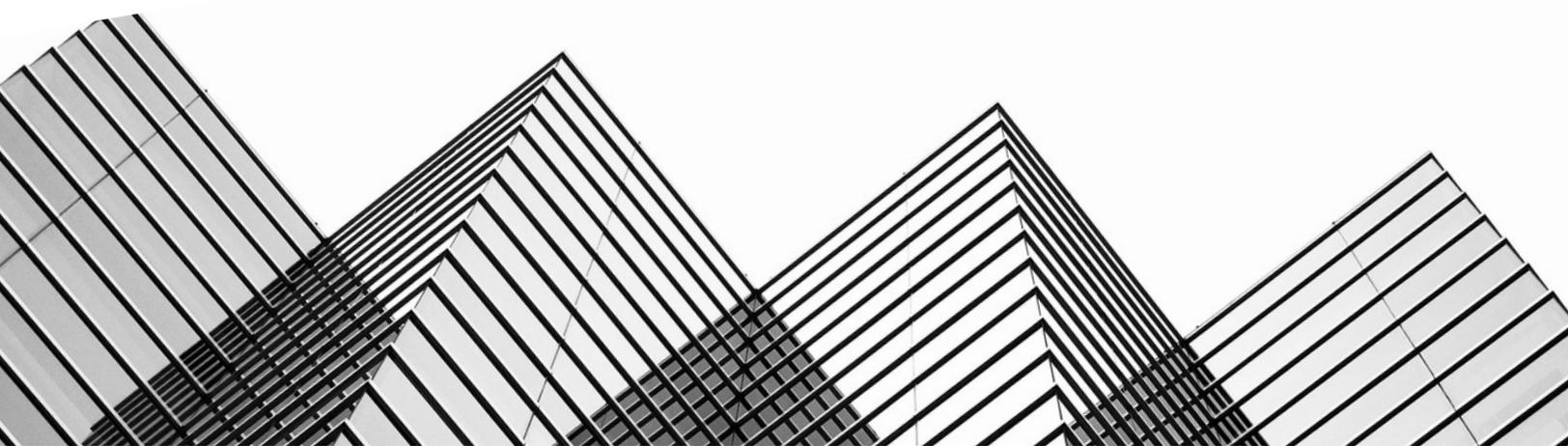**The Universities**
AT SHADY GROVE

Engineering and Technology Sector Hub

Recommendations Report

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Introduction & Background

The Universities at Shady Grove (USG) Strategic Plan 2.0 includes a commitment to our students and stakeholders, including our on-campus academic and program staff as well as our local and regional industries, to strategically engage them in the work that is instrumental to achieving **The Promise**:

The Promise

"We will hold ourselves accountable for ensuring students are able to secure meaningful employment opportunities and career opportunities upon completion of their degrees."

The USG Strategic Plan 2.0

As addressed in The Universities at Shady Grove's (USG) Industry Sector Hub Charter, USG's Promise will ultimately be fulfilled and operationalized through the work of an emerging Industry Sector Hub model. Specifically, the Hubs at USG are committed to fostering meaningful and sustained relationships between USG, academic partners, and local businesses in Montgomery County. These connections will ensure that students' educational journeys lead directly to lifelong learning and career success and that employers have regular access to a qualified and diverse pool of employees to help them grow and thrive.

Collectively, within the Engineering and Technology Hub we strive to:

▶▶ *Grow interest in engineering and technology careers within diverse populations*

▶▶ *Grow enrollment in engineering and technology-focused academic programs*

▶▶ *Ensure our engineering and technology graduates are career ready*

▶▶ *Meet the regional engineering and technology workforce demands*

Introduction & Background

ABOUT THE MEMBERS

The Engineering and Technology (E&T) Sector Hub includes members representing academic programs, regional employers, students, and USG staff. Each E&T designated academic program offered at USG was invited to identify a representative to serve on the Hub. Regional employers represent local or regional businesses operating in E&T fields. The student members are enrolled in E&T affiliated academic programs and were selected through the USG Student Council. USG staff members represent each of the six key organizational components as characterized through the flywheel and as noted in USG's 2.0 strategic plan. Please note that the current Engineering & Technology Sector Hub membership list is included in Attachment A.

