

## **Universities and Industries: A Proactive Partnership Shaping the Future of Work**

### **Mr. Daniel Weagle, Worcester Polytechnic Institute**

Dan Weagle, Sr. Account Manager, Office of Academic and Corporate Engagement, Worcester Polytechnic Institute (WPI)

Dan helps corporate leaders from across industries identify current and future challenges. He works alongside WPI faculty and subject matter experts to develop and deliver strategic partnership plans to address these challenges. These plans include proactive approaches to hiring, university research, and industry-specific graduate education for current employees. Once a strategic plan is implemented, Dan regularly meets with corporate partners to assess the impact of the plan and make necessary adjustments to maximize value to corporate partners. Dan currently works closely with companies from the energy, biotech, defense, insurance, and finance industries. Dan enjoys learning more about new technologies and the ways in which those technologies impact existing and emerging industries.

### **Mr. David B. Ortendahl, Worcester Polytechnic Institute**

David Ortendahl currently serves as Director of Corporate Relations at Worcester Polytechnic Institute (WPI) in Worcester, MA. In this role he currently oversees the WPI Career Development Center "Employer Team" and actively bridges the strategic corporate development for the career center in parallel with strategic initiatives of the WPI Division of Academic & Corporate Engagement and the University. He is a member of NACE (National Association of Colleges & Employers) and NACRO (Network of Academic Corporate Relations Officers) and has over a decade of experience in the realm of employer/corporate relations.

David is a member of the NACRO Benchmarking Committee and is co-chair of the NACRO Member Survey Sub-committee. For NACE, he serves as the focal to organize corporate networking events for the "NACE STEM Coalition," including the inaugural "NACE STEM Reception." David completed his MBA at Suffolk University in Boston, MA, and Bachelor's degrees at the Massachusetts College of Liberal Arts. He has served in a variety of roles in Higher Education at public and private universities including in divisions of Student Affairs, University Advancement, and is presently in the "Academic & Corporate Engagement" division at WPI.

### **Mr. Michael Ahern P.E., Worcester Polytechnic Institute**

Michael F. Ahern, P.E. (mfahern@wpi.edu) is a Director in Academic and Corporate Engagement at Worcester Polytechnic Institute (WPI). Mike leads a group that helps WPI support the educational needs of both corporate partners and individual students by developing new graduate programs for working professionals. Further, Mike teaches in WPI's Foisie Business School and performs research to improve power grid cybersecurity for the U.S. Federal Government.

Mike started as an engineer at gas turbine engine manufacturer Pratt & Whitney Aircraft in 1978 and joined an electric and gas utility company, Northeast Utilities (NU), in 1981. At NU, Mike rose through a series of increasingly responsible leadership positions and was promoted to Vice President in 2005. Following his retirement from NU in 2012, he joined WPI in his current capacity.

Mike earned a Bachelor of Science degree from WPI where he was selected as a member of the National Engineering Honor Society, Tau Beta Pi. He earned both Master of Science and Master of Business Administration degrees from Rensselaer Polytechnic Institute.

Mike is a registered professional engineer in Connecticut and held an electric Transmission System Operator certification from the North American Electric Reliability Council.

