awards is listed. This is an impressive list, except that no commercial projects or revenue are noted; only large awards, new facilities, and government grants are cited. The large (and very well funded) Ohio BioProducts Innovation Center leading this proposal is a strong positive feature. It is very well integrated with Ohio-based companies interested in bioproducts. As such, there may be substantial overlap of this proposal with existing projects. The prior performance on OTF #10-009 shows that for-profit jobs were projected to be 92, and actual for-profit jobs created were 2 (not very impressive). It appears that funds have already been granted for some of the product concepts, and the products defined should be commercially tested. The proposal meets the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The skills required for this proposal generally exist within the project team listed. The one area where the expertise is probably lacking is in film processing/production, but the large BioProducts Innovation Center presumably has capabilities in this area. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The proposed requested funds of $3 million are matched with $3.03 million cash cost share. The cash cost share is shared by all the partners involved, with various combinations of operating funds and capital funds for each partner. Funds are included from OSU, mitigating the unrecovered facilities and administration costs based on OSU's rate. Consistent with the RFP's supermajority requirements, approximately 70 percent of state funds will go to the lead applicant, and nearly 70 percent of the cost share is being provided by the clients. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The description of the technology problems to be solved relative to biobased additives to polymeric composites is very weak. The empirical formulation studies on the constituents of the composite to solve

smell, color, and stability issues should be conducted by the business partner, not the university partner. The description of the soybean-based nanofiber is also insufficient for the committee to evaluate the potential of the proposed composites to have commercial viability. While a number of potential customers for the proposed biobased composites are defined, it appears that at least several of these should be commercially evaluated where the problems noted are not critical for the application. The proposal as written does not provide sufficient technical information to be considered as a candidate for funding. It does not show a clear pathway for sustainability for the center beyond this program. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-346
Advanced Integration and Management of Electrical Power and Propulsion Systems
The Ohio State University

Proposal Overview:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$1,640,185	$2,077,978
Capital Funds	$0	$0
Subtotal	$1,640,185	$2,077,978
TOTAL	$3,718,163	

The platform capabilities in the Wright Project Center for High Performance Power Electronics (CHPPE) at OSU will be enhanced and used together with the clients to expedite near-term product development and enable long-term pipelines of future products from two leading manufacturers in Ohio: AMETEK Solid-state Controls, LLC, and GE Aviation. The engineering firm, IAP Research, Inc., will work with CHPPE to produce industrial prototypes for the clients.

These devices include an uninterruptible power supply (UPS) to enable monitoring and control systems for shale gas pipelines and distribution systems and power equipment for aircraft that will rely more on power electronics converters and less on hydraulic control systems. A silicon carbide (SiC)-based AC/AC converter for the integrated starter/generator for aeropropulsion power management is initially proposed for the latter.

Detailed Review:

- **Technical Merit and Plan**

Silicon carbide for wide-band gap electronics appears to have broad promise. However, the applications do not describe (1) the capabilities of the existing platform, the proposed enhancements thereto, and the extent to which these enhancements are required for the work proposed and the specific technical/commercial problems it will be used to solve; or (2) the extent to which these capabilities go beyond those of the clients; or (3) the detailed specifics of the technical approach and how it helps to exploit or enhance the properties of these materials for the chosen applications. Overall, the technical plan lacks many important specifics despite the promise of the underlying technology. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

The plan, which defines how the developments outlined will lead to market entry, consists of giving prototypes to the clients. However, the linkage between technology development, market requirements, and meeting market needs through the development of a product or product features is not described clearly. It is most likely too early in the development process to have a fully developed business plan, thus making the overall project ill-fitted for the goals of the IPP. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

Performance goals are only defined in general terms with little information on the main challenges or how they will be overcome. Start goals that are claimed to be completed already include initial business plans from GE and AMETEK, which are absent. The GE commitment letter expresses clear interest, but not a commitment of matching funds. Given the weak technical merit and plan combined with a weak commercialization strategy, support for the estimate of 74 jobs created and the retention of 25 high technology jobs (by 2018) described in the proposal appears unsubstantiated. Wealth creation and similar

economic growth parameters are similarly also at risk. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications:**

CHPPE appears to be a valuable capability, although it is unclear whether it has much to offer beyond that which is available within the companies themselves. The individuals comprising the R&D team appear to be capable and feature an important and interesting mix of both academic and industrial backgrounds. The PI, Dr. Jin Wang, has shown the ability to meet job growth numbers in a very limited sample size by virtue of his participation in the Center of Excellence for Electric and Plug-In Hybrid Vehicle Technology Program as co-PI. The proposal meets the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

The utilization of funds is not clearly spelled out in the budget narrative, and the cost share from GE is not committed. Furthermore, there is no cost share from IAP at all. AMETEK's cost share, however, is in order. Overall, though, the committee does not have confidence in the budget and cost share aspect of the proposal, which lacks specifics and is critically flawed by GE's lack of commitment. The proposal does not meet the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The descriptions of the obstacles to producing the desired equipment, the technical approach to the work, the specifics of the work to be done, and the key capabilities of the CHPPE that are not available in the client companies are inadequate for judging the likelihood of success or the probability that this grant will accelerate success. The lack of commitment from GE suggests that they do not find CHPPE's capabilities critical to their own success in their ultimate goals. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Program.

OTF IPP 13-350
Energy Storage Device Innovation Center (ESDIC)
The Ohio State University

Proposal Summary:

Proposed Budget		
	State Funds	Cost Share
Operating Funds	$1,250,000	$2,252,735
Capital Funds	$950,000	$0
Subtotal	$2,200,000	$2,252,735
TOTAL	$4,452,735	

The Hybrid Energy Storage Device Innovation Center (HESDIC) is an extension of OSU's energy storage activity and supports the development of a mix of energy storage technologies, including lead-acid batteries, lithium batteries, and super-capacitors, in order to improve performance and reduce cost at the cell, device, and system level. A specific focus of the proposed activity is extended-duty and hybrid powertrains. Clients include CAR Technologies, LLC, Chrysler Group, LLC, Edison Welding Institute, and Vanner, Inc. The focus is to enhance the Innovation Platform to bring together companies, develop a common understanding of the requirements for energy storage systems for transportation, and identify innovations required for materials as well as requirements for tools and training.

Detailed Review:

- **Technical Merit and Plan**

While the proposal presents a well-written plan, it lacks any detailed description of specific items that will be developed with and for clients. The definition of the platform is very general without specific capabilities identified. The technical tasks are not well defined and/or are described in broad generalities, and services to be provided to clients are also vague. Much of the effort appears to be focused on enhancement of the current platform rather than client-focused efforts directed at acceleration of product commercialization. The deliverables chart, however, is well defined and descriptive, but there is no firm link to the tasks that will be carried out or how clients will benefit in the end. The proposal does not meet the requirements of the RFP on Technical Merit and Plan.

- **Commercialization Strategy**

Without question, there is significant market potential for advanced energy storage. Unfortunately, industrial/commercial applications are spelled out only in a very broad fashion in the proposal. The proposal focuses on start/stop of micro-hybrids, advanced lead-acid hybrid energy storage devices, mini hybrids, integration of super-capacitors, and a host of other items. The proposal, however, does not clearly identify specific pathways to market for at least two of the for-profit clients' products or how the platform will be instrumental in accelerating this process. The proposal does not meet the requirements of the RFP on Commercialization Strategy.