PRIMARY OBJECTIVES

While the Industry Sector Hubs are responsible for a number of critical tasks as detailed in the Industry Sector Hub Charter, this report and the accompanying attachment will focus on summarizing the current process and work undergirding two primary Engineering and Technology Hub objectives at this point in time:

1 Leveraging relevant data and discussion, the Hub will develop a list of priority recommendations for review and decision by the USG Executive Council and Hub Coordinating Committee. All recommendations should be centered around delivering the USG Promise and service to the future fluid student.

2 Within the recommendation list, the Hub will outline the projected resource needs for spaces, people, equipment, software, technology, etc. to accomplish each initiative recommended.

Engineering and Technology Hub Recommendations

In order to arrive at a set of E&T sector hub recommendations that are strategically aligned with the USG 2.0 imperatives and the unique needs of the sector, members engaged in a review of relevant data and discussion that built on their expertise. The following four recommendations reflect both the data, the expertise of E&T sector hub members and the identification of those recommendations that the committee believes are the most impactful and achievable.

The recommendations are as follows:

RECOMMENDATION 1:

Collaborate with employers to develop and pilot skill-based stackable credentials model(s).

Institutions of higher education find themselves at an inflection point, needing to address the rising tide of student demand for more customized and flexible programs, while simultaneously maintaining their traditional, historical organizational constructs. Today's students are more diverse than previous generations and do not always follow a single and consistent path to employment. A changing workforce also compels higher education to more quickly and efficiently fill skills gaps and meet projected industry demands. This requires lifelong learning and re-skilling meaning individuals will need multiple entry and exit points through postsecondary education and the workforce.

Stacking credentials, including certificates, badges, and degrees can help address this need by easing student pathways and ensuring they do not need to pay for or spend time on the same material twice. They are building blocks where each short-term credential earned scaffolds to a higher-level credential. They are a benefit to both students and employers as they enable learners to obtain credit for a range of learning experiences and they align academic programming with the needs of the workforce. This recommendation seeks to engage academic and employer partners in discussions regarding efforts to embed short-term credentials into degree programs and to rethink the way credentialing is addressed through alternative approaches.

In addition, this initiative will propel the USM institutions, in partnership with employers and The Universities at Shady Grove to conduct a comprehensive internal audit of the diversity of courses across programs that are currently available at USG and to propose new courses that may be needed to build stackable certificates or credentials most responsive to the needs of local employers, their employees, and the individuals they hope to hire. Short-term stackable credentials will supplement and enhance learning options currently available through a traditional pathway and degree program. This will require collaboration and the development of streamlined, effective processes/procedures that allow for seamless interinstitutional couresharing and awarding of credentials as a means to support skill-based learning that is tailored to and highly responsive to industry demand.

RECOMMENDATION 2:

Define and implement an easily navigable overarching E&T pathway framework that provides a broad range of inclusive access points, enabling students to connect their unique strengths, interests, and values to E&T academic programming and career success.

The high tech industry is a crucial driver of the US economy and global competitiveness. The industry, however, must address talent shortages amidst increasing capacity. According to a report by Los Angeles-based management consulting firm, Korn Ferry, a global talent shortage is projected to grow to more than 85 million people by 2030, with 6 million projected to come from the US. The study projects that in the technology industry alone, the US could lose approximately $162 billion in revenue annually unless it can increase the stream of high-tech employees.

A 2023 talent shortage survey conducted by ManpowerGroup identified that 77 percent of US companies struggled to fill positions in 2023 with IT positions among the top ten most difficult to fill. According to the Bureau of Labor Statistics, the scarcity of engineers in the US will reach 1.2 million by 2026, while 545K software developers will have left the market by then. Addressing this talent gap will require a multi-faceted approach; including this E&T Hub recommendation to grow the talent pipeline through a clear pathway framework with inclusive access points.

Navigating the plethora of possible tracks or entry points into E&T academic programs can be daunting for students who identify that their strengths, interests, and values align with E&T careers. Students begin from a variety of starting points, with substantial variation in background, mathematics and science education, resources, and support structures. They also represent a variety of learner groups, including high school students, community college students, those desiring a career change, and those seeking career advancement. Creating an overarching E&T pathway framework that creates clear and equitable on-ramps for all learners, regardless of their background and entry point, will ease the way for increased numbers of students to find their path to E&T programs offered at USG and to employment in the region in high demand E&T fields.

