



INDIANA OFFICE OF ENERGY AND DEFENSE DEVELOPMENT



Transportation Systems Business Plan

November 2007

TRANSPORTATION SYSTEMS HIGH LEVEL BUSINESS PLAN

Transportation systems provides value add for Military, Homeland Security, and Aerospace platforms through major subsystems such as engines, transmission systems, landing systems, and controls. Engines include rockets, diesels, jets, and rockets. Platforms of interest include lightweight armored vehicles (the HumVee replacement), small passenger jets, small- to mid-sized advanced cargo planes, helicopters, and micro satellites. This focus area is centered in one of the state's key industries and provides a new base for retaining and obtaining new business from DOD and the Department of Homeland Security. The military business depends on domestic production and is immune to off shoring thus protecting Indiana jobs.

DETAILED DESCRIPTION:

These subsystems are geared to meet the following inter related requirements for:

- Heat mitigation
- Weight to performance
- Compactness
- High speed
- Fuel efficiency
- Low environmental impact
- Ruggedness
- Low maintenance requirements
- Where needed, personnel safety (e.g., armor and seats/in cab protection)

The components and materials that go into this target embrace functions such as research, development, design for manufacturability, testing, logistics, and maintenance. There is also a crosscut of this focus area with Defense Electronics (sensors, embedded systems, wireless and wired on board communications, command & control components), Future Energy Alternatives (power systems, common fuel, and high density fuel), Advanced Military Informatics (autonomous systems, information management, mixed reality, modeling/simulation) and Services and Support (Product Life Cycle).

Knowledge assets needed in this focus area are: Rapid Prototyping, Composite Materials, Nanotechnology, Advanced Engine Design, Combustion Modeling, Telematics, Power Electronics, Autonomous Operations, Sensors, Fly by Wire, Systems Engineering, Life Cycle Support, Commercialization expertise, and Manufacturing partnerships

IMPORTANCE FOR INDIANA TO FOCUS AND COLLABORATE ON TRANSPORTATION SYSTEMS

The Departments of Defense and Homeland Security are very well funded purchasers of services, and their budgets continue to grow. The SBIR/STTR programs work very well to promote cooking advanced research and helping in new business creation and growth. The State already has the foundational assets necessary to make Indiana a top-tier product and service provider to the federal government, namely an outstanding university system and many second-tier transportation industry system providers and a business-friendly state government executive branch. Indiana does not have to create these foundational elements from scratch.

These customers are traditionally at the leading edge of transportation systems technology and will be in the new systems that are addressing 21st century needs for increased force mobility/protection, energy efficiency, avoidance of foreign dependency, and maintainability. Many have identified these needs as ushering in a next

generation of transportation systems centered on alternative power systems, nanomaterials, and distributed sensing and intelligence with an objective of creating versions of vehicles that behave autonomously. Meeting these needs in a responsive way will involve closer integration of R&D, Technology, and Manufacturing as well as the cooperation among a well coordinated team of suppliers of materials, components, sub systems, and services to provide a total, quality solution. It takes a new level of collaboration to accomplish this. When this level is achieved, new opportunities to be leaders in the corresponding civilian markets will open up.

The advantage of doing business with the Military and Homeland Security is that they buy domestic products and keep jobs in country.

Table 29 below indicates the existence of Transportation Systems assets. There are academic assets, mostly at Purdue in W. Lafayette and major vehicle and systems manufacturers at major manufacturing centers in all but the southwestern quadrant where Crane offers services that can be used in this focus area. Numerous small companies are scattered throughout the state, covering such competencies as research on combustion simulation and testing, autonomous vehicles, composites, prototyping, dampening, fuel monitoring/controls, power electronics, and power management.

This focus area can augment the Muscatatuck Urban Warfare Center by providing new transportation options such autonomous vehicles, personnel protection, and heat mitigation. When those units return to their posts, they will be ready, willing, and able to use those advanced military informatics techniques and devices they used in their exercise.

