Department of Engineering Management and Systems Engineering

Strategic Plan for 2014-2020

(Draft Version: February 5, 2014)
Mission:

The mission of the department of Engineering Management and Systems Engineering at Missouri S&T is to serve the state, nation and international community by equipping students with the engineering, management and systems knowledge and experience necessary to identify and meet the challenge of solving technical problems that are complex and evolving.

Vision:

The department of Engineering Management and Systems Engineering at Missouri S&T will be recognized nationally for its excellence and innovation in the areas of on-campus and distance engineering management and systems engineering education, research, scholarship and professional service.

Strategy Statement and Themes:

By 2020, the department of Engineering Management and Systems Engineering will work to move into the top 35 of all Industrial, Manufacturing and Systems Engineering departments through its diverse expertise, unique holistic perspective, and global access to stakeholders.

The Engineering Management and Systems Engineering department will achieve this goal by focusing on the following strategic themes:

- Increase research productivity and core research competencies, and in the process create new opportunities for students to pursue undergraduate and graduate research, thereby increasing the department’s research reputation and the ability for our graduates to train the next generation of engineering managers and systems engineers.

- Continue to be a leader in the area of distance and online education by making department education and research programs accessible to all students, whether located on or off-campus, using the most advanced technology and teaching methodologies.

- Offer undergraduate and graduate education that fosters holistic thinking through the integration and application of discipline-specific engineering, management and systems knowledge and skills necessary to meet the real-world technical challenges of the 21st century.

- Develop partnerships with industry, government and academia in order to provide increased visibility of our academic programs and research, while also providing innovative and entrepreneurial responses to the current technological problems facing society.
Values:

The faculty, staff and students of the department of Engineering Management and Systems Engineering at Missouri S&T hold the following values:

Lifelong Success: We add exceptional value. The rewards of the Missouri S&T experience extend far beyond a college education, valued degree or gratifying career. The S&T experience prepares you for a fulfilling life defined by the confidence to succeed, a desire to excel and a love of learning that never stops.

Creativity: We are innovators. Building a better world demands a creative spark, innovative and entrepreneurial approaches, and curiosity to discover and explore new solutions to the world’s great challenges.

Integrity: We hold ourselves accountable for our actions. We strive to uphold the highest ethical standards, to conduct ourselves with trustworthiness and respect for all of humanity, and to instill in our campus community these same principles.

Sustainability: We live by example. As stewards of the public goodwill, the financial resources entrusted to us, and the environment, we emphasize resilient and sustainable practices in all our endeavors.

Partnerships: We are great partners. We focus on adding value and creating mutually beneficial partnerships. The solutions to today’s great challenges require agile collaboration, teamwork and engagement with our stakeholders, both on campus and in the greater business, civic, national and international communities.

Inclusion: We are an inclusive, welcoming community. We seek to build a creative learning environment marked by openness, understanding and valuing all people and perspectives.

Collegiality: We are good colleagues. We welcome different scholarly perspectives and points of view, while also engaging in constructive and civil dialogue with those whom we may disagree.
Comparator Benchmark Institutions:

The department of Engineering Management and Systems Engineering will use the following five departments and institutions as benchmark comparators:

- Air Force Institute of Technology
  - Systems and Engineering Management department
- Old Dominion University
  - Engineering Management & Systems Engineering department
- Stevens Institute of Technology
  - School of Systems and Enterprises
- University of Arizona
  - Systems and Industrial Engineering department
- University of Southern California
  - Industrial and Systems Engineering department

Each department was chosen since it offers both an Engineering Management and Systems Engineering degree at either the undergraduate and/or graduate level, similar to the EMSE department. As of January 1, 2014, three of the five institutions are currently ranked higher than the EMSE department in the U.S. News & World Report rankings of IMS departments. One institution was ranked at the same level as the EMSE department. Another institution was not included in the ranking, but currently has research expenditures higher than the EMSE department.
Strategic Themes, Levers and Actions

**Strategic Theme 1:** Increase research productivity and core research competencies, and in the process create new opportunities for students to pursue undergraduate and graduate research, thereby increasing the department’s research reputation and the ability for our graduates to train the next generation of engineering managers and systems engineers.