A USG E&T pathway framework will require deep and meaningful collaboration with educators, employers, and community leaders. Building upon the success of existing pathway initiatives such as ACES, STEM Ready, and Talent Ready, USG and its partners are well positioned to lead this effort.

RECOMMENDATION 3:

Create an apprenticeship/co-op program model and pilot with regional employers.

USG and its partners endeavor to ensure that students graduate career ready. Career readiness comprises three key components, 1) mastery of the technical skills provided through curriculum, 2) acquisition of career competencies, and 3) meaningful workplace experience. E&T Hub members agree on a recommendation that enables students to gain impactful workplace experiences interspersed within their programs of study. Data provided to Hub members, including the 2023 Montgomery County Economic Development report examining and addressing the regional labor-demand log jam in STEM, indicated that regional E&T employers preferred to hire new graduates only after they acquired meaningful hands-on experience. While there are a variety of experiential learning opportunities available to students, it is imperative that academic institutions and employers collaborate to increase access to experiential learning that is flexible, scalable, meaningful, and aligned with curriculum.

Apprenticeships and Co-op programs provide unique opportunities for academic partners and employers to build on-the-job workplace programs that combine hands-on experience and training with classroom instruction. These experiences differ from traditional internships as they are interspersed throughout a student's program of study, extend over multiple semesters, are full-time paid positions, and often include mentor support while in the workplace. This model benefits students, who earn academic credit and industry credentials while also earning a wage and building skills, but equally important it benefits the employer, who then retains a highly skilled worker. The E&T Hub recommends that Hub members collaborate to create a robust apprenticeship/co-op program model/framework and identify one to two regional employers willing to pilot the model during the 2024-2025 academic year.

RECOMMENDATION 4:

Collaborate with employers and academic partners to host impactful on-campus E&T programs/events aimed at increasing visibility. Sample activities/events may include the following:

- ▷▷ Student competitions

- ▷▷ School district science fair finals

- ▷▷ Simulations/demonstrations and career fairs

- ▷▷ Regional, state, and national conferences, etc.

Enrollment growth in STEM programs is a national, regional and local priority given the data demonstrating significant needs in these areas. Overall enrollment in E&T programs offered at USG is on a three year decline from a high of 549 students in the fall of 2021 to a projected low of 362 students in the fall of 2023. USG has a role to play in ensuring that well-prepared graduates in STEM and E&T fields are available to fill vacancies and meet the employment needs of local employers.

Local workforce data indicate that:

1   Job demands for E&T careers are expected to increase by 12.3% by 2028

2   Sample job posts to hire opportunities for E&T careers include:
- Web developer - 5.7 more posts than applicants
- Data scientist - 5.9 more posts than applicants

3   Job forecasts from 2021 - 2031 include:
- Ranges of a 23% increase for operations research analysts to 36% for data scientists
- Salaries range from $82,000 to $101,000

USG's role in increasing the supply of highly qualified E&T employees and in enhancing the skills of existing employees is not currently as well-established in the broader community or with local and regional employers as we would like. E&T related events and activities that bring potential undergraduate and graduate students to campus will provide USG with an opportunity to enhance awareness and increase enrollment in E&T programs offered at USG. This recommendation can be combined with a broader marketing campaign to ultimately increase the number of prepared graduates and ensure that those employed in these fields are aware of graduate program opportunities at USG.

Process to Identify Recommendations

The strategic process used to identify recommendations focused on four primary categories is described below. We recognize and welcome the synergy between recommendations. For example, Recommendations 1-3 will all contribute toward Recommendation 4 which is focused on increasing the visibility of USG as a way to increase enrollment and meet the needs of employers for new and current employees. As the other Hubs complete their recommendations, we anticipate that there will be an opportunity to collaborate and combine some recommendations in order to arrive at a set of enterprise-wide USG Industry Sector Hub Recommendations.

