Science, Technology, Engineering and Mathematics (STEM) Education

Dr. Kerry M. Joels

January 13, 2016
STEM and the Building Sciences

- Science
- Technology
- Engineering
- Mathematics

The Field is changing rapidly
STEM and the Building Sciences

• Increased technological requirements in the building sciences put the field in competition with other fields (healthcare, information technology, energy, engineering, etc.) for qualified talent

• What is the external image of building science career paths? (architecture, construction, FM, Building Codes, etc.)

• How do we distinguish ourselves with the students we need?
STEM and the Building Sciences

- The building science workplace requires a high degree of teamwork.... this will increase
- The building science workplace is increasingly technologically dependent
- The building science workplace needs to interest students at the high school level and lower division college level
- The building science future workforce will require a higher degree of data manipulation and analysis expertise
STEM and the Building Sciences

• NIBS STEM Education program is an effort to inspire, engage, educate, and employ promising students in the building sciences

• The first effort is a joint project with NIBS, the Total Learning Research Institute, NASA, IFMA and others to create a virtual base on Mars – MARS CITY - and simulate FM operations

• The MARS CITY Facility OPS Challenge engages teams of students acting in a virtual FM/ BIM environment

• The Challenge also has implications for advancing today’s FM professional
The MARS CITY Facility OPS Challenge

- A MARS CITY BIM was created by a team led by TLRI including KeiranTimberlake, Gilbane Construction, and Alderson Engineering
- A COBie Spreadsheet of the required equipment was generated and loaded into TMASystems WebTMA CMMS
- A team including IFMA and Carnegie Mellon created a database of FM activities
- Virtual technician rosters, FM task codes, and a building CMMS instance was created. The Twin Cities IFMA worked with the team to create the first FM scenario
• Total Learning Research Institute simulations utilize their TEAMING approach – a business model (TQM/ 6-Sigma) structure as the basis for simulations.

• The FM team with MEP officers and managers use the training scenario to turn FM requests into scheduled Work Orders and evaluate their solution.
The Challenge

MARS CITY Ops Training Scenario (Scheduling an FM shift)

Scenarios consist of pre-programmed work order requests including PM, regular maintenance, and emergency maintenance tasks.

Teams schedule and negotiate for virtual tech resources to create a Work Order schedule.

Simulation and FM software assign and monitor the Work Order scheduling solutions assign an overall team effectiveness rating.
The process

1. Request Received
2. Conversion to Work Order
3. Assigned to Tech
4. Work is Completed
5. Compare to Expert Solution
How did the team do?

- Team Solutions are compared to expert solutions with dashboard data
The Participants.....so far

MARS CITY

Facility Ops Challenge

KIERAN TIMBERLAKE
Summary

- Building Sciences now live in a new world of data exchange, simulation, and technology.
- We need students capable of functioning in this STEM environment and are competing with other fields for qualified talent.
- NIBS is aggressively pursuing highly visible and interactive educational experiences to engage secondary and lower division college students.
- The effort will require a national reach and a sustained implementation.
- The effort will require participation by all building science organizations and utilize their members’ relationship with their community and institutions.