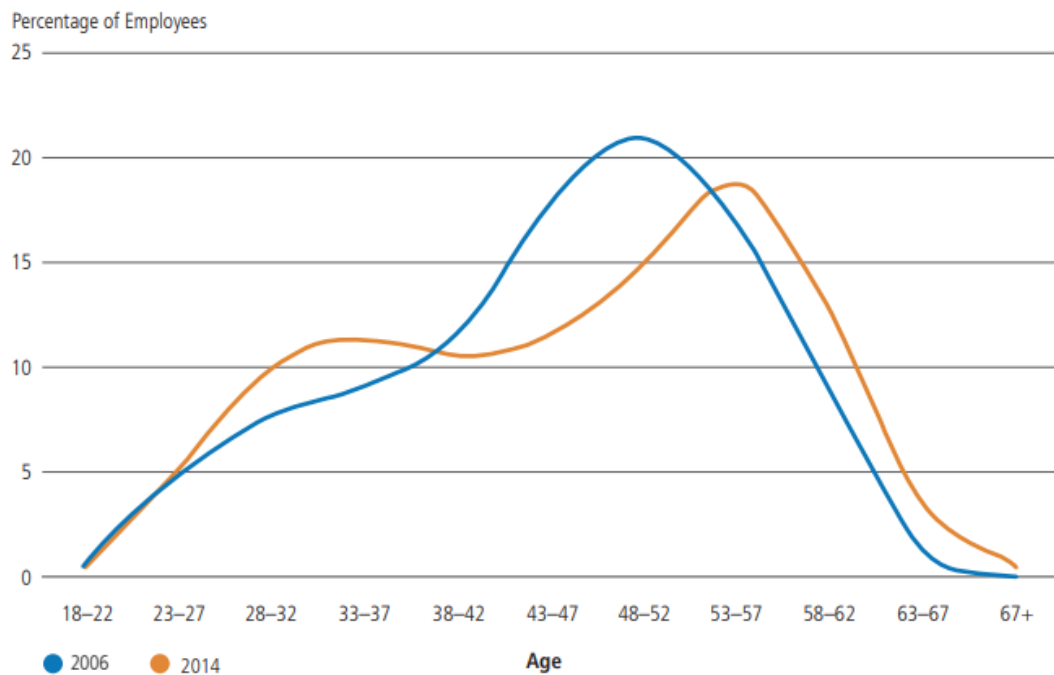
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#### Introduction and Background

The U.S. Electric Power industry directly employs 2.7 million people; it is estimated that the industry indirectly supports more than 7 million jobs and contributes \$880 billion to the economy annually (roughly 5% of the GDP) [1]. Currently, a large percentage of the utility and electricity sector workforce is nearing retirement. In the 2017 Quadrennial Energy Review report, it is estimated that "...roughly 25 percent of employees [from the energy industry] will be ready to retire in the next 5 years" (Figure 1. Age Distribution in Electric and National Gas Utilities, 2006-2014) [2].

**Figure 1. Age Distribution in Electric and National Gas Utilities, 2006-2014**



Forward-thinking leaders at many utilities understood this significant workforce demographic challenge as early as the 1990s. They sought out creative ways to attract job-seekers to the industry to help fill the talent pipeline and address this significant projected loss of experienced, knowledgeable employees. Electric utilities began targeting local STEM universities for both attracting new talent and developing existing employees through graduate education and training partnerships to help compensate for the impending experience exodus resulting from the retirement of their largest demographic.

Worcester Polytechnic Institute (WPI) was an intuitive first choice for many utilities in the Northeastern U.S. looking for a local Corporate-University partnership. WPI has been active in electrical engineering (EE) education since the field's inception in the 1880s [3]. The first graduate course in EE at WPI was offered in 1889 and, in 1907, WPI established Atwater Kent

Laboratories, the first building in the United States constructed strictly for the purpose of electrical engineering education and research [4]. Talented WPI EE graduates were sought-after by the electric utility industry and WPI was a feeder school for many local utilities. The electrical engineering program continued to evolve over the years and increased in focus to include emerging areas like signals, circuits, and computer engineering. With the emergence of new EE topical areas, there was an increase in career opportunities outside of the stalwart electric utility, which has translated to increased competition for EE talent between existing and emerging industries.

Badrul Chowdury, professor in the electrical and computer engineering department of the University of Missouri-Rolla, paints a not-so-pleasant picture of the electric power industry's significant challenges in hiring electrical engineering talent resulting from increased competition from emerging industries in the early 2000s: "For decades, things have gone downhill [in the electric power industry]. The salaries paid to power engineers have been lower than those of virtually all other electrical engineers. Student enrollments have steadily declined. University programs have atrophied. To top things off, as the electric power industry has been radically reorganized in the last 10 years to allow for greater competition, utilities have economized by cutting staff, even as the technical requirements of running their operations have become spectacularly more demanding" [5]. Given this bleak outlook, student interest in energy careers waned, and it had become increasingly difficult for industry to attract and retain new talent. Many universities discontinued their Power Systems programs at the undergraduate and graduate level. WPI, however, maintained its research and teaching capabilities in the area of Power Systems.

In the mid-1990s, proactive energy utility leaders from organizations like National Grid, ISO New England, United Illuminating, and Eversource Energy (f/k/a NSTAR, Northeast Utilities, CL&P, and PSNH) connected with a solution-focused team at WPI's division of Academic and Corporate Engagement (ACE). Together, influencers from these organizations entered into an ongoing series of forward-thinking, transparent conversations around industry workforce challenges. The purpose of these conversations was to uncover opportunities that could not be solved by industry *alone*, prioritize partnership opportunities (high v. low), categorize these opportunities (short-term v. long-term), and explore and implement actionable partnership solutions.