1. Brainstorming Initial Areas of Potential & Possibilities

During the initial E&T Implementation Team meetings as well as the May 2023 E&T Sector Hub meeting, members of the various affinity groups represented through the Hub (employers, USG staff, academic programs, and students) actively engaged in discussion and were encouraged to generate suggestions that reflected innovation and bold thinking in support of USG's The Promise - ensuring students are able to secure meaningful employment opportunities and career opportunities upon completion of their degrees. The resulting ideas were documented, reviewed, reflected upon, and integrated into the recommendation development process as noted through the steps below.

2. Data Alignment, Integration and Categorization to Guide and Inform Recommendation Approach

The second step on the path to drafting recommendations was to begin aligning data and exploring areas of integration across relevant sources with the emerging ideas from the various affinity groups represented in the E&T Sector Hub. Data sources included the following:

▶▶ May 2023 E&T Industry Sector Hub meeting

▶▶ 2023 Montgomery County Economic Development report examining and addressing regional labor-demand log jam in STEM

> ▶ 2022 Leading for Diversity in STEM: A Renewed Commitment

> ▶ Enrollment projections for current academic programs at USG

After reviewing the ideas that emerged from Hub and the noted data sources, four primary, overarching recommendation categories were identified including the following:

ACADEMIC PROGRAMMING - Innovative academic program enhancements that support regional workforce trends/demands and respond to the needs of fluid students.

K-JOBS PIPELINE - Engineering and technology K-Jobs pipeline which is responsive to the needs of diverse learners and employers.

CAREER READINESS - Evidence based strategies that enhance the career readiness of engineering and technology students.

USG IS A WELL-KNOWN LOCATION OF CHOICE - USG is a well-known location of choice for engineering and technology students and for employers to engage with the future workforce.

3. Identifying, Vetting and Refining of Recommendations Through the Implementation Team

The next step involved drafting actionable, specific recommendations within each of the four broad recommendation categories noted above. The E&T Co-Chairs and Sector Hub Implementation Team members met to brainstorm and generate recommendations. These recommendations were discussed as a group and combined to form the initial list. The draft recommendations were responsive to the insights and data shared at previous meetings and resulted in 10 specific, actionable recommendations in the four categories described above. (Attachment B – Engineering and Technology Hub (E&T) Sector Hub Draft Recommendations_Full Set)

4. Engage the Sector Hub in Prioritizing Recommendations by Category

On October 30, 2023, the E&T Sector Hub met for the second time to discuss the 10 recommendations and select the top recommendation by voting for the highest priority in each of the four categories noted on Page 10. A review of workforce needs, enrollment data for E&T programs at USG, and a summary of the Diversity in STEM Symposium hosted by USG provided additional background for decision-making.

To ensure that all members had an opportunity to contribute to the recommendations, small groups of representatives from each affinity group (employers, academic programs, students, and USG staff) discussed recommendations from the list of 10 in Attachment B. Through these facilitated small group discussions, teams discussed the recommendations that they personally found most exciting to the work ahead, selected the top two of all 10 priorities, and then shared with the whole group. As a final step, the E&T Sector Hub members then voted to select a total of four recommendations, one from each category.

The Work Ahead

The USG Executive Council's review of the recommendations will lead to a determination of next steps, including potential funding in the four areas of stackable credentials, an E&T pathway framework, an apprenticeship/co-op pilot, and hosting impactful E&T programs and events on campus. Each of these recommendations in and of themselves are significant initiatives that require the strategic use of resources.

To ensure that the work progresses ahead without delay, we must be proactive in our thinking as we shift from recommendations to actions. The recommendations and subsequent actions rely on a creative, innovative, and bold thinking approach as well as the development of shared strategic processes across the four industry sector hubs that require collaboration, value stakeholder input, monitor progress, and ensure that we hold ourselves accountable to achieving The Promise. Each aspect is essential to the other to avoid both stagnation and "mission creep."

The Hub Coordinating Committee needs to immediately engage in thoughtful planning to proactively develop shared processes across industry sector hubs as this step is essential to determining and implementing next steps. For example, there may be cross-over as other Sector Hubs develop recommendations. A well defined plan to build synergy and ensure collaboration across hubs is instrumental to the success of these initiatives. Without this level of planning, we risk fragmentation and delay.