- **Performance Goals**

The job creation numbers identified in the proposal are significant; however, it is difficult to substantiate these numbers given the weak technical merit and plan and equally weak commercialization strategy. If successful, the activity proposed herein can both leverage and enhance the existing Ohio supply chain. Metrics for prior activities are being met, although the projects that are considered in the award history are largely not mature. The proposal does not meet the requirements of the RFP on Performance Goals.

- **Experience and Qualifications**

The OSU team has significant experience and capability in this sector and has demonstrated the ability to perform in prior program activity. The role of CAR Technologies, identified as a client in the proposal, is questionable relative to the overall potential for commercializing a near-term product, as well as their fit as a client as defined by the RFP. Participation by Chrysler is deemed as being very important, providing that Ohio benefits from commercialization of products based on the capability of this platform. It is unclear, however, how significantly the platform will help accelerate Chrysler's economic growth in Ohio. The roles of EWI (a not-for-profit) and Vanner appear to be minor. The proposal does not meet the requirements of the RFP on Experience and Qualifications.

- **Budget and Cost Share**

Although the budget proposed seems appropriate given the work plan, some of the purchased services seem to be unexplained and/or undefined. Many of the dollars proposed appear to be allocated toward further build-out of the existing capability rather than accelerating product development and deployment, as intended by the RFP. The financial contribution of Chrysler is viewed as significant, but has no clear tie to economic growth in Ohio. EWI and Vanner draw approximately the same amount of funding from the program that they contribute in terms of cost share; this does not strengthen the proposal, particularly given their small contribution to the overall commercialization potential identified in the proposal. The proposal meets the requirements of the RFP on Budget and Cost Share.

Summary of Review and Recommendation:

The proposal seeks funds to leverage a hybrid energy storage innovation center at OSU to support the development of a mix of energy storage technologies. While the energy storage market is viewed as significant, it is not clear how the proposed activity would specifically accelerate the development of commercial activities to provide economic benefit to the State of Ohio. Instead, it appears that much of the funding is focused on infrastructure/capacity build-up with no clear pathway toward commercialization. The proposal uses only vague descriptions to explain how it would accomplish its goals, which makes it nearly impossible for the committee to judge the worthiness of this platform for funding. The proposal would be strengthened by a stronger description of how the funds would accelerate economic growth in Ohio with the clients. The committee does not recommend that this proposal be considered for funds under the Ohio Third Frontier Innovation Platform Programs.

Appendix C
Evaluation Worksheet

A. Technical Merit and Plan	**GRADE:**
1. **Evaluate the degree to which technical challenges can be met**	
2. *Platform Description. Does the proposal align with the definition of a platform (see page 5 of RFP)? A platform technology should have multiple applications in different fields, are these applications described in sufficient detail?*	
3. *Problem Statement:* Does the Lead Applicant understand the eventual customer and market needs as well as performance requirements?	
4. *Project Goals and Objectives:* Does the project have realistic goals and objectives? i. The goals should cover the Innovation Platform's near-term commercialization and innovation purposes that are driven by the Ohio for-profit company clients ii. The objectives should be related to the commercialization, innovation, and new product development activities that will be performed for each opportunity and how they are expected to provide the evidence and proof needed to carry the technology forward into market entry	
5. *Technical Approach:* a. How will goals and objectives be met? i. Proposal should include a comparison of research and development techniques, methods, facilities, and equipment with alternatives. ii. **The description of the specific tasks should be detailed enough so that the technical approach can be clearly evaluated as to whether there is a credible plan for moving the technology from the current stage of development to the next** iii. How will progress be made and measured, how will risks or challenges be overcome, and how will the project generate the proof necessary to attract additional financial resources required to advance the technology toward successful commercialization? b. What are the project's deliverables and schedule? i. Do the deliverables include tangible evidence of commercialization, innovation and technical progress? ii. The schedule should graphically display the duration of tasks, interactions between the tasks, and the timing of deliverables and other key milestones in terms of weeks or months. Is the schedule realistic?	
6. *Sustainability: D*oes the proposal include a plan beyond the 3 year time period for sustainable programs that will continue to utilize the Innovation Platform and its resources?	
B. Commercialization Strategy	**GRADE:**
1. *Commercial Applications*: Assess the platform's multiple commercial applications. Are they realistic?	
2. *Value Proposition*. What are the specific value propositions of the different commercial applications? Is sufficient evidence provided to support the contention that the market values these benefits?	
3. *Potential for Products and Future Pipeline:* Are the near-term (within 3 to 5 years) industry and economic impacts significant and realistic? **The Innovation Platform must have already achieved at least Proof of Principle**. What are the competitive advantages of the IPP's technologies or products over existing and alternative technologies? Assess the viability of post-Project period commercialization opportunities.	
4. *Management of Intellectual Property (IP)*. **Control and management of Intellectual Property (IP) are key success factors**. How will new Intellectual Property be managed to benefit Ohio-based companies? See page 13 of RFP.	

5. *Ability to Achieve Market Entry:* Does the team understand the total resource requirements for achieving market entry and full commercialization, the type of knowledge that must be produced at the identified positioning stage, and who will likely be the funding providers for the market entry stage?

6. The Proposal describes several other elements of its commercialization strategy, are the descriptions credible? Assess the overall strength of these: (see p. 14 of RFP)

Financial Resources	*Size of the Opportunity*	*Degree of Customer Readiness*
Receptive Capital Markets	*Ability to Leverage Ohio's Supply Chain*	*Potential for Leverage*
Ability to Compete Globally	*Degree of Sustainable Competitive Advantage*	*Investment and Time to Market*

C. Performance Goals **GRADE:**

1. Assess the platform's stated impact on Ohio in:
   a. job creation (for-profit, not-for-profit, retained);
   b. personal wealth (average salary of jobs created);
   c. new sales of products;
   d. follow-on investments and new industry funding for research and technical services that fit the Platform's mission
2. Appropriate to the technology being pursued, additional impact in Ohio should be assessed in the areas of: companies created or attracted to Ohio; talent recruitment; enhanced national and/or international recognition which leads to further interest and potential sources of funding and collaboration
3. **The Proposal must contain a realistic forecast of the economic impacts of the Innovation Platform**, including: direct employment, payroll, product revenue, and other leverage that will be achieved in three and five years. **Only direct impacts should be reported**. Note: The RFP clearly indicates that if the platform is an extension of, or related to, a prior Ohio Third Frontier Grant(s), then all economic impacts must be in addition to and separate from the impacts from every related project.
4. *Performance on Prior OTF Awards*: When appropriate, applicants must provide information related to their past performance. Based on these, identify any potential problems for the current project. Upon request, Ohio will provide the committee with data on past performance information including Semi-Annual Metrics Reports, Quarterly Reports, and the Final Report for every related prior grant.

D. Experience and Qualifications **GRADE:**

1. Do the Lead Applicant and Clients have the direct experience needed to perform both the technical and commercial work being proposed?
2. Commercialization, scientific, collaborative, regulatory, and programmatic leadership experience must be demonstrated in the proposal. Leadership should be evident for IP protection, regulatory compliance, product development, leveraging of additional funding/investment capital, and commercialization.
3. Who are the key personnel (technical director and commercialization director)? Do they have the required skills and experience to serve in their capacities?
4. *Management Plan:*
   a. Proposal must discuss plans for internal means of communication, coordination of data and information management, evaluation and assessment of progress, allocation of funds and personnel, and other specific issues relevant to the proposed activities.
   b. Sub-awards: Assess the Lead Applicant's oversight plan for any sub-awards, particularly how the Lead will ensure both financial accountability as well as adherence to the Innovation Platform's scope of work.

