VIMS-Industry Partnership Meeting
May 21, 2010
Notes

Present: Scott Alwine, Bill Bean, Jim Brister, Carl Friedrichs, Jim Golden, Jane Lopez, Dennis Manos, Gordon Miller, Paul Panetta, Mark Patterson, Leonard Sledge, David Spencer, Gregory Stringfeld, Mark Todero, Gene Tracy, Mike Unger, Lyle Varnell, Katy Wall, John Wells

1. **VIMS Update - John Wells**
   a. Marine Science Day, Saturday May 22nd open to the public, very educational & fun, annual event.
   b. Wind power/oil gas development—wind power has taken another step forward, potential for environmental impact assessments. Discussion: Mark Patterson is working on proposals for environmental impact assessments of proposed off-shore wind-power sites. Current funding for the assessments is far below requirements. Dennis Manos will explore the funding issue with W&M government relations staff.
   c. Oil & gas—don't know what will be coming in VA, looking for strategies to position ourselves. Lyle Varnell is the VIMS point person on these issues.
   d. Sec. of Commerce and Trade — John circulated a draft present briefing document "Innovative Technology and Industry Partnerships at the Virginia Institute of Marine Science." The pamphlet is designed to show how VIMS capabilities and collaborative projects with industry match important issues for the Commonwealth. It provides a short summary of the programs in autonomous underwater vehicles, biosensors, algae biofuels, aquaculture genetics and breeding, observing systems and the seawater research laboratory. The pamphlet notes that a VIMS-based C Corporation will soon be in place to provide more flexibility to promote research and development collaborations.

2. **Containment accumulation in algae cultured for biofuel production - Mike Unger**
   a. Mike's team has been evaluating how algae can be used to reduce nutrient loads and organic contaminants in water. Background:
      i. Various culture techniques are now also being used for remediation of nutrients at sewage treatment plants (STPs).
      ii. Water from STP outfalls contains a variety of organic contaminants ranging from personal care products to industrial chemicals.
      iii. We know from previous research that high organic content material from STP can concentrate organic contaminants.
   b. Contaminant Fate is Governed by Partitioning
      i. Limited water solubility "hydrophobic."
      ii. High affinity for lipid materials "lipophilic" organic carbon.
      iii. "Like dissolves like" Algae may be 6-50% lipid
   c. What is the fate of contaminants during the algae to fuel to waste life cycle?
      i. Do organic contaminants concentrate in algal biomass grown for biofuel production?

        ii. Does the algal biomass effectively remove dissolved organic contaminants from waste water?

        iii. What is the long-term fate of organic contaminants associate with algal biomass?

d. Methods: They evaluated contaminant accumulation in natural algae biomass cultured for biofuel production at two sites – the Susquehanna and the York Rivers.

        i. Natural algal assemblages, Algal Turf Scrubber (ATS) system

        ii. Algae collected weekly: to maximize growth. Also follows the pattern that would be used in weekly harvests for fuel production.

        iii. PAH removal is a function of hydrophobicity

        iv. Results: York River Floway, Virginia.

            1. Average TBT removal by floway=34%

            2. Kapp much high than predicted by hydrophobicity alone

            3. DBT higher in effluent

            4. Filamentous Algae 48h TBT Degradation Experiment: TBT, DBT, MBT is Concentrated

e. Key findings: A wide range of organic contaminants concentrate during the seven day growth period

        i. TBT and PAH can be reduced by up to 50%

        ii. TBT is also degraded to a less toxic form

f. Mike is working with Hydromentia on a proposal to apply the technology at a site along the Elizabeth River.

g. Discussion. Mike and his colleagues are also working on the development of biosensors that include specially designed monoclonal antibodies coupled to electronic sensors. These hold promise for detecting and tracking oil spills, among other uses. The group discussed possible use of the sensors in the Gulf of Mexico. Gordon Miller (G3 Systems) is involved in a project along the Texas coast, and he will follow up with Mike about potential applications there. Mike thinks one good application would be the detection of small leaks before they expand.