- **Lever 1.1 (S&T Lever 2.4):** Increase research productivity of the tenure-track (TT) faculty.
  - **Action 1.1.1:** Increase the annual research expenditures per TT faculty member.
    - **Goal/Metric:** Increase the two-year average annual research expenditures per TT faculty from $131,230 to $185,000 (calendar year 2014-2020).
    - **Owner:** Department Chair
  - **Action 1.1.2:** Increase the annual number of publications per TT faculty member.
    - **Goal/Metric:** Increase the two-year average annual number of archival journal articles per TT faculty from 2.5 to 3.5 (calendar year 2014-2020). Increase the two-year average annual number of archival journal articles and conference proceedings per TT faculty from 5.8 to 8.0 (calendar year 2014-2020).
    - **Owner:** Department Chair
  - **Action 1.1.3:** Increase the annual number of PhD students per TT faculty member.
    - **Goal/Metric:** Increase the two-year average annual number of PhD students per TT faculty from 2.75 to 3.5 (calendar year 2014-2020).
    - **Owner:** Department Chair
  - **Action 1.1.4:** Recruit and retain TT faculty with identifiable research funding sources and respected research publication outlets.
    - **Goal/Metric:** Successful hire, when positions are available (2014-2020).
    - **Goal/Metric:** Successful tenure / promotion of TT faculty (2014-2020).
    - **Owners:** Department Chair (lead) / Faculty Search Chair
  - **Action 1.1.5:** Recruit and retain an endowed Sarchet Professor who can help the department increase funding and research productivity through both their individual contributions and their efforts with existing and new faculty.
    - **Goal/Metric:** Successful hire, search over the 2014-16 academic years, hire for September 1, 2015 or January / September 1, 2016 start.
    - **Goal/Metric:** Successful retention of Endowed Professor, consistent funding stream and research success, and collegial collaboration with department colleagues (annual review 2015-2020).
    - **Owners:** Department Chair (lead) / Sarchet Search Chair
• **Lever 1.2 (S&T Levers 4.4 and 4.5):** Recruit high quality research-based graduate students.
  
  o **Action 1.2.1:** Increase the number of undergraduate students involved in OURE (Opportunities for Undergraduate Research Experience).
    - **Goal/Metric:** 50% of TT faculty working with OURE students by 2020. *Increase participation by one faculty member per academic year from 2014 to 2020.*
    - **Owner:** Associate Chair of Undergraduate Studies
  
  o **Action 1.2.2:** Increase the number of stipend and tuition offers that are made to high quality research-based graduate students.
    - **Goal/Metric:** One stipend / tuition offer per academic year per TT faculty member by 2017 (2017-2020).
    - **Owner:** Department Chair
  
  o **Action 1.2.3:** Develop and promote a BS to MS program for non-EM undergraduate majors to increase the number of on-campus research-based graduate students.
    - **Goal/Metric:** Initial program in place by fall 2015, total enrollment of 15 additional students by 2020 (approximately three per academic year).
    - **Owners:** Associate Chairs of Undergraduate (lead) / Graduate Studies

• **Lever 1.3 (S&T Lever 2.1):** Develop/promote core competencies and areas of research excellence.
  
  o **Action 1.3.1:** Recruit and retain TT faculty with core research competencies that can help support existing department strengths and / or build upon new areas of strength and opportunity.
    - **Goal/Metric:** Successful hire, when positions are available (2014-2020).
    - **Goal/Metric:** Successful tenure / promotion of TT faculty (2014-2020).
    - **Owners:** Department Chair (lead) / Faculty Search Chair
  
  o **Action 1.3.2:** Increase the number of 400-level research-based PhD courses in key areas to help create a culture of excellence in research and scholarship in core competencies.
    - **Goal/Metric:** One course per academic year per active research TT faculty member by 2020, starting in year 2015.
    - **Owner:** Associate Chair of Graduate Studies
  
  o **Action 1.3.3:** Increase research collaboration with non-EMSE Missouri S&T departments and faculty, including collaboration with aspirant schools, departments and faculty that will help to strengthen and promote core research competencies.
    - **Goal/Metric:** One external research collaboration per academic year (2014-2020).
    - **Owners:** Associate Chair of Graduate Studies (lead) / Department Chair / Director of Systems Engineering
Strategic Theme 2: Continue to be a leader in the area of distance and online education by making department education and research programs accessible to all students, whether located on or off-campus, using the most advanced technology and teaching methodologies.

• Lever 2.1 (S&T Lever 3.7): Increase the number of graduate level courses offered through distance education.
  
  o Action 2.1.1: Increase the percentage of 300-level courses offered through distance education.
    
