Report to the Provost and Senior Vice President for Academic Affairs on Recommendations for Enhancing and Adding to Michigan Tech's Methods of Education Delivery

Prepared by the Provost's Task Force on Innovation

December 20, 2018

Michigan Technological University

The following report is divided into four sections: this introduction, the Task Force on Innovation's recommended initiatives for Michigan Tech to implement or expand upon, the results of a prioritization activity, and an "inventory" of current practices at the university in the categories upon which the TFI focused.

During fall semester 2018 Provost Huntoon charged and convened a group named Task Force on Innovation (TFI). This team met regularly as a full group and split into smaller working groups to explore methods by which Michigan Tech can better deliver education to serve a larger number of students, including students who are different from the University's traditional, residential undergraduate student body. Michigan Tech is a leader in residential, hands-on engineering education, but could better serve future students through creative

and varied educational vehicles and strategies. The task force was split into five working groups that focused on the following areas:

- online learning
- pre-college to university transition
- remote sites, partnerships and off-main-campus sites
- alternative credentials
- alternative scheduling

It is important to note that during the course of brainstorming, as the team explored initiatives by which Michigan Tech could better deliver its educational programming, we found it difficult to imagine success without discussing cost, content of programming and marketing. While the team strove to make only recommendations regarding vehicles of delivery, it is the opinion of the group that success in any of these areas will be dependent upon, among other things, these market factors.

Some of the following recommendations represent initiatives the University is currently engaged in or have been implemented with little or no continuation. It is the recommendation of this task force that, should any of these recommendations be adopted, an implementation team first study opportunities for improvement based on past experiences.

Membership:

Chad Arney (co-chair)
Tara L. Bal
Apurva Baruah (graduate student)
Anne Beffel
Steven Blackburn
Mari W. Buche
Janet Callahan (co-chair)
John Irwin
Jean Kampe
Cody Kangas
Pushpalatha Murthy
Cassy Tefft de Muñoz
Erin Thompson
Jeremy Worm

Task Force on Innovation Charge – August 2018

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Reporting Structure

Reports to: Provost and Senior Vice President for Academic Affairs
Chaired by: Director, Strategic Initiatives, Office of the Provost and Senior Vice President for Academic Affairs

Charge

1) Engage in open-ended, blue-sky thinking regarding ways in which Michigan Tech can improve the ways in which the University meets the educational needs of current and prospective students.
2) Provide the provost (and the President's Council via the provost) with recommendations intended to make Michigan Tech more available, accessible, convenient, and relevant to prospective students. Topics that may potentially be considered include

(examples only):

   a) Online education
   b) Blended education (e.g., online and on-site programs, online and off-site programs)
   c) Non-traditional scheduling (e.g., block scheduling, inter-semester scheduling)
   d) Establishment of remote sites for delivery of courses/programs
   e) Stackable credentials (e.g., badges, certificates) that together lead to one or more degrees or professional certifications
   f) Competency-based education (e.g., credit for experience)
   g) Partnered programs (e.g., with other educational institutions, industry partners, government agencies)

3) Provide recommendations regarding the priority of possible actions
4) Provide recommendations on composition of working groups and/or focus areas that could be tasked with implementing one or more recommendation.
5) Provide recommendations on types of metrics that can be used to gauge the effectiveness of activities.
6) Provide report of recommendations by December 31, 2018.

Recommendations for Michigan Tech to Better Serve Current and Future Students

The following recommendations, presented in no particular order, represent the results of many whole-group brainstorming sessions and individual working group sessions from the greater TFI membership based on

the charge from the provost (presented previously). The TFI recognizes that many of these recommendations (if not all) have cross-cutting implications with the others, but in order to capture the diversity of ideas, the TFI decided to present them as individual actions. Although the charge included the imperative to present these in priority order, or order of most impact, the committee decided to present them in narrative format first and then to provide a sense of relative priority at the end of the document.

Initiative 1: Alternative Credential Development

Develop a framework by which Michigan Tech is poised to support alternative credentialing for undergraduate, graduate and non-degree seeking students.

Currently Michigan Tech offers graduate certificates which are mostly regarded as a midpoint to a master's degree. Michigan Tech also offers post-baccalaureate certificates and minors that are both typically earned by students earning bachelor's degrees. In addition to these credentials, it will be important to add more options for degree and non-degreeseeking individuals to earn credentials from Michigan Tech.