E. Budget and Cost Share **GRADE:**

1. **Is the budget justified in a detailed narrative with the appropriate forms? Is it adequate to meet proposal goals? Is the cost share necessary and reasonable?**
2. *Cost Share: (at least 1:1 ratio with state funds)*
   a. Refer to page 19 of the RFP for more details
   b. **What form does the cost share take? Ohio gives preference to discretionary, unrestricted and unallocated cash cost share**

c. **Cost Share must be in the form of cash** and must be for allowable costs that are verifiable
d. Other OTF or other State funding may not be used as Cost Share for this Proposal
e. **Proposed Cost Share must be firmly committed, with no contingencies or conditions, from known sources and available to the Innovation Platform at the time of Proposal submittal**

3. *Assess the detailed Budget Narrative:* The narrative should cover an explanation of the costs for both the Ohio Third Frontier Funds requested and Cost Share committed. The value, purpose and sources of the Cost Share should be defined.

4. *Commitment letters must be provided from each Cost Share provider*. The letters must address the nature and duration of the services to be received by the Client, how the platform will contribute to the strategy of the Client, and the specific amount and source of the Cost Share.

Appendix D
Innovation Platform Program Definitions, Goals, and Critical Criteria

As outlined in the Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP),[1] the Ohio Development Services Agency anticipates awarding up to $24 million in grants through the FY2013 Innovation Platform Program (IPP). Development anticipates awarding eight (8) to ten (10) grants through IPP, with each grant in the range of $1 million to $3 million (p. 8, revised).

Innovation Platform is defined as an already existing capacity that incorporates unique technology capabilities and strengths, talent, equipment, facilities, engaged industry partners, a track record of research commercialization and innovation, intellectual property, and other resources in a particular technology area that collectively can serve as a vehicle for significant, industry-defined and directed opportunities through the development and commercialization of new products and innovations (p. 5).

The purpose of the IPP is to link the development and innovation capabilities and capacities of an already established Innovation Platform and all its resources at an Ohio college or university or not-for-profit research institution to specific late stage development and innovation needs of Ohio companies. This linkage must in turn lead to job creation and business opportunities within Ohio through development and commercialization of new technologies, innovations and products that will have beneficial long-term economic impacts for Ohio (p. 5).

A **major goal** of the OTF is to catalyze collaborations in technology commercialization, innovation, and product development between the State's colleges and universities and Ohio industry. The IPP supports this goal by offering Grants to provide funding for operations, capital equipment and facility costs of existing Innovation Platforms that will benefit commercial purposes in the short-term and contribute to the sustainability and industrial relevance and use of the Innovation Platform in the long-term (p. 5).

The specific goal of the IPP is to support commercial partnerships involving an Innovation Platform at a single Ohio college, university or other not-for-profit research institutions, and Ohio for-profit companies. Partnerships are to be formed to further the near-term (within three (3) to five (5) years of the start of the Project Period) commercialization of product innovation, next generation products, and new products (p. 5, revised).

The **objectives of IPP** are:

- To support existing Innovation Platforms at Ohio colleges, universities, or not-for-profit research institutions that will serve specifically defined near-term commercialization objectives of two or more non-related Ohio for-profit companies;
- To support Innovation Platforms that will develop and launch new products, innovations, or services into the commercial market within three (3) to five (5) years of the Project start date;
- To kick-start the long-term, sustained use of the Innovation Platform by multiple Ohio industry partners.
- To support Innovation Platforms that will create wealth and employment opportunities within Ohio (pp. 5-6).

Each Proposal must address at least one or a combination of the following technology areas:

- Advanced Materials related to advanced polymers, ceramics, composites, carbon fibers and nanotubes, and specialty metals and alloys.

[1] Ohio Third Frontier Innovation Platform Program Fiscal Year 2013 Request for Proposals (RFP), available at http://development.ohio.gov/files/otf/FY2013%20OTF%20IPP%20RFP%20-%20Final.pdf, p. 5.

- Aeropropulsion Power Management.
- Fuel Cells and Energy Storage.
- Medical Technology related to imaging, surgical instruments/equipment, implant devices, and regenerative medicine.
- Software Applications for Business and Healthcare.
- Sensing and Automation Technologies.
- Situational Awareness and Surveillance Systems.
- Solar Photovoltaics.
- Agribusiness and Food Processing (p. 6, revised).

A Lead Applicant is the entity that submits a Proposal and will be legally and financially responsible for the administration of any resulting award of OTF Funds. The Lead Applicant will be responsible for the administration of the Proposal should it be awarded. The Lead Applicant must also serve as administrative director of the Innovation Platform. The technical direction of the Innovation Platform is to be determined and controlled by the client Ohio for-profit companies (p. 7).

A Client is an Ohio for-profit company that is not an affiliate of the Lead Applicant and is committed to contributing cast Cost Share. Proposals must include client service relationships with at least two unrelated Ohio for-profit companies. All Clients must be represented by a lead individual and submit an itemized budget on Budget Form 2. A Client must be designated on Budget Form 2 to contribute cash Cost Share by way of a Subcontract/Subgrant to fulfill itemized budget components. The Clients must have the capability for commercializing any resulting product innovation, next generation products, and new products and be committed to the long-term commercialization of the technology. A contribution of cash Cost Share resources by a Client is strong evidence of that commitment. Proposals must have a minimum of fifty (50) percent of the Cost Share contributed by Ohio for-profit companies. Strong Proposals will have a supermajority of Cost Share contributed by the client Ohio for-profit companies as evidence of their commitment to the value of the technology platform. Teams with strong commercialization structures are required. Any commercialization that results must benefit Ohio through investment, sales, job creation, and/or business capitalization. All Clients must submit a Letter of Commitment (pp. 7-8, revised).

A committed end-user is a business or governmental entity that has a commercial interest in, and commits to commercial application of, the results of the Innovation Platform. A committed end-user may submit a letter. Committed end-users do not require designation on Budget Form 2 (p. 8).

Term of the Project is the plan of activity or activities that make up the total scope of work for which an award of Ohio Third Frontier Funds is requested and for which a Proposal is approved. The Project Period during which the active work funded by the Grant will take place shall be no more than three (3) years. For an additional two (2) years, annual reports detailing the overall status of commercialization and innovation activities and the economic impacts of the Innovation Platform will be required (p. 9, revised).

Evaluation Criteria: Only the most meritorious proposals are sought for funding. Proposals will be evaluated based on responsiveness to all the requirements of the RFP and on the Lead Applicant's response to any additional information that may be requested. Implicit in those requirements and evaluation criteria is the quality of the Proposal and budget (p. 22).

Specific **criteria designated in the RFP with the highest relevance to and weighting** for the IPP:

- Alignment of the Proposal with the IPP purpose, goals, objectives, eligibility, funding, and Cost Share requirements as described in Section 2 of this RFP.