    Goal/Metric: Increase 300-level graduate student-focused distance courses from 80% to 100% (2014-2020).
    
    Owner: Department Chair
  
  o Action 2.1.2: Increase the number of 400-level courses offered through distance education, in particular, those that match department core research competencies.
    
    Goal/Metric: Add one new research-based 400-level course per academic year (2015-2020).
    
    Owners: Department Chair (lead) / Associate Chair of Graduate Studies

• Lever 2.2 (S&T Levers 4.3 and 4.4): Use eLearning methods to offer a better educational experience for undergraduate and graduate students, while providing more time for both research and other department educational activities.
  
  o Action 2.2.1: Increase the number of faculty offering courses using eLearning methods/techniques.
    
    Goal/Metric: Increase the number of faculty participating in eLearning from 3 to 6, or approximately one every two years (2014-2020).
    
    Owner: Department Chair
  
  o Action 2.2.2: Increase the number of courses using eLearning methods / techniques.
    
    Goal/Metric: Increase the number of undergraduate or graduate courses using eLearning methods and techniques from 3 to 6, or approximately one every two years (2014-2020).
    
    
    Owner: Department Chair

• Lever 2.3 (S&T Levers 1.4, 3.6 and 3.7): Increase department visibility, as well as exposure of faculty and department expertise, by offering professional development courses.
  
  o Action 2.3.1: Increase the number of faculty offering professional development courses.
    
    Goal/Metric: Increase the percentage of faculty participating in the creation and delivery of professional development courses from 1 to 3, or one faculty member every three years (2015-2020).
    
    Owner: Department Chair
o Action 2.3.2: Increase the number of professional development courses offered by the department faculty.
  - Goal/Metric: *Increase the number of professional development courses from 1 to 3, or one course every three years (2015-2020).*
    - Owner: Department Chair

- **Lever 2.4 (S&T Lever 4.4):** Hire NTT faculty, in Rolla or at a distance, with both the proper experience and expertise to support department graduate education, both on-campus and distance.
  
  o Action 2.4.1: Hire and retain NTT faculty to support required Engineering Management and Systems Engineering undergraduate and graduate program core courses, as well as non-research based graduate courses within the department graduate programs.
    - Goal/Metric: *Successful hire, when positions are available (2014-2020).*
    - Goal/Metric: *Successful promotion of NTT faculty (2014-2020).*
    - Owners: Department Chair (lead) / Faculty Search Chair

- **Lever 2.5 (S&T Levers 1.4 and 4.6):** Hire, retain, mentor and provide staff with the proper skills and resources necessary to effectively support distance and online education efforts, as well as traditional on-campus undergraduate and graduate programs.
  
  o Action 2.5.1: Hire and retain staff in support of distance and online education.
    - Goal/Metric: *Successful hire, when positions are available (2014-2020).*
    - Goal/Metric: *Successful promotion of staff (2014-2020).*
    - Owner: Department Chair

  o Action 2.5.2: Provide staff with the necessary training and resources to effectively support distance and online education, and their interaction with department constituents.
    - Goal/Metric: *Periodic academic year review (each September) of necessary staff resources (2014-2020).*
    - Goal/Metric: *Make available resources for one training opportunity each academic year for staff development (2014-2020).*
    - Owner: Department Chair

  o Action 2.5.3: Insure that the EMSE department has the proper staff levels to effectively support all department programs, as well as interaction with internal and external department constituents.
    - Goal/Metric: *Periodic academic year review (each September) of necessary department staffing levels (2014-2020).*
    - Owner: Department Chair
Strategic Theme 3: Offer undergraduate and graduate education that fosters rigorous and holistic thinking through the integration and application of discipline-specific engineering, management and systems knowledge and skills necessary to meet the real-world technical challenges of the 21st century.