The role of WPI's ACE division is to facilitate rich dialogues between external corporate partners and internal stakeholders (WPI administration, faculty, and staff) and to progress key elements from those dialogues into impactful solutions-based partnerships. As the number of corporate partnerships has grown at WPI, so too has the complexity of the communication and number of internal and external stakeholders required to support the partnerships. With this growth, the ACE division established processes to facilitate accurate, timely communication between busy internal and external stakeholders. This paper will provide examples, specific to energy industry partnerships, to demonstrate ways in which WPI engages with industry to identify opportunities for mutually-beneficial partnerships, record and progress industry

engagement across university departments, and seeks to understand and act upon future needs within the energy industry.

### **Creating the Division Structure for Successful Corporate Engagement**

First impressions are important. This statement is true in industry as well as academia. Corporate leadership can easily become frustrated when there is no clearly-defined university representative or formal process for engaging with faculty, staff, and students. For that reason, it is important that WPI's ACE division is structured in such a way that WPI's busy corporate partners can easily connect with the appropriate WPI representative around their specific needs in a timely manner. Further, it is the role of those representatives to engage with the corporate partner to better understand their needs, ensure that the proper corporate and WPI representatives are engaged in a meaningful dialogue around corporate needs, and remove obstacles to build and execute a strategic corporate partnership plan.

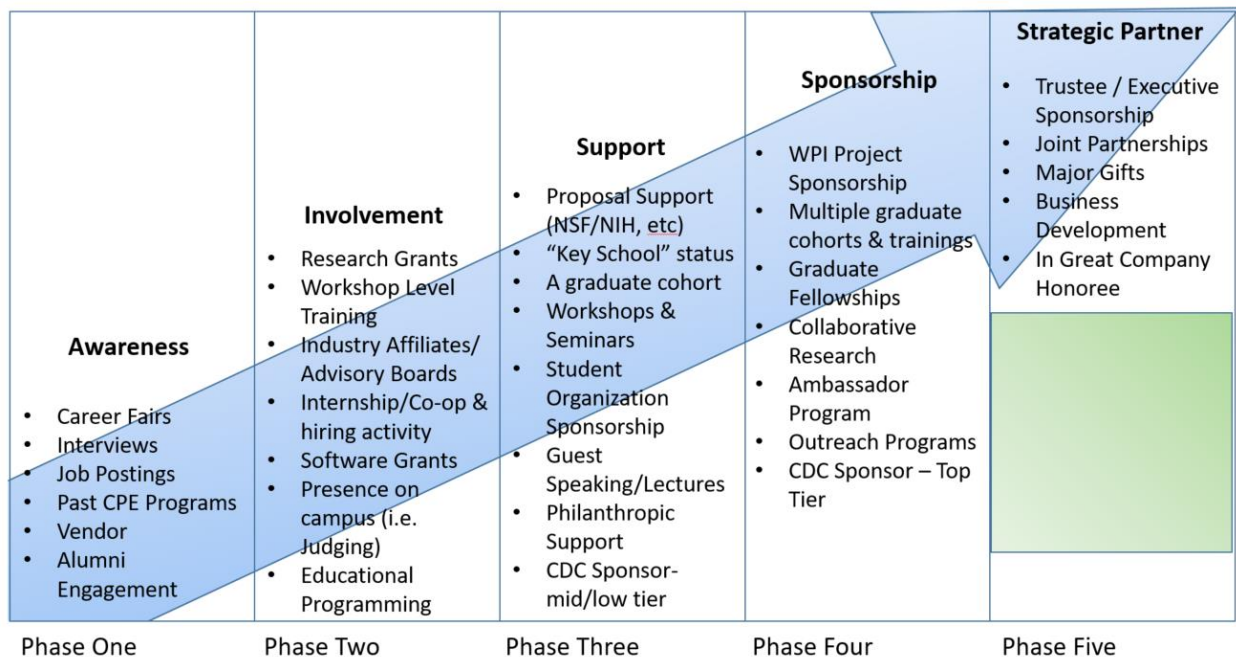
Different offices within the ACE division engage with students, faculty, and corporations in different ways. These offices, although part of the same division, were often siloed in their approach to engaging with these stakeholders. A siloed approach created redundancies and prevented the division from maximizing stakeholder impact. Two offices that regularly engaged with these stakeholders were the office of Corporate and Professional Education, which oversees graduate programs and training for corporate partners, and the Career Development Center, which manages activities related to engaging and recruiting talented WPI students.