3. **Chesapeake Bay Algae Project site selection issues - Gene Tracy**

a. Gene provided a quick overview of the scope of the project and participating partners. The project seeks to turn pollution into fuel. The major goals are to:

        i. Deliver design criteria to Statoil for the development of off-shore algae farms;

        ii. Remediate environmental impacts; and

        iii. Investigate other by-products

b. Status of the Statoil project. Develop design criteria over the next year.

        i. Completed subscale testing with good results.

        ii. Research small-scale prototypes – sites at William & Mary and VIMS

        iii. Develop engineering prototypes and test harvesting techniques. Sites under discussion: Peach Bottom (Susquehanna), VIMS, Crane Island (Constellation), Jamaica Bay

c. Discussion.

        i. Is there a potential role for Dominion Power in this, perhaps involving the Surry site?

  ii. The VIMS site is using the observation buoy developed for other research projects. This is a good synergy.

4. <u>Seawater Research Laboratory Progress and Usage - Jim Brister</u>

 a. Lab in operation for two years

 b. The website -- http://www.vims.edu/about/facilities/seawaterlab/index.php -- described the capabilities and fee structure

 c. The lab has lots of open space so partners can occupy a footprint until completion of their experiments.

 d. The lab has six primary contained wet labs and BSL2 and BSL3 capabilities. This provides a great opportunity for industry to have access at very reasonable cost.

 e. Currently the space is only marketed through the website. Discussion: Participants thought that wider marketing was appropriate, even if all of the infrastructure is not yet in place.

5. <u>Technology and Business Center Update-Bill Bean</u>

 a. Bill described the general mission of the Center as a link between business and researchers at W&M/VIMS.

 b. The Center recently contracted to manage the James City County Business Technology Incubator.

  i. Objective: provide entrepreneurs and start-up businesses with a vision of strong growth with the amenities, counseling, and service to help grow a successful business

  ii. Target Client Markets:

   1. Knowledge economy based

   2. Technology oriented firms

   3. Green technologies

   4. International and relocating companies

   5. University-related companies

  iii. The incubator already has four clients in these categories.

 c. Discussion

  i. Jim Golden noted that the incubator could expand to include York County and Williamsburg.. It would be part of the IdeaWorks project envisioned under the Hampton Roads strategy to expand innovation. Lee Beach discussed that concept with the Partnership at the last meeting.

  ii. Jim also noted that the outreach classes conducted by business school professors were a great way to get basic business insights.

6. <u>Short Introductions</u>

 a. David Spencer

  i. Professor of Practice, Director of Center for Space Systems, Georgia Tech.

  ii. He is doing summer research at NASA on collaborative observations from remote sensing platforms (aerial vehicles) and in situ assets (Underwater vehicles) to trace chemical distributions in the coastal oceans.

      iii. He will be concentrating on prototype systems to measure the spatial distribution of dissolved oxygen in the Chesapeake Bay. The prototype system could include an on-shore tower, piloted aircraft, and an underwater vehicle. The underwater vehicle might be one Georgia Tech has or one from VIMS.

   b. Mark Todero
      i. MTA Group. Interested in business applications of VIMS capabilities.
      ii. Last project was targeting and writing business plan, funding for an e-commerce site.

   c. Mark introduced Gordon Miller, G3 systems
      i. Gordon is an entrepreneur who owns several companies and is involved with two major angel networks in Virginia.
      ii. Gordon noted several opportunities suggested by the discussion at the meeting. One, noted earlier, would be to link the technology Mike Unger discussed to an on-going project involving off-shore mapping in Texas. He also mentioned Japanese efforts to grow and harvest algae that might be relevant to the algae project at VIMS.

7. <u>General Discussion</u>

Mark Patterson noted that the Association for Unmanned Vehicle Systems International will hold an unmanned boat surface competition at the Founders Inn at Regent University on June 10-13. There will be 14 teams of college students – teams are primarily undergraduates and only one graduate student. The Fetch autonomous underwater vehicle will do the course as a surface boat. http://www.auvsifoundation.org/AUVSI/FOUNDATION/Competitions/ASVCompetition/Default.aspx?C=00000000-0000-0000-0000-000000000000

8. <u>Closing Comments—John Wells</u>

July 23rd next meeting