- **Lever 3.1 (S&T Lever 3.1):** Develop an undergraduate program that better integrates the core courses and meets both the engineering and management demands expected of B.S. graduates.
  - Action 3.1.1: Create comprehensive undergraduate senior design projects that require better integration of core knowledge.
    - **Goal/Metric:** Student senior assessment / satisfaction survey, initial implementation in 2015, annual review (June 2015 - June 2020).
      - **Owner:** Associate Chair of Undergraduate Studies
  - Action 3.1.2: Increase systems thinking to better integrate core engineering management concepts and courses.
    - **Goal/Metric:** Student senior assessment / satisfaction survey, initial follow-up of undergraduate systems engineering course in fall 2014, subsequent follow-up in fall 2015 and fall 2016, as needed (2014-2016).
      - **Owner:** Associate Chair of Undergraduate Studies
  - Action 3.1.3: Annually review the relevance and rigor of undergraduate program offerings, making changes as needed.
    - **Goal/Metric:** Student senior assessment / satisfaction survey, initial baseline review in spring 2014, annual review thereafter (2014-2020).
      - **Owner:** Associate Chair of Undergraduate Studies

- **Lever 3.2 (S&T Levers 1.1 and 2.5):** Require all undergraduate students to participate in an experiential learning experience.
  - Action 3.2.1: Identify experiential learning opportunities that best integrate core engineering management program concepts.
    - **Goal/Metric:** Develop a list of approved opportunities by the end of the 2015 spring semester.
      - **Owner:** Department Chair
  - Action 3.2.2: Require all undergraduate students to participate in an experiential learning experience.
    - **Goal/Metric:** 100% of new students, initially enrolled fall 2015 and later, participating in a department approved experiential learning opportunity before graduating.
      - **Owner:** Associate Chair of Undergraduate Studies
• **Lever 3.3 (S&T Lever 4.9):** Require all undergraduate students to participate in a service learning experience within the curriculum.
  - **Action 3.3.1:** Assign a service learning coordinator to locate and manage projects.
    - **Goal/Metric:** Service Learning Coordinator appointed by the end of the 2014 calendar year (December 2014).
    - **Owner:** Department Chair
  - **Action 3.3.2:** Build relationships with companies and government agencies both within and outside Missouri to increase service-learning opportunities.
    - **Goal/Metric:** Initiate one new relationship per academic year (2015-2020).
    - **Owner:** Service Learning Coordinator

• **Lever 3.4 (S&T Lever 4.4):** Hire and retain faculty with the proper experience and expertise to support department undergraduate and graduate education.
  - **Action 3.4.1:** Hire NTT faculty to support both core and elective undergraduate Engineering Management courses, especially those that are non-research based EMSE courses.
    - **Goal/Metric:** Successful hire, when positions are available (2014-2020).
    - **Goal/Metric:** Successful promotion of NTT faculty (2014-2020).
    - **Owners:** Department Chair (lead) / Faculty Search Chair

• **Lever 3.5 (S&T Lever 3.1):** Expand the attractiveness and reach of the undergraduate Engineering Management program.
  - **Action 3.5.1:** Work with other Missouri S&T undergraduate programs to create dual-degree undergraduate opportunities for students primarily interested in non-Engineering Management majors.
    - **Goal/Metric:** Develop a curriculum framework for at least two dual-degree undergraduate opportunities by 2020, or one every three years (2014-2020).
    - **Owner:** Associate Chair of Undergraduate Studies
  - **Action 3.5.2:** Create the ability for undergraduate students to further customize / specialize the undergraduate Engineering Management program through the general option.
    - **Goal/Metric:** Develop a curriculum framework for customization and specialization of the undergraduate degree by the end of the 2015-2016 academic year (May 2016).
    - **Owner:** Associate Chair of Undergraduate Studies

• **Lever 3.6 (S&T Lever 4.7):** Increase undergraduate enrollment and graduation rates.
  - **Action 3.6.1:** Increase undergraduate enrollment.
    - **Goal/Metric:** Increase the three-year average undergraduate enrollment by approximately 5 students per academic year from 127 to 160 students between September 2014 and September 2020.
    - **Owner:** Associate Chair of Undergraduate Studies
• **Lever 3.7 (S&T Levers 3.1, 3.7 and 4.5):** Utilize graduate certificates to recruit, market, build relationships with other universities, and support department research.
  
  o **Action 3.7.1:** Create and / or support existing research-based graduate certificates that strengthen core research competencies, helping to attracting research-based graduate students; Create and / or support existing topical graduate certificates that can be taught by NTT professors, instructors, adjuncts and faculty in support of distance education efforts.
    §**Goal/Metric:** Create, replace, strengthen, and / or review one graduate certificate each academic year (2014-2020).
    • **Owner:** Associate Chair of Graduate Studies
  
  o **Action 3.7.2:** Cooperate with other universities to consider collaboration with distance courses, graduate certificates and graduate programs.
    §**Goal/Metric:** Initiate one new relationship / opportunity per academic year (2015-2020)
    • **Owners:** Director of Systems Engineering (lead) / Associate Chair of Graduate Studies