In 2017, the division of Academic and Corporate Engagement realigned departments and personnel to best support stakeholder needs and drive a new chapter forward of its original vision. Under this realignment, the Corporate Partnership team was created as the externally-facing branch of the office of Corporate and Professional Education. Similarly, the Employer Relations team was identified as the externally-facing branch of the Career Development Center. Together, these two teams were tasked with developing a more deliberate strategy for supporting and growing corporate partnerships at WPI and increasing partnership-related communication across the division. Through information-sharing sessions and strategic corporate partnership meetings, these two teams work to identify corporate partners of WPI who engage with *some* departments within ACE, but not others. Cross-divisional corporate engagement strategies have been developed for companies that are identified as "high potential" for expanded partnership opportunities. These strategies seek to introduce highly engaged corporate partners to new academic departments and administrative offices at WPI whose expertise and services could be of benefit to the corporate stakeholder.

This realignment was a major shift in thinking among internal university departments, and has not been without its challenges. Chief among those challenges is communicating the benefits of the new structure to members of other WPI departments and obtaining "buy in" for the new model. The realignment, while confusing to some internal stakeholders at WPI, did create an opportunity for members across the ACE division to re-engage with these longtime stakeholders (faculty and staff from other departments) around their newly-defined roles and how those roles can directly support the initiatives and goals of other departments while better supporting the overall mission of WPI.

On a macro-level for the university, the ACE division is a key stakeholder in driving the efforts of a broader “Institutional Engagement” model which incorporates WPI’s research enterprise, the division of advancement, and the ACE division. In this model, WPI has utilized best practices from the Network of Academic Corporate Relations Officers (NACRO) to evaluate key partnerships with corporations. The 5-phase partnership approach defined in “Five Essential Elements of a Successful Twenty-First Century University Corporate Relations Program” served as a major inspiration for the WPI partnership growth model [6]. In the WPI approach, teams evaluate corporate activity across a WPI-custom-view of the five phases as well as across three divisions – research, ACE, and University Advancement. Figure 2 was created by WPI’s externally-facing ACE division as a tool to help evaluate and analyze existing corporate partnerships.

**Figure 2. NACRO-Inspired 5 Phases with a WPI Overlay**



**Powerful Partnerships**

The Energy Industry is facing significant challenges, including an aging workforce, regulatory changes, and increasing customer demands for grid flexibility. These challenges may seem like a recruiting impediment to an industry desperately seeking to attract new talent; however, challenges like these translate to opportunities for the problem-solving students at WPI. In fact, the newest-generation of job-seekers is attracted to careers that provide a sense of purpose and industries that make a positive impact on society [7]. A 2017 study by Deloitte found that “...millennials are becoming increasingly sensitive to how their organizations address issues such as income inequality, hunger, and the environment. Eighty-eight percent of millennials believe that employers should play a vital role in alleviating these concerns, and 86 percent say that business success should be measured by more than profitability” [8]. The Energy industry,

with its emerging focus on incorporating renewable energy into a capital-intensive, existing grid structure in a sustainable, responsible way, should be a prime candidate for millennials seeking a meaningful career with the opportunity to make significant positive impacts on the environment.

WPI takes a consultative approach in working with Energy industry partners around building and maintaining a talent pipeline. In doing so, it is important that the WPI ACE team understand each corporate partner's unique recruitment and retention goals in order to craft a tailored strategic plan to effectively navigate the career marketplace at WPI and work toward continual engagement of the workforce to drive retention.

In the late 1990s and early 2000s, ACE engaged with a number of local, prominent electric utilities to craft and deliver tailored, onsite graduate Power Systems Engineering programs for their employees, to engage in sponsored student projects, and to fund WPI faculty research. As these initiatives expanded and WPI began engaging with more and more corporate partners in the industry, ACE representatives noticed three key themes emerging around the importance of recruiting talent, retaining and developing the workforce, and planning for the future of the energy industry amid so many uncertainties (regulatory changes, technological advances, etc.). In response to these three topics and at the urging of leadership within these partnering companies, WPI's ACE division assembled the Energy Industry Advisory Board in 2010 to further explore these topics and develop actionable solutions. The board, currently known as the Energy Strategy Board, consists of leaders across business units from organizations like National Grid, Eversource Energy, ISO New England, and AVANGrid with a passion for attracting, developing, and retaining talent.

