

EXTERNAL ADVISORY BOARD MEETING

October 30, 2013

Attendees:

Stephan Biller*	Rob Maskell	Katherine Stevens*
Mike Dudzik*	Mike McGrath	Ken Stewart*
Wayne Eckerle	Don Mottaz*	Mark Tomlinson
Tina Guldborg+	John Russell	Ben Wang+
Ron Jackson*	Pete Sigmon	Charles Wessner*
Theresa Kotanchek	Susan Smyth*	

Note: Names with an * were not present during the meeting.
+ GTMI faculty

Overall GTMI Action Items: all participating members agreed that the format of the meeting was good and all presentations were excellent.

1. Identify areas of manufacturing research that offer the best opportunities for GTMI to take the leadership role from a global perspective
 - a. Develop a graphic, e.g., a pyramid, which shows the key technology areas and the corresponding research in each of those areas, possible collaborative projects, and the grand challenge GTMI is trying to achieve in an innovative manner.
2. Use the grand challenges identified to
 - a. Identify agencies to approach
 - b. Identify industries to collaborate with in terms of these challenges and target research areas.
3. Benchmark other universities conducting research in manufacturing, identify gaps where GTMI can establish itself as a world leader
 - a. Also use this opportunity to identify other academic partners for collaboration.
4. Other topics to consider for future meetings:
 - a. Cybersecurity as it relates to manufacturing, specifically 3D printing and defense-related design and manufacturing are software/data-rich and vulnerable to cyber attacks
 - b. Internet of Things and big data – how will it transform manufacturing in years to come
 - c. Identify modeling and simulation of manufacturing processes capabilities.
5. After an overview of the first GTMI Industry Partners Symposium, the GTMI EAB recommended the following:
 - a. Extend to a full day event that includes a poster session for more in-depth discussion
 - b. Develop a follow-up strategy to keep the conversation going
 - c. Combine as many events as possible into one visit to save on travel costs and reduce time commitments/number of visits.

Six invited presentations by GTMI-affiliated faculty were made to the EAB: 1) additive manufacturing, 2) bio-inspired design, 3) next generation carbon fibers, 4) model-based systems engineering, 5) printed electronics, and 6) sustainable manufacturing. All presentation slides are available on the GTMI EAB secure website using the following credential to login:

User: gtmi

Password: T3chnology

Important comments and recommendations made by the EAB members are summarized below.

Additive Manufacturing by Dr. Suman Das

1. Identify “sweet spots” or specific research areas that will be unique to GTMI. Make GTMI the go-to place for “XYZ research”
2. Explore and enhance interdisciplinary research within Georgia Tech (such as iMAT – Institute for Materials) and externally such as National Additive Manufacturing Innovation Institute (NAMII, recently renamed America Makes) and Oak Ridge National Lab (ORNL)
3. Leverage best practices used by researchers in electronics and materials here at Georgia Tech. Bring technologies together such as printed electronics and 3D printing.

Bio-inspired design by Dr. Jeannette Yen

1. Collaborate with Ben Wang/GTMI to provide solutions in lightweight structures/materials design and manufacturing
2. Identify and promote how GT differentiates itself from other universities in this research space (current strength of GT is in teaching bio-inspired principles)
3. Develop distance learning that offers more collaboration across the country/world by combining the Massive Open Online Course (MOOC) format with social media.

Next generation carbon fibers by Dr. Satish Kumar

1. Incorporating carbon nanotubes into carbon fiber seems to be a promising pathway to develop the next generation of strong and multifunctional fibers
2. Develop approaches for orienting CNT in the fibers that can be useful for bio-inspired design and manufacturing
3. Should study approaches to transfer the promising fiber properties into composites (interface and interphase)
4. Continue to build unique partnerships such as ORNL, Cytec, Hexcel, etc.

Model-based systems engineering by Dr. Chris Paredis

1. Consider inclusion of “risk analysis” in Grand Challenges because the defense industry has removed risk-taking from the process but it needs to be added back into systems engineering
2. Partner with companies who are teaching incoming engineers how to think with systems engineering in decision-making
3. Develop greater interaction between engineering and social sciences; can also learn from natural/biological systems
4. Collaboration with psychology/organizational behavior is positive and should amplify.

Printed electronics by Dr. Chuck Zhang

1. Build a consortium to encourage collaboration with companies and government agencies. Reach out to industry more to further develop application-driven technology
2. Collaborate with researchers in additive manufacturing.

Sustainable manufacturing by Dr. Bert Bras

No specific comments or recommendations.

An expert panel consisting of Drs. Don McConnell (moderator), Suman Das, Tom Kurfess and Shreyes Melkote was organized to discuss NNMI and GT's NNMI bids: additive manufacturing, lightweight metal manufacturing innovation, and digital manufacturing & design innovation.

Attendees were asked to name the top key areas of research on which we should focus based on the 16 topics identified as part of AMP 1.0 (report published by the AMP Steering Committee in July 2012). The results were as follows:

1. Four out of six attendees named Advanced Sensing, Measurement and Process Control as one of the top three areas on which to focus
2. Five out of six attendees listed Advanced Manufacturing and Testing Equipment as a key area
3. 50% of attendees identified Bio-manufacturing and Bio-informatics as a needed research area and one noted that this is an area where the United States can be a world leader versus areas where we have fallen behind (i.e., semiconductors and certain aspects of additive manufacturing)
4. 50% also listed Sustainable Manufacturing as a top research focus
5. One attendee listed flexible electronics as a focus area "if we aren't too late in that area" and industrial robotics, especially in terms of including that in the systems-level thinking