

## Minutes

### LGC Advisory Board in Advanced Manufacturing, Engineering Services, and Software Development/IT Support

February 27, 2017

The Lowcountry Graduate Center's Advisory Board met at its scheduled time on Monday, February 27, 2017. Board members in attendance were: Jim Thompson, Garth Cook, Paul Gibson, and Marcia Saari. Board members unable to participate were: Ashley Guinn, Chris Martin, Dick Tiano, Heather Lake, and Bryan Stefani. Attending as guests were Ron Welch (The Citadel), Brian Kuney (SCMEP), and Abdel Bayoumi (USC). Representing the LGC in the meeting were: Patty Simpson, Chris Duncan, and Nancy Muller.

Following brief introductions by all present and participating by teleconference, Dr. Bayoumi opened his presentation with a short historical narrative of the U.S. Army's request of USC for help in reducing its \$1.0 billion in spending on condition-based maintenance (CBM) for its Apache and Blackhawk aircrafts. USC wrote a white paper that the Army used to implement Predictive Maintenance (PM) based on predictive analytics, replacing its outmoded CBM culture. The decision was transformative and saved millions of dollars in annual costs, extended the time between overhauls for critical components, reduced the number of tail rotor gearbox replacements by 34.5%, and generated the highest return on investment for any Army-funded project in history at 20.2 to 1. The PM process shifts thinking away from CBM which is based either on need (i.e., reactive) or assumed schedules.

This undertaking breathed life into USC's Center for Predictive Maintenance in the College of Engineering and Computing, aimed at applying the interdisciplinary, integrated principles and more holistic process implemented for the Army across a variety of commercial industries and enterprises. It represents a paradigm shift in thinking, incorporating, among other elements, "smart-sensing" on board an aircraft. In healthcare, an analogy can be made to wearable technology through which clinical data is collected on patients and transmitted by wireless communications to a cloud-database for predictive analytics of risk factors and thus timely (and more cost effective) preventive intervention, Muller interjected. Bayoumi continued that generated data can be transmitted in a manufacturing operation to a parts design engineer to optimize the design's requirements in terms of production specifications. Such modeling of a system is based on real data, not theoretical or arbitrary input. It allows for continuous quality improvement. The model, in essence, becomes a "digital twin" of a part, finished product or even operation.

Zero-defect manufacturing is thus the goal of a new joint project between Clemson and USC.

In stressing the interdisciplinary nature of predictive analytics, Bayoumi said the Center has integrated faculty and students from academic disciplines in business, public health, engineering, information technology, and computing. To help illustrate the process, he introduced the "wheel

of predictive maintenance,” depicted as a graphic in his Power Point slides and handouts for those present.

Initially, the Center seeks to provide training for credentialing and also academic offerings to companies in general machinery manufacturing, petrochemical processing, and water treatment (both purification and desalination). Bayoumi envisions extending this to services and especially healthcare, where Muller pointed out the principles are already being applied by MIT and Stanford, both in terms of risk management (and reduction of inpatient medical errors in hospitals) as well as asset management (especially software maintenance for improved uptime and reliability).

Kuney expressed frustration that small to medium sized manufacturers in greatest need of this discipline in their processes are the least knowledgeable in how to get started. It feels overwhelming to many. Because Volvo is giving preference to vendors who have ISO 9000 and 9001 certifications, Kuney suggested that USC should explicitly communicate how PM certification is related and supportive of such ISO goals. Gibson remarked that from the perspective of higher education, such an offering can serve as concrete evidence to prospective students of real-world applications in the workplace upon graduation and thus help boost recruiting and enrollment in programs because of job prospects. Muller added that from an employer’s perspective, this helps HR understand what knowledge-based talent and skill sets are needed across an employee base so that PM can be successfully implemented and sustained. This helps to direct priorities in professional recruiting and focus for on-going development and continuing education for current employees.

There was insufficient time to discuss other agenda topics, other than two brief announcements:

- The Citadel has plans underway to create and offer a new undergraduate degree in construction management engineering. Communication seeking CHE approval is in process.
- SCMEP has established its newest regional center at the LGC and workshops open to working professionals are already being offered at the LGC’s facility in North Charleston. Primary focus is on automotive manufacturing, with the start-up of Volvo’s new North American plant under construction in Metro Charleston. A news release has been issued.

The next meeting dates of the Advisory Board are June 12<sup>th</sup> and November 13<sup>th</sup> at the same time. Please respond to the Doodle to indicate your plans for attending and mark your calendars:

<http://doodle.com/poll/tykh6si8t66p2vad>

Meeting adjourned at 6:15 p.m.

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