The first actionable solution that resulted from the Energy Strategy Board was to create an annual event for the purpose of connecting industry leaders with talented local students to discuss industry trends and collaboratively envision the future Power Grid. A successful event would include networking opportunities, faculty research presentations, and presentations around challenges and opportunities for the next generation of career-seekers in industry. From this vision, the Annual WPI Energy Symposium was established in 2011.

This annual, free-to-the-public event has been a great success. Each year, the WPI campus welcomes 100+ industry representatives, WPI faculty, and local college students (including WPI students and others from the Higher Education Consortium of Central MA (HECCMA)). Each Symposium addresses an emerging theme in the energy industry. Keynote speakers, expert panels, and faculty research presentations are composed to complement and support that theme and to reinforce messaging to students around the importance of tackling these sticky issues in order to "keep the lights on" for energy customers. Before, during, and after the event, students have the opportunity to network with professionals from the world of power and learn more about career opportunities and the industry's outlook. In the past two years alone, several WPI students have reported to ACE colleagues that they received job offers as a result of dialogues that started with industry representatives at the WPI Energy Symposium. In addition, a key industry need was being met since undergraduate interest and enrollment in Power Systems grew markedly. Today, WPI's undergraduate Power courses often enroll 40+ students, making them

quite popular. Many of the students who enroll in these undergraduate offerings plan careers in the Energy Industry, which helps to fill the talent pipeline for WPI's power industry partners.

In addition to facilitating connections between students and industry leaders, it is a main goal of the WPI Energy Symposium to discuss and further explore emerging trends within the industry. A theme that continued to emerge in keynotes, panels, and audience questions was the need to educate and prepare the current and future energy workforce on concepts related to emerging renewable energy technologies (which feed energy back into the grid) and how those technologies integrate with the existing power grid (which was designed for one-way distribution of energy to consumers, and not to accept and distribute energy generated by those same consumers).

With this input from industry professionals around this emerging need, WPI developed an entirely new Power Systems Engineering graduate course, ECE 5532/Distributed and Renewable Power Generation. This advanced graduate course, which requires students to complete four graduate-level prerequisite courses, "...introduces the characteristics and challenges of interconnecting increasing numbers of Distributed Energy Resources (DERs) to the Electric Power System (EPS)" [9]. This fully-online course, premiered in 2016 and has reached maximum enrollment each time it has been offered by WPI, making it one of the most popular Power Systems courses offered by the university. Most enrolled students are full-time working professionals employed in the energy industry. Student feedback on the course is consistently positive and students find the concepts covered in the course immediately applicable to work-related challenges they are currently undertaking in their energy careers.

### **Growing and Maintaining the Career Pipeline**

Campus recruiting partnerships are at the core of a university's work to develop students' minds and guide them into successful careers. Blending experiential education, such as internships or co-ops, with the curricular skills gained through classrooms and labs, Higher Education is committed to augmenting the student experience with meaningful opportunities. Offices like the WPI Career Development Center provide the facilitation of industry opportunities with the career guidance students desire in order to be successful.