- Quality of the responses to the requirements of this RFP as outlined in the Statement of Work, including the Platform Information, the Commercialization Strategy, Performance Goals, Experience and Qualifications, and Budget. The following specific elements of the Proposal will be examined:
    - Fit with the definition of a platform as defined in Section 2.1
    - Commitment of Ohio for-profit company Clients as evidenced by their contribution of cast Cost Share
    - Evidence of a sustainable pipeline of commercialization opportunities
    - Degree to which technical challenges can be met
    - Degree to which applicant has a protected position with respect to their proposed technology
    - Quality and likely achievability of the commercial path to market
    - Financial stability of the Ohio for-profit company Clients who will take the technologies to the market
    - Degree to which this Innovation Platform with help build the State's supply chain and overall technology cluster
    - Impact of the Innovation Platform in terms of additional revenue and employment in three and five years
    - Realism and achievability of the proposed business model
    - Sustainability and continued relevance and likely use of the Innovation Platform by Ohio industry
- Compliance with this RFP's administrative requirements.
- If applicable, the current economic impact of previous related OTF Grant(s) (pp. 22-23, revised).

Cost Share:

It is expected that a supermajority of Ohio Third Frontier Funds remain with the Lead Applicant to support the Innovation Platform's work on collaborative projects for the Ohio for-profit companies (p. 7).

Cost Share Requirements—Magnitude: The monetary value of the cash Cost Share commitment must be one dollar for every dollar of OTF Funds requested (i.e., a ratio of 1:1). All Cost Share must be identified in the Proposal by amount, proposed use and source. Cost Share must be documented on the budget forms and in a commitment letter from each organization contributing Cost Share…The Cost Share must represent a specific new commitment, including the dollar amount, to the Innovation Platform described in the Proposal. Preference will be given to Proposals that pledge discretionary, unrestricted, and unallocated cash (pp. 18-19).

Cost Share Requirements—Sources and Uses: Cost Share must be in the form of cash and must be for allowable costs that are verifiable and auditable. Cost Share must be used directly in support of the Innovation Platform rather than for coincidental or related/similar allocations. Cost Share must be necessary and reasonable to support the Innovation Platform objectives.

If an organization has a published Indirect Cost rate, un-recovered Indirect Costs (the difference between 20 percent and the published rate) may be used as Cost Share. Only Indirect Costs not fully recovered from the requested Ohio Third Frontier Funds are eligible to be used as Cost Share. Please note, a published Indirect Cost rate must be published as part of the general policies of the organization and applied uniformly to all grants or contracts. A federally negotiated and approved Indirect Cost rate is one form of a published Indirect Cost rate. In those cases where the Lead Applicant does not have a published Indirect Cost rate agreement, the Lead Applicant is limited to using 20 percent of its Cost Shared direct costs as Cost Shared Indirect Costs and no other un-recovered Indirect Costs from the operating budget may be claimed.

The expense of the Cost Share must take place during the Project Period. Cost Share must be charged to resources of the Lead Applicant or Client and documented within the financial books of the Lead Applicant or Client, as the context requires. Other OTF or other State funding may not be used as Cost Share for this Proposal, and funds awarded under this RFP may not be used as Cost Share against other OTF Projects (p. 19).

Cost Share Requirements–Constraints: Resources that have already been designated as Cost Share for some other award cannot be used as Cost Share for an IPP award. The Cost Share must be applied to the Innovation platform during the Project. Expenses incurred outside of the Grant Period do not count toward the Cost Share Requirement. The Lead Applicant is solely responsible to have adequate funds to cover all expenses of the Innovation Platform not covered by the OTF Funds awarded. **Please note, the Cash Cost Share proposed by the Lead Applicant and all Clients must be firmly committed, with no contingencies or conditions, from known sources and available to the Innovation Platform at the time of Proposal submittal** (pp. 19-20).

Appendix E
Biographical Sketches

COMMITTEE MEMBERS

T.S. SUDARSHAN, *Chair,* is president and CEO of Materials Modification, Inc. He is responsible for the management and technical development of innovative materials, processes, and techniques and the development of new technologies related to surface engineering and nanotechnology. He has worked on both government and industrially sponsored programs centered on high-risk high-payoff advanced technology and in non-traditional areas. Dr. Sudarshan has been the recipient of numerous awards and honors, including the Design News Award and R&D 100 for the microwave plasma technique Nanogen and for the Plasma Pressure Compaction technique. He has served on numerous committees of the National Science Foundation (NSF), the National Institutes of Health (NIH), the U.S. Army, the Michigan Economic Development Council, and ASM International–The Materials Information Society. He has also served on the technical advisory boards of numerous companies over the last two decades and on the advisory board of the NSF center at Alabama State University. Dr. Sudarshan is the editor of the journals *Materials and Manufacturing Processes* and *Surface Engineering*. He has more than 170 publications and 22 issued patents with several more under evaluation at the patent office. He is a fellow of ASM International and the International Federation for Heat Treatment and Surface Engineering and the Institute for Metals, Mining and Materials–UK. Dr. Sudarshan received his B.Tech. in metallurgy from the Indian Institute of Technology in Madras, India, and his M.S. and Ph.D. in materials engineering science from the Virginia Polytechnic Institute and State University. He has previously been involved with several National Research Council (NRC) activities, including six committees that reviewed proposals for the State of Ohio (2008-2010 as a member, and 2011-2013 as chair); the Committee on Small Business Innovative Research to Support Aging Aircraft; the Committee on Review of the National Nanotechnology Initiative; the Committee on Lightweight Materials for Automotive Applications, Committee to Review the Industrial Technologies Program of the Department of Energy, the Committee to Review the Research Program of the Army Research Laboratory, and two terms on the National Materials Advisory Board.

VIOLA L. ACOFF is head and professor of the Department of Metallurgical and Materials Engineering at the University of Alabama. Her research interests are focused on joining of intermetallics, particularly the areas of cold roll bonding and reaction annealing, and the effects of texture on welded and roll bonded structures. She has received the NSF CAREER Award and has been awarded Best Paper honors by both the American Welding Society (Warren F. Savage Memorial Award) and the Minerals, Metals, and Materials Society Symposium on Gamma Titanium Aluminide. Additionally, Dr. Acoff served as chair of the Birmingham chapter of ASM International and chair of the ASM International Joining Critical Sector. She received her B.S., M.S., and Ph.D. in materials engineering from the University of Alabama, Birmingham. She previously served on several NRC committees, including the Committee on NIST Technical Programs Panel on Manufacturing Engineering and the 2006 and 2011 committees that reviewed proposals for the State of Ohio.

CATHERINE G. AMBROSE is an associate professor of orthopaedic surgery at the University of Texas Health Science Center at Houston. She is also the director of the Biomechanics Laboratory at the University of Texas Medical School at Houston. Dr. Ambrose also serves as adjunct associate professor at Rice University and the University of Texas, Austin, and is a member of the scientific staff at Shriners Hospitals for Children in Houston. Her research interests are in material property assessment for orthopaedic materials, including bone, cartilage, ligaments, and tendons; biodegradable materials for orthopaedic applications; diagnosis and treatment of metabolic bone diseases, including osteoporosis and

osteogenesis imperfecta; and in vitro and in vivo models for orthopaedic applications. She received her B.S. in mechanical engineering from Washington University in St. Louis and her M.S. in biomedical engineering and Ph.D. in mechanical engineering from the University of Texas, Austin. Dr. Ambrose previously served on the 2011 committee that reviewed proposals for the State of Ohio.