• **Lever 3.8 (S&T Levers 4.5, 4.7 and 4.8):** Develop a PhD student acceptance and qualification structure and process that supports both the teaching and research objectives of the department, and aids in retention of high quality doctoral students.
  
  o **Action 3.8.1:** Modify / update the PhD qualifying exam process to insure department faculty have the proper PhD students necessary to achieve individual and department research objectives.
    §**Goal/Metric:** New qualification exam process developed and approved for fall 2015 implementation.
    §**Goal/Metric:** Annual review of applicants (GRE, GPA, etc.), student progress, etc., to assess the success of the new PhD qualification exam (2016-2020).
    • **Owners:** Associate Chair of Graduate Studies (lead) / Director of Systems Engineering

• **Lever 3.9 (S&T Lever 4.6):** Increase access to professional mentoring for undergraduate students.
  
  o **Action 3.9.1:** Increase student mentoring and strengthen student relationship with faculty, Engineering Management Academy members, and alumni.
    §**Goal/Metric:** 50% of undergraduate seniors participating in professional mentoring by fall 2017.
    • **Owner:** Department Chair
Strategic Theme 4: Develop partnerships with industry, government and academia in order to provide increased visibility of EMSE academic programs and research, while also providing innovative and entrepreneurial responses to the current technological problems facing society.

- **Lever 4.1 (S&T Lever 3.5):** Partner with industry and academia to support undergraduate and graduate research and education.
  
  o **Action 4.1.1:** Create a department-level Industry Advisory Board to support both graduate level research and teaching outreach and objectives.
    
    - **Goal/Metric:** Initiate by December 2014, complete by December 2015.
      
      - **Owners:** Department Chair (lead) / Director of Systems Engineering
  
  o **Action 4.1.2:** Create a department level “Fast Track” group of Engineering Management alumni that are 5-10 years from degree completion to help with undergraduate and graduate curriculum refinement, while also providing a source for future Academy of Engineering Management membership.
    
    - **Goal/Metric:** Initiate by September 2015, complete by September 2016.
      
      - **Owner:** Department Chair
  
  o **Action 4.1.3:** Partner with other universities to meet research and teaching objectives.
    
    - **Goal/Metric:** Initiate discussions of one new collaboration opportunity per academic year (2014-2020).
      
      - **Owners:** Department Chair (lead) / Associate Chair of Graduate Studies / Director of Systems Engineering

- **Lever 4.2 (S&T Lever 1.5):** Collaborate with industry, government and academia to increase community outreach and provide innovative and entrepreneurial solutions to current engineering, engineering management and systems engineering challenges.

  o **Action 4.2.1:** Tie-in research with outside companies by pursuing relevant funding opportunities, such as the SBIR (Small Business Innovation Research) program.
    
    - **Goal/Metric:** Initiate one new opportunity every two years (2014-2020).
      
      - **Owner:** Associate Chair of Graduate Studies
  
  o **Action 4.2.2:** Work with other Missouri S&T departments and faculty to help researchers with internal technology transfers challenges.
    
    - **Goal/Metric:** Initiate discussions on one new technology transfer opportunity per academic year (2014-2020).
      
      - **Owner:** Department Chair
  
  o **Action 4.2.3:** Promote service learning and outreach with the local / regional community as a way to teach entrepreneurial thinking, providing a university-to-community-to-innovation link.
    
    - **Goal/Metric:** Initiate discussions on one new external service learning opportunity per academic year (2014-2020).
      
      - **Owners:** Service Learning Coordinator (lead) / Department Chair
**Leadership and Strategic Plan Coordination:**

The Engineering Management and Systems Engineering department at Missouri S&T has the following department leadership:

- **Department Chair**
  - Associate Chair for Graduate Studies
  - Associate Chair for Undergraduate Studies
  - Director of Systems Engineering

- **Department Committees**
  - Executive Committee, Graduate Affairs, Promotion and Tenure Committee, Public Relations and Events, Strategic Planning Committee, and Undergraduate Affairs

For coordination and execution of the EMSE department strategic plan, the EMSE Strategic Planning Committee will meet at the beginning of the fall and spring semesters to review performance metrics and tactical plan progress for each theme, lever and set of actions. Specifically, the Strategic Planning Committee will develop new tactical plans at the beginning of the fall semester, and will monitor progress and update the tactical plans as needed at the beginning of the spring semester.