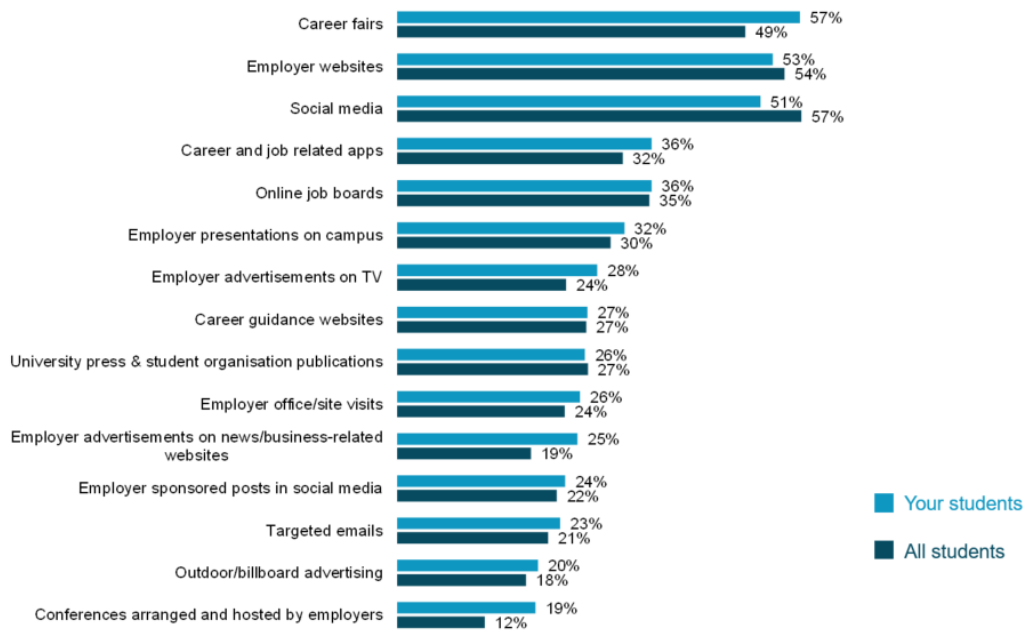
In Academic Year 2017-2018, the WPI Career Development Center successfully implemented a number of recruiting programs that yielded significant impact. From a student-services point of view, over 3,300 unique students, of WPI's 6,000 total student population, attended a WPI career fair. Throughout the year, over 75% of the undergraduate population utilized a service of the CDC. These statistics are incredibly helpful to WPI corporate partners who seek to understand the available pool of talented, engaged potential employees. It is also important for corporate partners to realize the level of industry competition for access to those potential employees.

From an employer services standpoint, over 5,600 companies were connected with the CDC with over 28,000 unique job postings made available to the WPI student and alumni populations via the Handshake career services platform. Of those, 480 companies were present on the WPI

campus to recruit WPI talent on a face-to-face basis and over 100 organizations were involved in 3 or more recruiting services.

A recent Universum report shows that WPI students prefer to be engaged on campus by potential employers (Figure 3) [10]. “Employer Presentations on Campus” was highly ranked preference among students, after “Career Fairs,” the most preferred method of engagement by WPI students. Conveniently, WPI hosts “Tech Talk” opportunities for employers to engage with students around a technical topic on campus. Subject matter experts from industry are invited to engage the WPI community around industry-specific topics that can have a lasting impact on soon-to-be job or internship seekers. These types of events cannot happen successfully without student, faculty, and industry collaboration. WPI energy industry partners have delivered several Tech Talks on campus over the years to ignite and further fuel technical interest in industry careers.

**Figure 3. Student Perspective on Employer Engagement**



Many companies continue to engage students around industry-related technical topics outside of theoretical exploration in the Tech Talk lecture hall. “Experiential Education” is a broad term that can encompass a variety of project and practical training or work experiences. According to the National Association of Colleges and Employers (NACE), experiential education “... encompasses a wide variety of enriching opportunities for students, including service-learning, volunteering, student organization leadership and campus involvement, faculty-led research and projects, experiential study-abroad, student employment/work-study, cooperative education, and internships” [11]. WPI encourages corporate partners to take the next step in engaging students through sponsorship of student projects.