Sometimes called microcredentials or badges, there are opportunities to adopt models of badging to augment our current models. A Michigan Tech specific sub-brand will be important to distinguish this type of credential from the growing landscape of institutions offering badging. Badges can be used to document learners' ability to demonstrate a level of competence that can be measured. Badges can be used to document learning that is associated with a specific proficiency (e.g., ability to do basic calculations within Excel spreadsheets) or attainment of a specific intended learning outcome (e.g, ability to construct an argument based on evidence). The use of badges opens the door to competency-based education - a model in which students' competencies are documented using badges (for example) rather than grades. This model is desirable in that it allows students and others to identify areas of strengths and weaknesses and plan for future learning accordingly.

This model could be useful in many situations. For example, for students who are just entering college and have the need to build their college success skills because they will not face the threat of a "bad" grade at the end of their first semester. Instead they could have the opportunity during their first semester to demonstrate competency in multiple areas. Only success is rewarded, however, lack of success is documented (by an absence of badges) and can be remediated in the future.

Offering credentials that are attainable in shorter periods of time, and which may or may not represent a long-term path to a degree will provide both on-ramps and off-ramps to education during and beyond the bachelor's level and will help the University serve place-bound, time-bound, and/or working professionals. It is expected that microcredentials will increase enrollment in many programs; modification of admissions criteria and continuous enrollment policies will likely be necessary for success.

Microcredentials have been successfully implemented at many higher-education institutions to date. As part of the marketing and branding of any new types of credentials, Michigan Tech should identify common definitions as to their purpose, time to completion, and other factors. The different credentials should be stackable, meaning that learners can earn progressively more substantial credentials through time.

One example would be to develop an online model to offer credentials that are stackable toward a professional master's degree. Michigan Tech could create and offer a 10/10/10 credit model in which the first 10-credit credential comprises three foundational courses at three credits each and a summative, one-credit course. The additional two credentials (with the same 3 x 3 credits + 1 credit design) could be offered as specialties within a discipline and could build on one another, but only after the first foundational credential is completed successfully. For each credential, the aim of the one-credit course is for it to be reflective across the learner's recent coursework and, in context of their career learning, designed to add value for both the student and their employer, if applicable. The one-credit course could also be a vehicle for providing corresponding program assessment data.

One strength of this model is that multiple master's degree areas are closely related by their foundational courses. For example, across engineering degrees, the foundational course badge might consist of foundations in applied mathematics, foundations in computing or computational modeling, foundations in technical writing, foundations of thermodynamics, etc. Such courses are of wide applicability and might be taken by many different majors, thus providing efficiencies of scale. It is expected that this model is one that could be offered online, so as to facilitate ease of enrollment.

An example at the undergraduate level would be to take traditional three-credit courses and split these into one-credit modules for delivery to a variety of constituents. These could include dual or concurrent enrollment students, prospective students looking for assurance of preparedness for attending Michigan Tech, students looking to change majors, or non-traditional students looking to attend college for the first time. These foundation credits could be offered as microcredentials for refreshing workforce skills, would offer opportunity to combine programming at a very flexible level and provide a vehicle for attracting students who would normally not consider Michigan Tech a "fit".

An example at the professional level would be offering one credit for professional development training equal to at least twenty contact hours (provided participants pass the appropriate assessments). In this case, the one credit is the credential, but having earned a credit provides an incentive to participants to consider pursuing an advanced degree at Michigan Tech. As a case study, the Michigan Tech Mobile Lab currently offers a large number of 20 contact hour professional development training modules delivered on-site, typically at an employers location. These training modules contain homework, and could easily be adapted to include a student assessment (e.g. final exam). In the past three years there have been many individuals that have participated in as many as three of these training modules. By offering college credit at Michigan Tech for completing the training modules, many of these individuals may consider continuing and completing a degree, or at least a certificate / badge / micro-credential as described above.

Other alternative credential models should be explored as well, including credit for competency in areas such as admissions and graduation requirements, whereby the university has a framework to be more flexible in reducing barriers to admission and degree completion.

Working group/focus area recommendation: Registrar, accreditation, faculty in current certificate programs, faculty interested in developing curriculum for this initiative, graduate school, department advisors, admissions

Measures of success: enrollment in certificate, badging, microcredential, professional development and degree programs

Initiative 2: Tribal College Engagement

Work with the tribal colleges that surround Michigan Tech to offer on-site gateway courses for STEM degree paths, particularly engineering paths.