ATTACHMENT A

Engineering and Technology Sector Hub Membership List

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ATTACHMENT A
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ATTACHMENT A

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ATTACHMENT B

ENGINEERING AND TECHNOLOGY (E&T) SECTOR HUB DRAFT RECOMMENDATIONS_FULL SET

Hub Purpose

The Hubs at USG are committed to fostering meaningful and sustained relationships between USG, academic partners, and local employers in Montgomery County. These connections will ensure that students' educational journeys lead directly to lifelong learning and career success and that employers have regular access to a qualified and diverse pool of employees to help them grow and thrive.

Collectively, we strive to:
- Grow interest in engineering and technology careers within diverse populations
- Grow enrollment in engineering and technology-focused academic programs
- Ensure our engineering and technology graduates are career ready
- Meet the regional engineering and technology workforce demands

The draft recommendations below are designed to foster pilots, spur innovation, and guide programming as well as other activities that enhance USG's partnerships pathway for stakeholders in the engineering and technology industry sector and are derived from the following sources:
- March 2023 E&T Industry Sector Hub meeting
- 2023 Montgomery County Economic Development Corporation (MCEDC) report examining and addressing regional labor-demand log jam in STEM
- 2022 Leading for Diversity in STEM: A Renewed Commitment –
- Enrollment projections for current academic programs at USG

ATTACHMENT B

ENGINEERING AND TECHNOLOGY (E&T) SECTOR HUB DRAFT RECOMMENDATIONS_FULL SET

CATEGORY A: INNOVATIVE ACADEMIC PROGRAM ENHANCEMENTS THAT SUPPORT REGIONAL WORKFORCE TRENDS/DEMANDS AND RESPOND TO THE NEEDS OF THE FLUID STUDENT

1. Collaborate with employers to develop and pilot skill-based stackable credential model(s).
2. Work in collaboration with universities and employers to create an innovative and sustainable USG research infrastructure responsive to local and regional industries and provide opportunities for student participation.
3. Bridge E&T programs and the USG Student Affairs department to pilot a model that explicitly embeds defined Montgomery County Career Competencies into program-specific curriculum to implement a well-rounded learning experience for students.

CATEGORY B: ENGINEERING AND TECHNOLOGY K-JOBS PIPELINE WHICH IS RESPONSIVE TO THE NEEDS OF DIVERSE LEARNERS AND EMPLOYERS

1. Define and implement an easily navigable overarching E&T pathway framework that provides a broad range of inclusive access points, enabling students to connect their unique strengths, interests, and values to E&T academic programming and career success.
2. Establish an E&T pathway scholarship program(s) that is responsive to a wide range of student needs and supportive of increasing diversity in E&T careers.

ATTACHMENT B

ENGINEERING AND TECHNOLOGY (E&T) SECTOR HUB DRAFT RECOMMENDATIONS_FULL SET

CATEGORY C: EVIDENCE BASED STRATEGIES THAT ENHANCE THE CAREER READINESS OF ENGINEERING AND TECHNOLOGY STUDENTS

1. Develop and implement an E&T experiential learning/employer engagement model that brings employers in-residence at USG in exchange for providing experiential learning opportunities for USG students.
2. Develop and implement a campus-wide mentoring model that incorporates nuanced components relevant to engineering and technology students.
3. Create an apprenticeship/co-op program model and pilot with regional employers.
4. Create and implement an innovative cross-institutional E&T faculty engagement strategy focused on leveraging the expertise and unique employer/instructor connections inherent in part-time/adjunct faculty roles to deepen faculty/employer relationships leading to curricular enhancements and experiential learning opportunities for students.

CATEGORY D: USG IS A WELL-KNOWN LOCATION OF CHOICE FOR ENGINEERING AND TECHNOLOGY STUDENTS AND FOR EMPLOYERS TO ENGAGE WITH THE FUTURE WORKFORCE

1. Enhance opportunities for employers to engage with E&T academic programs and faculty by providing in demand professional development and continuing education options for current employees.
2. Collaborate with employers and academic partners to host impactful on-campus E&T programs/events aimed at increasing visibility. Sample activities/events may include the following:
   a. Student competitions at USG
   b. School district science fair finals
   c. Host simulations, demonstrations and career fairs
   d. Sponsor STEM-focused summer camps for middle and high school students
   e. Host regional, state, and national conferences, et cetera