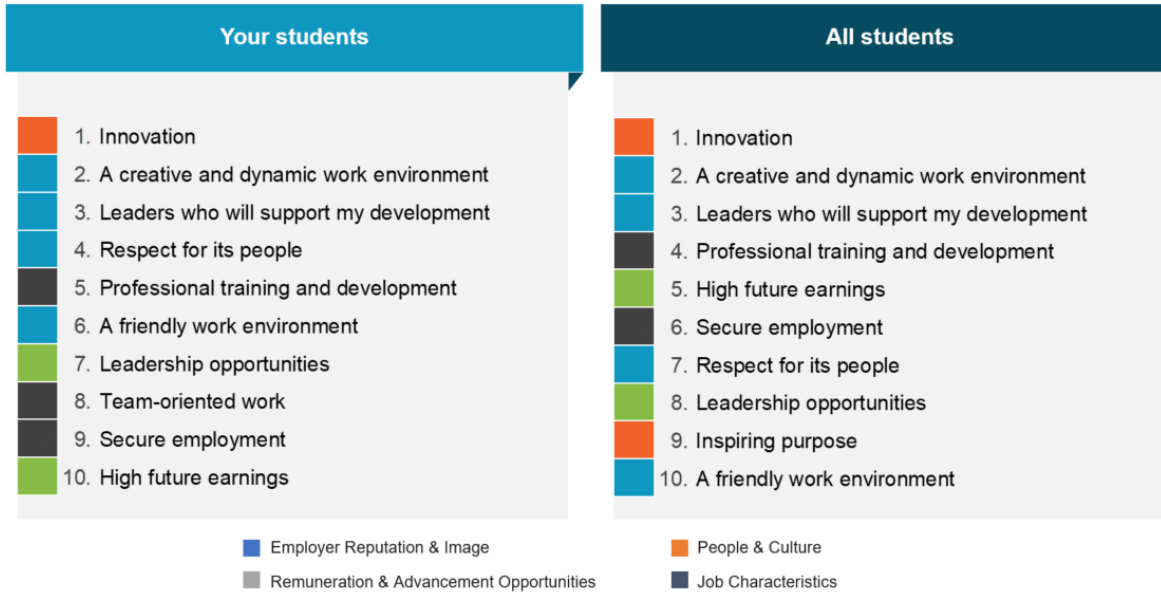
Since the 1970s, WPI's project-based curriculum at the undergraduate level has been providing significant value to students. WPI curriculum requirements balance both "soft skills" with a complementary offering of "technical skills" and depth required in each discipline. Through the senior-year "Major Qualifying Project" (MQP), companies can also interact with faculty and students by providing a meaningful engineering/science challenge through sponsorship. When coupled with an internship or co-op experience, businesses can grow university talent into strong full-time hire potential. These students, by spending ample time with the employer through internships and sponsored project work, understand the business culture and mission of the organization and have deemed the company a good "fit" for their careers. According to NACE, over 45% of interns convert into full-time hires and are able to on-board and provide value more rapidly to those businesses than direct new-hires [12]. Since 2003, local energy utilities have sponsored over 10 WPI MQPs and there are currently 3 MQP contracts being negotiated for Academic Year 2020 with utilities.

While being present on campus and engaging with students in a "face-to-face" setting is a major priority for most corporate partners, WPI strives to encourage virtual engagement with members of the WPI community as well. WPI, like many universities, utilizes a centralized recruiting platform (Handshake) that allows industry partners to connect with student and alumni talent through an online career portal. As a follow-up to many WPI conversations with the electric utility partners around recruiting opportunities, the WPI team shares company-specific Handshake reports. These reports summarize the number of jobs and internships that the utilities have posted over the past three years as well as the position titles and years of experience required for each position. Several utility partners have analyzed the report and identified additional open positions that should be posted to WPI students through the portal. The teams were able to follow up with appropriate hiring managers internally at their organizations in order to post those additional positions in a timely manner to support their recruiting cycle.

## **Retention**

The Universum Talent Research 2018 Partner Report indicates that the third most important employer attribute among college-going students nationally (and at WPI) was "Leaders who will support my development" [10]. This attribute ranked significantly higher than both "secure employment" and "high future earnings" (9th and 10th respectively) (The Most Important Employer Attributes). Clearly, the next generation of employees values companies that realize their potential and are willing to invest in their development. Further, many working professionals have witnessed that "...rapidly advancing technologies and team-centered business models drive organizations to redesign themselves...[and employees can struggle] ...to create new career models and build new skills across the workforce" [13]. Simply put, current and future employees are seeking out rewarding professional and personal development opportunities in order to position themselves for success; they want their employers to support their efforts by investing time and resources in their development.

**Figure 4. The Most Important Employer Attributes**



As part of a consultative approach, ACE has recommended that the energy industry, facing a significant exodus of experience resulting from a rapidly-retiring workforce, strongly consider offering customized graduate programs for their existing workforce. There are benefits to this approach in addition to meeting the professional development expectations of the workforce described above; these include collaboration across business units in an organization and increased employee retention.

Many energy utilities partner with WPI to offer convenient, part-time cohort-based graduate programs for employees in different disciplines that complement the nature of work in different business areas across the company. In many cases, there is significant knowledge transfer resulting from the engagements of a cross-departmental team of graduate students who regularly engage in a live classroom setting and through project-based group work outside of class. This knowledge transfer can have a silo-busting effect in a corporate environment and many corporate partners have noticed the impact within their organizations.