Michigan Tech is uniquely situated with six (of 38 total) tribal colleges in close proximity (see **Figure 1** below). Each of the six colleges that surround Michigan Tech is within an Ojibwa community. Moving west from Michigan Tech, the Dakotas and Montana also have a proximity advantage to work with tribal colleges, but the individual communities that house the tribal colleges in these states are of different peoples. If Michigan Tech could establish a strong working relationship with the Ojibwa, we could begin to better serve the Native American people and students who contribute to the diversity of our local community and, perhaps, become a national model for promoting diversity through partnerships. Other initiatives could include a summer bridge program for students transferring from tribal colleges (after completing their associate's degree) to Michigan Tech, and a residential learning community in DHH to help the students maintain a strong support community. Michigan Tech's size and small-town, natural environment may be more attractive to Native American students than larger universities located in urban settings. Use of the Ford Center as a base for intensive learning opportunities is also possible.

Figure 1. Location markers for the 38 tribal colleges in the United States. Image source: https://tribalcollegejournal.org/map-of-tribal-colleges/

Enrollment of students in Michigan Tech courses offered on tribal-college campuses could be an avenue to obtain funding from agencies such as NSF and NASA that would provide support for educational programming and research projects involving Native American students and their communities.

See **Figure 1** for a clear idea of the proximity advantage that Michigan Tech has. Starting on the east coast and moving westward, we are the first university with such a proximity advantage. With all six tribal colleges that surround us being Ojibwa colleges, we are likely the only US university to have both the proximity and the "same people" advantage. And, with a large college of engineering, we are in a unique position to establish STEM pathways from tribal colleges to an engineering degree.

This may take some time, and perhaps a few years of discussion and trust-building with administrators of the tribal colleges and the community elders. We could then move slowly from offering gateway courses on tribal campuses to building articulation agreements to providing supportive STEM pathways through degree attainment at Michigan Tech. Offering pathways that could allow the students to return and work in their communities may be the best first pathways to try. These could include civil and environmental engineering, ecology, forestry, biology, computer science, business degrees, surveying, construction management, and others.

Working group/focus area recommendation: Registrar, accreditation, interested faculty, CDI *Measures of success:* Enrollment of Native American undergraduate students at Michigan Tech, degrees completed, articulation agreements with tribal colleges, enrollment of students in tribal college courses offered by Michigan Tech, hiring of Native American faculty

Additional Resources:

Sharik, T. L. (2015). Diversifying student demographics in forestry and related natural resources disciplines. Journal of Forestry, 113(6), 579-580. http://dx.doi.org/10.5849/jof.15-031

Initiative 3: University-wide, Holistic Approach to Online Education Delivery

A large contingent of higher education learners are online learners, a market Michigan Tech is not currently targeting effectively. Research shows that online learning "continues to be primarily a vehicle for working adults for furthering their education while staying employed and/or raising a family. It also broadens the educational possibilities of nontraditional students" (Jarvie-Eggart, Kemppainen, Freeman, 2018, p. 3). This initiative is to create a university-level unit that is charged with combining and bolstering the university's efforts to deliver online education both in the areas of training and micro-credentialing up to, and including, fully online degree programs.

The following would have significant positive impact on increasing online-learner enrollment and improving the quality of online programs and Michigan Tech's reputation as an online education provider:

- Combine marketing efforts and create a sub-brand to distinguish Michigan Tech's online educational offerings.

- Offer a university-wide, concerted approach to quality in online education as an extension of currently delivered trainings and Quality-Matters efforts on campus.
- Provide instructional design support at a level consistent with faculty needs for each online course offered by Michigan Tech.
- Create, maintain and track incentives and requirements for faculty to teach fully online courses in order to ensure quality and consistency of the online education offered by Michigan Tech.
- Support industry partnerships to offer online graduate credits.
- Support pre-college and other transitional programs to offer college credit prior to formally entering a degree program.
- Offer tuition incentives or discounts to be competitive in the online marketplace.