DAVID E. ASPNES (NAS) is a Distinguished University Professor in the Department of Physics at North Carolina State University; and he is presently at KyungHee University, Seoul, as a recipient of a World Class University appointment by the Republic of Korea. Following a year as a postdoctoral research associate at the University of Illinois, Urbana-Champaign, and another at Brown University, he joined Bell Laboratories, in Murray Hill, New Jersey, as a member of the technical staff. Dr. Aspnes then became head of the Interface Physics Department in the newly created Bellcore, the part of Bell Laboratories associated with the operating companies in the AT&T divestiture. He joined North Carolina State University as a professor of physics, and he was named Distinguished University Professor of Physics in 1999. Dr. Aspnes is best known for his experimental and theoretical contributions to the development and application of optical techniques for the analysis of materials, thin films, interfaces, and structures. These include theory and practice of spectroscopic ellipsometry, modulation spectroscopy, reflectance-difference spectroscopy, and materials and interface analysis using nonlinear optics. He received his Ph.D. in physics from the University of Illinois, Urbana-Champaign. He has previously served on a number of NRC committees, most recently the 2011 NRC committee that reviewed proposals for the State of Ohio, the Committee on NIST Technical Programs Panel on Manufacturing Engineering (2010), and the Committee on NIST Technical Programs Panel on Chemical Science and Technology (2009).

CAROL CHERKIS is a life sciences industry consultant at NewCap Partners. With more than 30 years of experience in the life sciences industry, she provides small and medium-sized, fast-growing companies in that industry with advice and hands-on support to facilitate their development and successful implementation of global research and development (R&D) and business strategies. She also works closely with government agencies to support their programs for increasing both the number of life sciences companies in their locations as well as the amount of cooperative research being done globally. Dr. Cherkis' areas of business expertise include competitive intelligence and strategic planning, alliance formation (R&D, licensing/co-development, marketing, distribution, etc.), project management, product development, and new product launches. Dr. Cherkis started her career with the Dow Chemical Company. After many years as a scientist and research manager, she moved into business functions. In her last position at Dow, she was the biotechnology program director in the Corporate Ventures Group and had global responsibility for identifying small and medium-sized companies as sources of new technology as well as corporate partners to expedite market penetration of existing and future products. Later, she served as the director of healthcare at Frost & Sullivan, then one of the largest market research firms in Silicon Valley. In addition to her role at NewCap Partners, Dr. Cherkis is the founder president of the consulting firm BioInfoStrategies. In that role, her advisory services focus on assisting small and medium-sized, fast-growing companies—in the areas of biotechnology/pharmaceuticals, medical devices, diagnostics, biochemical reagents, biodetection/instrumentation, and bio-derived fuels and chemicals/biomaterials—with assessing the commercial feasibility of their technologies, developing and implementing business strategies, and establishing licensing, co-development, marketing, and distribution alliances. Dr. Cherkis has a Ph.D. in biological chemistry from the University of Michigan Medical School and an A.B. in biology from Bryn Mawr College. She previously served on the 2011 NRC committee that reviewed proposals for the State of Ohio.

DAVID E. CROW (NAE) is a consultant and retired senior vice president of engineering at Pratt and Whitney Aircraft Engine Company and professor emeritus of mechanical engineering at the University of Connecticut. At Pratt and Whitney, he was influential in the design, development, test, and manufacturing in support of a full line of engines for aerospace and industrial applications. Dr. Crow was involved with

products that include high-thrust turbofans for large commercial and military aircraft, turboprops and small turbofans for regional and corporate aircraft and helicopters, booster engines and upper-stage propulsion systems for advanced launch vehicles, turbopumps for the space shuttle, and industrial engines for land-based power generation. His involvement included sophisticated computer modeling and standard work to bring constant improvements in the performance and reliability of the company's products, while at the same time reducing noise and emissions. Dr. Crow received his Ph.D. in mechanical engineering from the University of Missouri, Rolla, his M.S. in mechanical engineering from Rensselaer Polytechnic Institute, and his B.S. in mechanical engineering from University of Missouri, Rolla. Dr. Crow is currently serving on the NRC the Army Research Laboratory Technical Assessment Board and as chair of the Panel on Air and Ground Vehicle Technology–2011. He has previously served on numerous committees, including the 2003 committee that reviewed proposals for the State of Ohio, the Committee on NASA Technology Roadmap: Propulsion and Power Panel, the Committee on Examination of the U.S. Air Force's Aircraft Sustainment Needs in the Future and its Strategy to Meet Those Needs, the Board on Manufacturing and Engineering Design, and the Committee for the Evaluation of NASA's Fundamental Aeronautics Research Program.

J. ERIC DIETZ is the director of the Purdue Homeland Security Institute and professor in the Computer and Information Technology Department at Purdue University. Dr. Dietz's research focuses on homeland security, intelligence and decision-making IT, risk management with critical infrastructure, and situational awareness. Prior to joining Purdue's faculty, he served in the U.S. Army, retiring in 2004 as a Lieutenant Colonel. He has led Army research and acquisition programs, including chemical weapons detectors, command and control software, communications prototypes, and army power systems and was in the initial cadre of Uniformed Army Scientists and Engineers. Dr. Dietz was also the founding executive director for the Indiana Department of Homeland Security (IDHS) while on sabbatical from Purdue from 2005 to 2008. During his tenure at IDHS, he led Indiana's response to seven Presidential Major Disasters and Emergency Declarations, which included restoration and recovery of critical infrastructure. Dr. Dietz received his B.S. and M.S. in chemical engineering from the Rose-Hulman Institute of Technology and his Ph.D. in chemical engineering from Purdue University. Dr. Dietz previously served on the committee that reviewed proposals for the State of Ohio in 2009.

BRUCE D. GITTER is an adjunct professor of radiology and imaging sciences at the Indiana University School of Medicine. In addition, Dr. Gitter serves as a scientific consultant for the pharmaceutical industry, focusing on neurodegenerative and psychiatric diseases drug discovery, neuroimaging, nuclear medicine technologies, and neuropharmacology. In his previous position as senior principal scientist/manager at Covance, Dr. Gitter led the Nuclear Medicine Department with responsibilities for in vivo and ex vivo nuclear medicine imaging, focusing principally on pre-clinical neuroscience, cardiovascular, diabetes, and cancer models. His team used small-animal PET imaging, autoradiography, membrane receptor pharmacology, and immunohistochemistry to examine neurodegenerative changes in rodent disease models and pharmacodynamic effects of drugs in the central nervous system. His team was also responsible for discovering and validating novel tracer biomarkers for multiple therapeutic applications. Prior to joining Covance in 2008, Dr. Gitter worked on drug discovery and development at Eli Lilly & Company for 25 years. During his career, he has issued 10 U.S. patents, authored or co-authored 41 peer-reviewed scientific publications, and served as a peer-reviewer for multiple neuroscience and pharmacology journals. Dr. Gitter received his B.S. in biochemistry and chemistry, M.S. in microbiology, and Ph.D. in immunoparasitology from the University of Georgia. He previously served on the NRC committee that reviewed proposals submitted to the State of Ohio in 2012.

JAHAN K. JEWAYNI is an independent consultant who has worked as a financial advisor with a national financial advisory firm. His practice focuses on advising middle-market companies in the $10 million to $150 million revenue range. Mr. Jewayni has 20 years of experience in finance and operations of companies ranging from start-ups to Fortune-500 companies. His work covers areas such as renewable

energy, satellite communications, consumer electronics, commercial real estate, consumer products, and non-profits. Specifically in the renewables area, he reviews dozens of executive summaries and business plans per year for companies seeking seed capital, growth capital, and advisory services. Some of the recent opportunities involved a concentrated solar power company, a small-scale utility solar installation company, and a fund that would build energy-efficient low-income housing communities in developing countries. Prior to his work in the financial services industry, Mr. Jewayni spent more than a decade as a small business owner and financial consultant to small and medium enterprises. He is actively involved with a number of non-profits and is a board member of Devotion to Children, an organization focused on helping children from economically disadvantaged families. Mr. Jewayni earned a B.S. in accounting from the Robert H. Smith School of Business at University of Maryland and became a certified public accountant in 1995. He previously served on the 2011 NRC committee that reviewed proposals for the State of Ohio.