For example, in partnership with one power utility, WPI offers a graduate track-based model featuring three different academic tracks (Power Systems, Mechanical Engineering, and Construction Project Management) which correspond to the needs of different business areas at the utility (Transmission & Distribution, Gas, and Capital Construction Projects, respectively). There are three core management courses that all students complete together, regardless of their academic track. As a result of this curriculum structure, employees from different “sides” of the business who may never have a work-related reason to engage with one another, are able to engage in information sharing. In addition, students are encouraged to select course projects related to industry challenges and company-specific opportunities. This incorporation of work-related projects allows students from different sides of the business to better understand and appreciate the roles and responsibilities of their counterparts in separate divisions. There are

even opportunities to provide suggestions, feedback, and lessons-learned that are applicable from one division to another.

Further, the cadence of course offerings and terms of graduate program participation can be adjusted by the corporate sponsor to assist with retention goals. One of the customizable features of a corporate-sponsored graduate partnership with WPI's ACE division is that the course cadence is defined by the sponsor. A 30 credit, 10 course Masters degree offered by ACE could be completed in as little as two and a half years at four courses per year; however, in consideration with other factors like professional development budget and a cautious approach to avoiding employee burn-out, some corporate partners select to halve that cadence, expanding the program to a five year duration at two courses per year. This lengthened cadence can be a strategic approach by partnering companies to assist with reaching employee retention goals.

### **Planning for the Future of Work: Membership in Industry's Professional Organizations**

While most of the examples, tools, processes and procedures provided in this paper have highlighted WPI-based solutions, one of the best attributes of the ACE division is working to identify undefined future challenges and opportunities. In a recent conversation with Wayne Bishop Jr., Head of Marketing at Omicron Electronics Corp, Wayne remarked "The [energy] industry is constantly impacted by emerging and disruptive technology. How you view the technology reflects on your organization's approach: If it's emerging, it's because you're proactive. If it's disruptive, it's because you're reactive." While ACE strives to understand and engage with our corporate partners and react to their needs in deep and meaningful ways, the organization must be proactive in its approach to industry partnership by working from the same side of the table as our corporate partners in navigating industry challenges on the horizon.

ACE seeks out opportunities to better envision and shape the future of the industries with which we work. Members of the ACE division have been active participants in leading energy industry-focused professional organizations like the IEEE Power & Energy Society (PES), Energy Providers Coalition for Education (EPCE), the Center for Energy Workforce Development (CEWD), Energy Council of the Northeast (ECNE) and others. Faculty and staff across WPI attend conferences and networking events hosted by these organizations. A number of WPI representatives maintain officer positions or serve on committees within these organizations. Still other WPI representatives volunteer time to engage in initiatives central to the mission of these organizations.

Another beneficial partnership that WPI fosters is with Universum. Universum "...works with over 2,000 universities, alumni groups, and professional organizations to gather insights from students and professionals in order to advise employers on how to attract and retain talent that fit their culture and purpose." [13]. As a university partner of Universum, WPI has access to comprehensive Universum employer-branding reports in return for opening the survey to WPI students. When presented with case-specific data around "top-valued employer attributes" or given a snapshot of "ideal employer ranking" by company name, many employers find that the results do not reflect some of their assumptions. This data can be used to supplement their own research as they work to adjust their messaging and positively position the energy industry among competing industries for new talent.

The common lament of many energy industry hiring managers is that they are unable to compete over talent with big tech companies. It is true that some big tech companies rank high on Universum's *national* "Ideal Employer Ranking" survey; however, those companies are ranked much lower on the same survey taken by WPI students. A number of local companies who regularly engage with the WPI campus community in myriad ways score higher than some widely recognized big tech companies. ACE colleagues present these reports to encourage partners across all industries to be present and engaged in their university partnerships.

## Looking Ahead

WPI continues to explore ways to work alongside its partners in the energy industry to proactively identify future opportunities to attract talent and address workforce development needs. As the industry continues to grow and evolve, so too does WPI's approach to supporting the industry partnership for continued success. WPI's model for corporate engagement has evolved as the needs of internal and external stakeholders have developed over the years. What has remained constant is the university's commitment to tackling industry challenges alongside our corporate partners. These increasingly complex challenges provide unique opportunities for WPI students and faculty, self-identified problem solvers who are always seeking out practical, real-world opportunities to exercise the theories developed through formal education.

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