Working group/focus area recommendation: CTL, registrar, industry partners, graduate school, interested faculty, marketing and communications, provost's office

Measures of success: enrollment in online programs, brand recognition, adoption of quality standards for online courses

Additional Resources: The Internet Will Not Replace Us

Initiative 4: Develop and Increase Partnerships with Two-year Colleges

To increase the opportunities for learners seeking opportunities in their local communities before attending Michigan Tech, the University should consider developing new and increasing support for relationships with community colleges both in Michigan and other key states. These relationships will also serve as places where Michigan Tech can bolster its identity and brand with this segment of potential students.

One method would be to strengthen or, in some cases, develop ongoing articulation agreements with community and technical colleges. Some articulation agreements with two-year college degree programs currently exist within some Michigan Tech departments but are not maintained under one roof. The task of maintaining and promoting the agreements often times is added to the duties of the department advisor. An office with the necessary support to maintain the agreements would provide a consistency not currently in place and opportunities for concerted outreach efforts. Other academic outreach components may include visiting two-year college advisors on a regular basis, hosting an annual articulation conference to provide academic information for specific degree programs and developing mentoring programs for the incoming transfer students to provide support while they attend Michigan Tech. Michigan Tech could also develop partnerships with local two-year colleges, such as Gogebic Community College, early in the students' career paths to provide those students access to Michigan Tech facilities, learning centers, counseling services, etc. during their first two years while attending a local community college.

Working group/focus area recommendation: registrar, admissions, department advisors

Measures of success: number of articulation agreements, number of transfer students, number of two-year institutions attending "articulation conference," retention of transfer students, transfer-student-satisfaction survey results

Additional Resources:

University of Dayton has a model for linking up with the local Community College Sinclair in a partnership called "UD Sinclair Academy." https://www.udayton.edu/academy/index.php

The recent ASEE conference had a session on Engineering/Engineering Technology Transfer Issues: Two-year College to Four-year College

One of the papers in the session: Avenue-E: An Innovative Student Transfer Pathway Program [view paper] Dr. Jennifer Sinclair Curtis (University of California, Davis), Beth Frances Broome Broome (Affiliation unknown), and Mrs. Cynthia Murphy-Ortega (Chevron Corporation)

This paper presents a summer program initiative for transfer students that is partially sponsored by industry. The program is also targeted at increasing minority populations in STEM programs.

Initiative 5: Off-main-campus University Presence

Develop an off-site physical presence following established models in higher education in an effort to expand Michigan Tech's ability to serve a wider population of current and potential students. It will be important for Michigan Tech to have the ability for direct contact from a variety of constituents. These could be on-campus students away for various reasons, online learners, place-bound or working individuals, high-school students, Michigan Tech faculty and staff or prospective learners for many different programs at the University.

Initially, development of a standard template for off-campus university entities could follow currently devised methods of partnering with a community college and creating a presence in a "university center" there. An organization that many people at Michigan Tech have experience working with is Northwestern Michigan College (NMC) in Traverse City.

Additionally, a more advanced model would be to develop an off-site, incubated industry partnership enterprise program in key geographic markets. Instead of students doing a multi-year enterprise program on campus, this is a co-op-style semester away (considered full-time enrollment) which would engage students in working directly with industry to solve problems and inspire innovation on-site. This model provides students with a hands-on, real-world experience and the opportunity to engage with companies while also allowing the companies to form deeper linkages with the university and its research/knowledge expertise. This could also lay industry-relations groundwork to deliver advanced training for a corporate-partners initiative.

Also, a “mobile campus” concept could be derived from current university initiatives (APS Labs, Mind Trekkers) which would offer opportunities such as recruiting, mobile labs, proctoring, advising, admissions support, and other program in student-based services.

Working group/focus area recommendation: School of Technology, provost’s office, Traverse City Manufacturing Council, NMC

Measures of success: use of off-campus services, development and delivery of off-campus courses/programs, number of off-campus sites

Initiative 6: Develop and Support a Framework for Alternative Scheduling

Develop a framework and sustainable process for departments and/or faculty to fully utilize block scheduling models to better support students. These blocks could be partial semesters, credit-bearing courses during semester breaks, or schedules that span semester boundaries. This flexibility in scheduling will allow Michigan Tech to be more concerted and targeted in delivering education to multiple markets. Additionally, this would allow for accelerated learning and opportunity to pair introductory courses at the student level while splitting very large course enrollments across a semester.