Table 1

INDIANA ASSETS

<u>University</u>	<u>Crane</u>	<u>Large Companies</u>	<u>Small Companies</u>	
PU Birck Nanotechnology Center	Radiation Hardening	Cummins	Aerodine Engineering Group	In Space
PU Zucrow Laboratories	Environmental Testing	Rolls Royce	Air Bouyant	E-A-R Specialty Composites
PU Communication Research Lab	Failure Analysis	AM General (HumVee)	Tri Aerospace	Damping Technologies
PU Plasma Reformer	Acquisition Logistics	Navistar (NE International Truck)	Symphony Motors	CMW
PU School of Aeronautics and Astronautics (Ranked 6 th)	System Engineering	Caterpillar	Odyssian Technology	Themco Instrument
IPFW Center for Systems Engineering	Modeling and Simulation	Sikorsky	Lite Machines	Sentelligence
Rose-Hulman		Delco Remy	Indy Robotics LLC	Metaldyne
IUPUI Lugar Renewable Energy Center		Honeywell	Wabash Technologies	Hoffco/Comet Industries
		BAE Systems	Harmon Becker	Kinetic Art and Technology
		GM Allison	Butler Engineering	I Power Energy Systems
		Raytheon	Wolf Technical Services	PowerSys
			Riverside Manufacturing	Total Concepts of Design

			Incerco Technical Ceramics	Anderson Tool & Engineering - space
<u>Other</u>			HK Engine Components	MSP Aviation
Indiana Small Aircraft Transportation Systems Consortium (INSATS)	Indiana Advanced Aerospace Manufacturing Alliance (IAAMA)	International Council on Systems Engineering (Crossroads of America Chapter)	Ball Systems	Midwest Aerospace
Skilled Manufacturing Workforce	Electrocore Consortium branch		Visteon	Prototype Development

Indiana's assets, especially in smaller electronics engineering companies, will enable early prototypes to be coordinated within the state and through the new Urban Warfare Center centered around Muscatatuck. This will give those companies an advantage in introducing their new technology directly to the operational military and homeland defense units for assured and faster acceptance by the ultimate end user – the warfighter, the first responder, and the operations planner.

There is a foundation for immediate action as the following initiatives have been identified by the Indianans already involved in this focus area:

- Major primes/small business Alliance patterned after the Indiana Advanced Aerospace Manufacturing Alliance
- Power Propulsion/Conversion/Management
- System Engineering Academic Program
- Future of Transportation Vision Statement
- Opportunities Fair
- Customer requirement Show and Tell
- State level trade show market program
- Indiana Aerospace Consortium, modeled after the Ohio Aerospace Institute

PROPOSED TEAM ACTION PLAN

IN YEAR ONE:

1. Convene Opportunity Fair.
2. Convene a customer requirement Show and Tell.
3. Convene a how to do business with DOD conference.
4. Exhibit as a state at a trade show, for example, MBAA, Regional Airline (will be in Indianapolis), Propulsion Conference, AIAA (will be in Oshkosh).
5. Build a database of companies with competencies and capabilities.
6. Have a tangible result for multi stakeholder collaboration to show companies the benefit of being in the initiative, especially a small business.
7. Conduct a Technology fair for small technology firms. The current industry fairs are too broad. This opportunity fair has to be focused to technology rather than supplies.
8. Pick one or two initiatives coming from government, and put on a full force, collaborative effort to show an early win.

There is a dependency on entities outside this team to perform the following activities to meet this plan: a state marketing plan, and a briefing on this report with the new university presidents and Ivy Tech's new chancellor. The team expects that it will participate in the planning and support for these activities.

IN YEAR TWO:

1. Win/execute above initiatives
2. Continue to bid collaboratively on initiatives.
3. Evaluate the progress of the focus action team to identify improvements and next steps.
4. Enhance the online system of opportunities.
5. Enhance the discovery process of year one by outreach to other big customers (PW, GE, etc).
6. Have manufacturing czar in place.
7. Have the small business group in place.

RECOMMENDED STAKEHOLDER ACTIONS

This focus area will depend on specific actions on the part of stakeholders within the state.

PUBLIC/PRIVATE DEFENSE ASSETS CONSORTIUM

- Enlist major contractors and DOD/DHS agencies to show small companies how to do business with them.
- Facilitate better collaboration (meetings) between commercial companies, between universities, and Federal and State legislators to build relationships, catalyze efforts to address specific initiatives/contract opportunities, and discuss issues. For small businesses, this involves reaching out to organizations outside Washington D.C. such as national labs and out-of-state prime contractors.
- Organize national meetings with government program managers and chief technology officers to learn about capabilities needed by DOD and Homeland Security and to familiarize them with Indiana assets.
- Create a facility to provide a virtual tradeshow to address the cost of running a tradeshow, attending a tradeshow, and exhibiting at a tradeshow.
- Create a Commercialization Center for Defense SBIR Phase II companies to find funding, manufacturing partners (preferably in state), and identify civilian potential.
- Create and manage a program for marketing Indiana as a defense technologies state.
- Provide an information source for new SBIR/STTR, BAAs and other opportunities.
- Assist in attracting Angels, VCs, and Strategic Partners for funding Transportation Systems startups.
- Involve the Transportation Systems focus area team in Indiana's 2035 vision.