HYWEL B. JONES is an independent consultant whose former research focused on the mapping of disease genes and estimation of risk using biomarkers. He continued his research at Stanford University before moving into industry 15 years ago. He was the senior director of business development at ParAllele (acquired by Affymetrix for $125 million with $20 million invested) and was a co-founder and vice president of business development at True Materials (acquired for $25 million with $0.5 million invested). He has consulted widely including pharmaceuticals (e.g., Roche, Merck) and biotech (e.g., NextBio, Pathway Genomics) in areas including personalized medicine, biomarker development, Healthcare IT, POC devices, and molecular tools and services. He has also advised a number of investment firms (e.g., Aisling Capital, Thomas McNerney). Dr. Jones co-founded and sits on the board of AKESOgen, a CLIA-approved clinical laboratory focused on molecular testing. He is trained in mathematics and biostatistics, receiving his Ph.D. from the University of Cambridge, U.K.

MOHAMMAD A. KARIM is vice president for research of Old Dominion University. He is editor of *Optics and Laser Technology* an associate editor of *IEEE Transactions on Education*, and a member of the editorial boards of *Microwave and Optical Technology Letters* and *World Journal of Modeling and Simulation*. Dr. Karim chairs the program committees of the International Conference on Computers and Information Technology and the International Conference on Industrial Electronics, Technology and Automation. Dr. Karim is an elected fellow of the Optical Society of America, the Society of Photo-Instrumentation Engineers (SPIE), the Institute of Electrical and Electronics Engineers, the Institute of Physics, the Institution of Engineering and Technology, and the Bangladesh Academy of Sciences. He is author of 19 books, more than 375 research papers, and 8 book chapters and has served as guest editor of 33 journal special issues. The list of his research sponsors include the Office of Naval Research (ONR), NSF, the U.S. Air Force, the Naval Research Laboratory, the U.S. Army, NASA, the Department of Education, the Ohio Aerospace Institute, the Department of Defense, and the Avionics Laboratory of Wright-Patterson Air Force Base. Until 2004, Dr. Karim served as dean of engineering at the City College of New York of the City University of New York. He received his B.S. in physics from the University of Dacca, Bangladesh, and his M.S. in physics, M.S. in electrical engineering, and Ph.D. in electrical engineering from the University of Alabama. Dr. Karim previously served on the 2011and 2012 NRC committees that reviewed proposals for the State of Ohio.

CHESTER D. KOLODZIEJ is the executive director of Freedom Field Renewable Energy, Inc. His 30 years of experience in manufacturing, technology, and distribution spans a broad range of renewable energy, nanomaterials, radiofrequency identification, and carbon fiber technologies. Mr. Kolodziej has worked with multiple start-ups and has consulted for companies such as Becker Wind Energy, Advanced Composite Industries, NoChemCleaning, LLC, Atometrics Micro-Machining, and Materials Modification, Inc. His recent peer-review experience includes committees for the 21st Century Jobs Fund for the State of Michigan, NSF, the Development Capital Network (Phase II), and the Fast Pitch Business Plans for the State of Illinois. He received his B.B.A. from the University of Wisconsin, Whitewater, and

his MBA from Northern Illinois University. Mr. Kolodziej previously served on the 2010 and 2011 NRC committees that reviewed proposals for the State of Ohio.

LAURA T. MAZZOLA is currently the senior vice president for global initiatives at Wave 80 Biosciences. She has 20 years of experience in the biotechnology industry, from R&D to the commercialization of platform technologies. Recently, she was CEO of Excellin Life Sciences, a company enabling cell-specific genetic engineering, guiding the enterprise from university spin-out through corporate collaborations and Series A funding. She also founded NanoBioConvergence, a non-profit seminar series for nanotechnology, and has been an invited lecturer at the Walter A. Haas School of Business of the University of California, Berkeley. Dr. Mazzola was an early employee at Affymax and Affymetrix, developing the high-density array technology that became the revolutionary GeneChip™ product line. She then helped reorient business development at Symyx Technologies through pharmaceutical industry collaborations and licensed their first commercial product, earning the Frost and Sullivan 2002 Market Engineering Technology Innovation Award. She has been a technology analyst for Nature Biotechnology, the California State Senate, NIH, and the National Academy of Sciences. She received a B.A. from Kalamazoo College and an M.S. and Ph.D. in physical chemistry from Stanford University. Dr. Mazzola has previously served on several NRC committees that reviewed proposals for the State of Ohio (2003, 2006, 2008, 2009–chair, 2010, and 2011).

TRENT M. MOLTER is an associate research professor and business development officer for the Center for Clean Energy Engineering (C2E2) of the University of Connecticut, whose mission is to be a world leader in fuel cell research, education, and product development so that Connecticut will be the primary global venue for the sustainable energy industry. The Connecticut Global Fuel Cell Center recently received an award from the Department of Energy to research the effects of impurities on fuel cell performance and durability. Dr. Molter led this team with the focus on improving the reliable performance of proton exchange membrane fuel cells. Dr. Molter also serves as president and CEO of Sustainable Innovations, LLC, a Connecticut-based company engaged in the development of products that support human sustainability. He has also been responsible for the development and marketing of new technology for fuel cell and hydrogen applications since 2003. Prior to his current employment, Dr. Molter was senior vice president for Proton Energy Systems for 7 years, a chemical company, and prior to that he was an advanced technology engineer for United Technologies Hamilton Sundstrand. He received his Ph.D. from the University of Connecticut in materials science and engineering. Dr. Molter has previously served on several NRC committees that reviewed proposals for the State of Ohio (2008, 2009, 2010, and 2011).

C. BRADLEY MOORE (NAS) is a professor of chemistry emeritus at the University of California, Berkeley. Dr. Moore's research in physical chemistry focuses on molecular energy transfer, chemical reaction dynamics, photochemistry, and spectroscopy. His research group uses lasers to produce and detect molecules in specific energy states. In this way benchmarks are established for the mechanisms of molecular processes and predictive understandings developed. He is particularly interested in the energy states of molecules and free radicals at energies above the dissociation threshold. Applications of this work are found in combustion and atmospheric chemistry, in chemical and molecular lasers, and in isotope separation. He has served in many positions responsible for research administration, including vice president for research at Ohio State University (OSU; 2000-2003) and at Northwestern University. While vice president at OSU, Dr. Moore also worked on supporting economic development through research initiatives with the university president at the time, as well as with the Ohio Board of Regents for Higher Education and local and state officials. Prior to working at OSU, Dr. Moore was the director of the Chemical Sciences Division at Lawrence Berkeley National Laboratory. In addition to his current faculty position at Berkeley, he consults independently and in association with the Washington Advisory Group. He currently serves on the NRC Committee on Assuring a Future U.S.-Based Nuclear Chemistry Expertise and previously served on numerous NAS nomination committees, as well as the Committee on

Building Cyberinfrastructure for Combustion Research, and the Panel on Chemical Science and Technology.