Currently, the University maintains two seven-week tracks in each of the three semesters during the academic year. Linear Algebra and Differential Equations are offered as accelerated, seven-week courses which allows students to focus on one topic at a time, yet still complete both of the courses in one semester. Additionally, there are a small number of courses that are offered during spring break and at intervals over the summer semester, outside of the standard tracks. Also, the number of night and weekend courses should be expanded to accommodate working and time-bound students. An example of this is the MBA at Michigan Tech which is delivered on campus in the evenings.

An interesting model for general education could be one that would involve intensive, community-oriented, problem-based learning opportunities that involve faculty from multiple disciplines who come together to guide students’ learning. If the intended learning goals for a problem-based interdisciplinary course were aligned with general education requirements, this approach could be a way to engage our students in general education in a very meaningful way.

Other alternative scheduling approaches may include a “one-course-per-month” model or study-abroad opportunities that offer shortened, immersive schedules.

Adopting these frameworks could result in the opportunity for the university to adopt a “buffet-style” approach to student degree requirements. It would not be advised that an entire degree program could be developed ad hoc by a student, however providing a significant portion of a degree (maybe 20%) as self-designed could increase student retention, satisfaction, development, and cross-discipline experiences. Additionally, a la carte degree design would allow for personalized degree permutations, leading to custom and unique specializations. These methods would allow for rapid response to industry and market demands of the

university's graduates. With this ability to customize their curriculum, students could design credentials and specializations that are relevant to their interests, backgrounds, and career interests.

Alternative scheduling could also offer a solution to issues caused by the fact that some current programs at Michigan Tech have lengthy chains of courses due to prerequisite requirements. Implementing the various scheduling options listed above could allow these sequences to be completed in less time (e.g. taking them in series with seven week tracks would halve the time to completion) which would be an obvious benefit to students. Such alternative schedules would also allow for continuous matriculation throughout the year and provide more flexibility.

Working group/focus area recommendation: Registrar, department advisors, gen ed council, current adopters, study abroad faculty

Measures of success: adoption by departments, increased student completion rates, retention and satisfaction

Initiative 7: Create a University Level Division for Professional Studies

The Division of Professional Studies will be focused on innovative programs and delivery methods to meet the needs of a broad cross-section of post-baccalaureate students. This division would be responsible for not only administering existing programs (scheduling, credentialing, organizational details, tuition structures, and other administrative issues), but with leading efforts in nimble, entrepreneurial and innovative ways that respond to market and workforce demands and needs. This division could be led by an advisory board with education and industrial representation.

This newly created division or unit could:

- Offer online, blended, on-campus or onsite delivery of courses and content.
- Advocate for and curate content designed for learners who want to acquire rigorous knowledge and who are place/time-bound without compromising quality.
- Create pathways for advanced certifications and degrees.
- Deliver and maintain stand-alone credentials for professional development or career advancement where further study may or may not be required (e.g., similar to CEU's offered by other institutions, or college credit for professional development training as described in Initiative 1).
- Create and offer opportunities for skill development in special topics (e.g. single topic programming course, vendor-specific knowledge).

Working group/focus area recommendation: Graduate School, representation from all colleges and schools, innovation and industry engagement, career services

Measures of success: successful program development and implementation, enrollment in professional learning structures

Initiative 8: Develop a Comprehensive Dual Enrollment Strategy

Nearly 100,000 high school students across Michigan, Minnesota and Wisconsin annually enroll in dual/concurrent enrollment programs embedded within postsecondary institutions, to the tune of over $60 million in tuition and fees. Presently, Michigan Tech annually enrolls an average of 10 students in dual enrollment courses. While the majority share of this market is presently owned by community college partnerships, Michigan Tech is uniquely placed in both geographic disposition and curricular rigor to consider offering a national platform for high-achieving STEM pre-college students to experience a robust, credit-bearing academic experience. Expansion of university influence and accessibility to prospective students would inherently broaden the funnel for future matriculation and yield through investment in developing a multi-faceted, virtually-delivered curricula to high schools synchronous with on-campus students. Key market segments of interest could be targeted in conjunction with established feeder districts; increased margins of return could potentially be found in rural, higher education deserts.

Quantitative outcomes of dual enrollment often project significantly increased rates of high school and postsecondary education completion, as well as higher first-year GPAs, while anecdotal benefits include greater self-efficacy in college readiness. Additionally, dual enrollment engagement would greatly enhance connectivity with high school educators.