STATE GOVERNMENT

- Provide education for a small company new to Defense procedures and terms. DOD contracts are requiring a larger portion of works to be done by small and/or minority-owned business.
- Give first-time proposers SBIR proposal preparation assistance.
- Put the 21st Century Fund SBIR matching program on a sustainable basis.
- Institute a quick grant proposal process.
- Own the statewide database of available state assets.
- Staff an advocate in Washington D.C. to help find opportunities in transportation within DOD and Homeland Security and to promote Indiana generated proposals in this focus area.
- Provide tax incentives for companies that use Indiana resources.
- Give incentives for schools to have new curricula in this area.
- When new companies set up shop in the state, have them involve local suppliers.
- At the state level, incentivize a company that builds a new plant to also place an R&D facility with it.

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- Encourage more state technology incubator activity.

INDUSTRY

- Lift barriers in the SBIR process for small companies to work with large companies.
- Define the need for systems engineering skill to state's universities and assist in curriculum development and operation.
- Large companies create cross organizational teams with small businesses, academia for targeted development programs that provides a close relationships, no problems, work experience.
- Small businesses use students as interns to keep them in the state.
- Establish a "Welcome wagon" for companies moving into the state.
- Large companies help small companies going after government business with letters of support, access to their facilities, and teaming arrangements.

ACADEMIA

- Train technicians to be generalists so that they can work on next generation transportation systems that combine mechanical, electronic, software, and control systems tradecraft (Mechatronics).
- Provide more generalist education (including advanced degrees) for Aeronautical, Mechanical, Electrical, and Manufacturing Engineering, because they will have to be integrated in the Next Generation of vehicle systems.
- Dramatically expand the Systems Engineering program across the state. This is a very high priority in this focus area because of an existing shortage of this skill. Engage industry to justify and define the curriculum. Involve them in its classes.
- Create a process for companies to use foreign student with Blue Cards where FAR and ITAR allow.
- Improve the technology transfer process to release more technology for commercialization by commercial firms without endangering the latter's competitiveness. This would mean an even quicker process for small businesses because they tend to be more agile.
- Improve a company's access to university resources facilities, research, and researchers, including ability to hire for the summer or on a one-year sabbatical basis.
- Improve the collaboration between the Flagship universities and IVY Tech.

IMPLEMENTATION PLAN

ORGANIZATION AND SUSTAINABILITY

For ultimate success, this focus area must have some initial wins to show that collaboration is effective and to attract other companies, especially SMEs not yet doing business with the government, into the effort of gaining \$ from these customers. This means that the organizational structure has to avoid the heavy handed processes of the past and proceed in a self-organizing network manner.

METRICS

The following parameters are recommended as a source for three to seven vital performance measures:

- Job creation directly attributable to incremental government contract work
- Federal government contract \$\$/capita progress in state rankings
- New business entities created / relocated to state who have been awarded government contracts

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- Brain drain reversal
 - Availability of additional technicians
 - Connectivity
 - Dual (civilian) use opportunities

SUMMARY

The Transportation Systems focus area already has a strong position in Indiana. However, there is a next generation of vehicle systems that will be needed by the military and homeland security that will involve new forms and levels of collaboration and an upgraded workforce. To be successful, the Transportation Systems focus action team must achieve the following objectives:

1. Access to a central “consortium” that can manage marketing, the high level customer relationships, centralized infrastructure, a reputation for success, high level state relationships, and growth/renewal.
2. Active, on-going programs to recruit, involve, and assist inexperienced SMEs in obtaining business from DOD and DHS.
3. An improved process for getting IP out of Indiana Universities so that it can be commercialized.
4. A partnership of all the players with a strong teaming attitude and knowledgeable leaders acting as catalysts not overlords.
5. Attract, retain, and upgrade transportation systems resources, knowledge, and tradecraft in the state.