ARTHUR L. PATTERSON is the managing member at GTI, a consulting firm that contracts with clients in a variety of industries, including producers of biopharmaceuticals and orthopedic implants, and several not-for-profit entities where GTI acts as an association management company. Currently, Mr. Patterson has primary responsibility for successful execution of GTI's professional services agreements, which typically include evolution of strategic alliances and access to required capital and, on behalf of not-for-profit organizations, a full range of day-to-day and financial management and reporting services. Before GTI, Mr. Patterson was the president and CEO at CMC, LLC, a contract manufacturer of medical devices and biopharmaceutical drug products where he had primary responsibility for implementation of CMC's business plan. Before CMC, he was the founder and president of Biologics, LLC, a manufacturer of modular cGMP compliant clean rooms and other laboratory facilities, and the CEO of Elona Biotechnologies, Inc., a microbial-based contract research organization and cGMP-compliant manufacturer of biologic drug substances. Mr. Patterson has facilitated a host of start-ups and growth-stage companies and raised a total of more than $50 million in new capital for start-up and growth-stage companies. He obtained his A.B. in economics and management services from Duke University and his M.M. in marketing finance from Northwestern University. Mr. Patterson has previously served on four NRC committees that reviewed proposals for the State of Ohio (2008, 2009, 2011, and 2012).

SHALINI PRASAD is a Cecil and Ida Green Distinguished Professor and associate professor of bioengineering at University of Texas, Dallas. She also holds an adjunct appointment as professor in the Department of Physics at Portland State University. Dr. Prasad is the director of the Biomedical Microdevices and Nanotechnology Laboratory, which has supported over 15 graduate researchers and more than 20 undergraduate researchers over the past 7 years. Previously, she worked at Wichita State University as an associate professor in the Department of Electrical Engineering and Computer Science and was appointed as the Bomhoff Distinguished Professor in Bioengineering. Before joining Witchita, she worked as a research assistant professor for the Arizona State University, the National Nanotechnology Infrastructure Network Node, and the Center for Solid State Electronics Research. Prior to that, she worked as an assistant professor in the Department of Electrical and Computer Engineering at Portland State University and as an adjunct assistant professor in the Department of Biomedical Engineering at Oregon Health Sciences University. Her multidisciplinary research work "Development, application and characterization of a single cell based sensor" won her a graduate student research award. Dr. Prasad's research interests include the engineering of multi-functional nanomaterials for designing portable, "point-of-care" devices and platforms for cellular and molecular diagnostics and focus on addressing public health challenges of rapid and cost-effective diagnostics, which has applicability in the diagnosis of various diseases such as cancer, neurodegenerative diseases, and cardiovascular diseases. Dr. Prasad's research laboratory has been actively participating in developing translational technologies for affordable molecular diagnostics platforms. Her research work has been supported by a number of federal and state agencies as well as corporate entities. She has more than 30 peer-reviewed journal publications. Dr. Prasad received her B.E. from the University of Madras, India, in electronics and communication engineering. She obtained her Ph.D. degree in electrical engineering from the University of California, Riverside.

LLOYD M. ROBESON (NAE) is an adjunct professor of materials science and engineering at Lehigh University and is a retired principal research associate in corporate research at Air Products and Chemicals. He previously spent almost 20 years in polymer research at Union Carbide Corporation. Dr. Robeson's research areas include polymer blends, structure/property relationships, engineering polymers, composites, biomedical polymers, dynamic mechanical analysis, emulsion polymer characterization, adhesion, polymer permeability, membrane separation, polymer utility in electrical/electronic/ optoelectronic applications, and water soluble polymers. He has received numerous awards, including the

Applied Polymer Science Award of the American Chemical Society in 2003. Dr. Robeson received a B.S. in chemical engineering from Purdue University and a Ph.D. in chemical engineering from the University of Maryland, College Park. He has previously served on several NRC committees, including four committees that reviewed proposals for the State of Ohio (2007, 2008, 2009, and 2010) and on the Panel on Building and Fire Research (2008 and 2010).

SUBHASH C. SINGHAL (NAE) is an independent consultant and Battelle Fellow Emeritus at Pacific Northwest National Laboratory. His primary research interest is in all aspects of high-temperature solid oxide fuel cells, from fundamentals, designs, materials, and fabrication to commercialization. Dr. Singhal is also interested and experienced in R&D of high-temperature metallic, ceramic, and composite materials, particularly for advanced energy conversion systems, including fuel cells, gas turbines, and steam turbines. Other areas of interest include corrosion- and erosion-resistant protective coatings; thermal barrier coatings; thermodynamic properties of materials and systems; high-temperature solid state chemistry and electrochemistry; hydrogen production and storage; management of technology teams and technical innovation; and participation in and advising international organizations in materials and energy areas, including the NATO Science for Peace program and the NATO Advanced Study Institutes program, among others. Dr. Singhal received his B.S. in physics, chemistry, and mathematics from Agra University (India), his B.E. in metallurgy from the Indian Institute of Science, his Ph.D. in materials science and engineering from the University of Pennsylvania, and his MBA in technology management from the University of Pittsburgh. He previously served on the NRC Panel on Sensors and Electron Devices of the 2007 Army Research Laboratory Technical Assessment Board, the Materials Engineering Peer Committee, and the Committee on Assessment of the Need for Quality Determination of Non-Fuel Materials in the National Defense Stockpile.

KATEPALLI R. SREENIVASAN (NAS/NAE) is senior vice provost and university professor of physics and mathematical sciences at New York University (NYU). Dr. Sreenivasan's research is primarily in the area of fluid dynamics, including turbulence, complex fluids, cryogenic helium, and nonlinear dynamics. Prior to joining the faculty at NYU, Dr. Sreenivasan was director of the International Centre for Theoretical Physics in Trieste, Italy, and Distinguished University Professor of Physics and Engineering at the University of Maryland where he was also director of the Institute for Physical Science and Technology. Dr. Sreenivasan also taught at Yale University for 22 years. He has had visiting professorships at the California Institute of Technology, Rockefeller University, Cambridge University, and the Institute for Advanced Study at Princeton, among others. Dr. Sreenivasan is also the recipient of numerous awards, including the Guggenheim Fellowship, the Otto Laporte Memorial Award of the American Physical Society, and the 2009 Nusselt-Reynolds Prize from the Assembly of World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics.

NORMAN M. WERELEY is the techno-sciences professor and associate chair of aerospace engineering at University of Maryland. His research interests are in dynamics and control of smart structures, with emphasis on active and passive vibration isolation and shock mitigation applied primarily to rotorcraft as well as other aerospace and automotive systems. A key focus of his research is the theory and application of magnetorheological (MR) fluids and semi-active MR dampers and their application to occupant protection, vibration isolation, and stability augmentation systems using advanced feedback control strategies. Dr. Wereley's research has been funded under a U.S. Army Research Office Young Investigator Award and an NSF CAREER Award, as well as grants from the Defense Advanced Research Projects Agency, the Army Research Laboratory, the Air Force Office of Scientific Research, NASA, ONR, and numerous corporations. Dr. Wereley has published more than 140 journal articles, 10 book chapter contributions, and more than 230 conference articles. Dr. Wereley is a co-inventor on 10 patents, with more than a dozen patents pending. Dr. Wereley serves as editor of the *Journal of Intelligent Material Systems and Structures*. He also serves as an associate editor for the Institute of Physics' journal *Smart Materials and Structures* and *AIAA Journal*. He is currently serving as chair of the SPIE

Symposium on Smart Structures. Dr. Wereley was awarded the American Society of Mechanical Engineers (ASME) Adaptive Structures and Adaptive Materials Best Paper Award and was named the American Institute of Aeronautics and Astronautics (AIAA) National Capital Section Engineer of the Year. He was also awarded the A. James Clark School of Engineering Faculty Service Award and the AIAA Sustained Service Award. Most recently, Dr. Wereley was awarded the Harry T. Jenson Award from the American Helicopter Society for contributions to active crash protection systems in helicopters (team award with Boeing, U.S. Army, Honeywell, and the University of Maryland). Dr. Wereley will be awarded the ASME Adaptive Structures and Materials Systems Prize. He is a fellow of AIAA, ASME, and the Institute of Physics. He is also a lifetime member of the American Helicopter Society. Dr. Wereley holds a B.E.in mechanical engineering from McGill University in Montreal, Canada, and M.S. and Ph.D. degrees in aeronautics and astronautics from the Massachusetts Institute of Technology.

J.W. WHEELER is senior vice president for economic strategies at Thomas P. Miller and Associates (TPMA). He served as the policy lead for development of the Strategic Economic Development Plan for Indiana. Recent projects include development of industry cluster strategies; various base closure and realignment and military transformation projects; energy-related projects in electric and hybrid-electric vehicles, distributed power, and advanced coal technologies; feasibility studies and business plans for business incubators and technology parks; and participation in a variety of health information technology strategy and planning efforts. Prior to joining TPMA, Dr. Wheeler was director of Electricore's Midwest operations where he was charged with developing corporate-university partnerships in advanced technology development. As executive vice president for TechPoint—a merger between Indiana Technology Partnership (ITP) and Indiana Information Technology Association—and as president of ITP, he served as a leader for the statewide technology community's public policy and economic development initiatives (2002-2004) and managed special programs for information technology. Dr. Wheeler received his B.A. in economics from the University of Missouri system and his M.A. and Ph.D. in economics from Rutgers, the State University of New Jersey. He has previously served on several NRC committees that reviewed proposals for the State of Ohio (2005, 2007, 2008, 2009, 2010, and 2011).

RAUL E. ZAVALETA is the CEO of Indigo BioSystems, Inc., a provider of software automation solutions for expert processes in hospital laboratories, clinical reference laboratories, pharmaceutical companies, government agencies, and other laboratories doing clinical research and chemical composition testing. He is a partner at Volatus Advisors, LLC, an enterprise development consulting firm for entrepreneurial services. In this role, Mr. Zavaleta helps emerging companies with strategic visioning, business planning, and capital structures. He has started or mentored several technology companies that focus in the areas of pharmaceutical clinical trials, healthcare information technology, and DNA testing. Prior to beginning his career as an entrepreneur, Mr. Zavaleta worked for Dow Chemical, American Hospital Supply, and Smith Kline Beecham Laboratories. He serves on the board of trustees of Marian University (in Indiana) and on the board of directors of the Indiana Health Industry Forum and the Greater Indianapolis Chamber of Commerce. Mr. Zavaleta received his B.S. in chemical engineering from the University of California, Los Angeles. He previously served on the 2011 NRC committee that reviewed proposals for the State of Ohio.

STAFF

PAUL JACKSON, *Study Director,* is a program officer for the Aeronautics and Space Engineering Board (ASEB). He joined the NRC in 2006 and was previously the media relations contact for the Office of News and Public Information. He has been the study director for a variety of ASEB's projects, including six other proposal reviews for the state of Ohio and several studies for NASA, including the Committee for the Assessment of NASA's Orbital Debris Programs. Mr. Jackson earned a B.A. in philosophy from

Michigan State University in 2002 and an M.P.A in policy analysis, economic development, and comparative international affairs from Indiana University in 2006.

DWAYNE DAY is a senior program officer with the ASEB. Dr. Day started with the Space Studies Board (SSB) in 2005 before joining the ASEB. He has served as the staff officer and study director for NRC studies on the assessment of space radiation hazards to astronauts, the future of NASA's workforce, NASA's performance in solar system exploration, and on options for the next New Frontiers mission selection. He has a Ph.D. in political science from George Washington University, specializing in space and national security policy. Dr. Day is the author of *Lightning Rod,* a history of the Air Force chief scientist's office; has co-edited or edited several books and journal issues, and has written on American civil and military space policy and history. Prior to joining the SSB, he worked as an investigator for the Columbia Accident Investigation Board. Prior to that, he worked for the Congressional Budget Office and at George Washington University's Space Policy Institute.

CATHERINE A. GRUBER, an editor, joined the SSB as a senior program assistant in 1995. Ms. Gruber first came to the NRC in 1988 as a senior secretary for the Computer Science and Telecommunications Board and also worked as an outreach assistant for the National Science Resources Center. She was a research assistant (chemist) in the National Institute of Mental Health's Laboratory of Cell Biology for 2 years. She has a B.A. in natural science from St. Mary's College of Maryland.

LEWIS B. GROSWALD is an associate program officer for the SSB. He joined as an Autumn 2008 Lloyd V. Berkner Space Policy Intern and then served as a research associate for more than 4 years. Mr. Groswald is a graduate of George Washington University, where he received a master's degree in international science and technology policy and a bachelor's degree in international affairs, with a double concentration in conflict and security and Europe and Eurasia. Following his work with the National Space Society during his senior year as an undergraduate, Mr. Groswald decided to pursue a career in space policy, with a focus on educating the public on space issues and formulating policy. He has worked on NRC reports covering a wide range of topics, including near-Earth objects, orbital debris, life and physical sciences in space, and planetary science.

ANDREA M. REBHOLZ joined the ASEB as a program associate in 2009. She began her career at the National Academies in 2005 as a senior program assistant for the Institute of Medicine's Forum on Drug Discovery, Development, and Translation. Prior to the Academies, she worked in the communications department of a D.C.-based think tank. Ms. Rebholz graduated from George Mason University's New Century College in 2003 with a B.A. in integrative studies–event management and has more than 7 years of experience in event planning.

MICHAEL H. MOLONEY is the director of the SSB and the ASEB at the NRC of the National Academies. Since joining the NRC in 2001, Dr. Moloney has served as a study director at the National Materials Advisory Board, the Board on Physics and Astronomy (BPA), the Board on Manufacturing and Engineering Design, and the Center for Economic, Governance, and International Studies. In his time at the ASEB/SSB Dr. Moloney has overseen the production of more than 30 reports, including three decadal surveys—in planetary science, life and microgravity science, and solar and space physics, a prioritization of NASA space technology roadmaps, as well as reports on issues such as NASA's Strategic Direction, orbital debris, the future of NASA's astronaut corps, and NASA's flight research program. Before joining the SSB and ASEB in 2010, Dr. Moloney was associate director of the BPA and study director for the decadal survey for astronomy and astrophysics (Astro2010). With 12 years' experience at the NRC, Dr. Moloney has served as study director or senior staff for a series of reports on subject matters as varied as quantum physics, nanotechnology, cosmology, the operation of the nation's helium reserve, new anti-counterfeiting technologies for currency, corrosion science, and nuclear fusion. In addition to his professional experience at the Academies, Dr. Moloney has more than 7 years' experience as a foreign-

service officer for the Irish government—including serving at the Irish Embassy in Washington and the Irish Mission to the United Nations in New York. A physicist, Dr. Moloney did his Ph.D. work at Trinity College Dublin in Ireland. He received his undergraduate degree in experimental physics at University College Dublin, where he was awarded the Nevin Medal for Physics.