Working group/focus area recommendation: Center for Pre-College Outreach (CPCO), admissions, Michigan ISDs, academic faculty, accreditation

Measures of success: increased dual enrollment students, increased tuition revenue, increased ISD and educator engagement

Additional Resources:
Inside Dual Enrollment, Stephen G. Pelletier
http://aascu.org/MAP/PublicPurpose/2018/Winter/InsideDualEnrollment.pdf Dual Enrollment
Growing in Popularity and Frustration, Ron French
https://www.mlive.com/education/index.ssf/2016/11/dual_enrollment_growing_in_pop.html

Initiative 9: Centralize and Advance Pre-College Engagement Administration

In 2014 Brad Baltensperger (retired Chair of the Department of Cognitive & Learning Sciences) and Peter Larsen (Director, Research Development) compiled a report summarizing Michigan Tech engagement in the pre-college engagement space. The report demonstrated the scope and range of Michigan Tech's K-12 involvement, which is "remarkably broad and deep" and plays an "important role in supporting and reforming STEM education." In the 4.5 years since this collective activity has broadened greatly across campus, from individual faculty and staff efforts, to comprehensive programming delivered by academic and administrative units to student organization-based outreach. However, to date, beyond self-started collaboration and department-initiated processes, cohesive institutional practice, policy, and administration of pre-college efforts and assessed outcomes have yet to be established. The Center for Pre-College Outreach (CPCO) annually engages 100,000 K-12 students through Summer Youth Programs and Mind Trekkers; over 700 currently enrolled Michigan Tech undergraduate and graduate students participated in these programs prior

to matriculating to the university. The Center for Science & Environmental Outreach conducts over 100 program sessions locally and across Michigan to upwards of 15,000 students. These are but two immediate examples from an undocumented inventory of many, with annual revenue and expenditures surpassing several million dollars; over 50 active awards currently recorded by SPO, totaling $2.5 million, with an additional 58 pending proposals totalling $14.8 million.

Through intentional, purpose-driven strategy and alignment of existing (and emerging) K-12 initiatives, Michigan Tech would find enhanced efficiencies in data tracking, increased yield in recruitment efforts, synergistic access to funding and cross-cutting facilitation in program management and delivery. Given existing models and methods driven by public and private universities (particularly land-grant institutions) from which to prototype, positioning Michigan Tech as a defined and transformational provider of meaningful pre-college engagement with measurable outcomes is within reach.

Working group/focus area recommendation: CPCO, provost's office, university relations & enrollment

Measures of success: increased undergraduate enrollment yield, increased K-12 project funding, increased administrative capacity for academic units (e.g., decrease in time spent preparing to deliver K-12 and increased time in actual delivery)

Additional Resources:
Michigan Tech and K-12 Education: A Report on Current Activity, Brad Baltensperger & Pete Larsen
Pre-College Programming Model: 25 Dimensions, Susan Sheth and Christopher Tremblay

The following section represents a very coarse look at the quantifiable aspects of where Michigan Tech is poised currently with online learning and transfer students.

Table 1: Fully Online Credentials Currently Offered by Michigan Tech

MS or PhD	Department	Type	Abbreviation	Yes or No
MS	Civil and Environmental Engineering	Civil Engineering	ECE	Yes
MS	Electrical and Computer Engineering	Electrical Engineering	EEE	Yes
MS	Mechanical Engineering	Engineering	EGR	Yes
MS	Cognitive and Learning Sciences	Applied Science Education	SASE	No
MS	School of Technology	Integrated Geospatial Technology	TGT	Yes
MS	Mechanical Engineering	Mechanical Engineering	EME	Yes

MS	School of Technology	Medical Informatics	TMIN	Yes
MS	Mathematics	Applied Statistics	SAST	Yes
PhD	Mechanical Engineering	Mechanical Engineering	MEEM	Yes
Certificate	Electrical and Computer Engineering	Advance Electric Power Engineering	CAEP	Yes
Certificate	Mechanical Engineering	Automotive Systems and Controls	IASC	Yes
Certificate	Mechanical Engineering	Hybrid Electric Drive Vehicle Engineering	CHEV	Yes

Table 2: Online Enrollment at Michigan Tech (Compendium Data)

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
UNDERGRADUATE STUDENTS IN ONLINE COURSES											
	556	459	586	671	801	1,143	1,416	1,547	1,807	1,966	
GRADUATE STUDENTS IN ONLINE COURSES											
	88	202	402	337	469	446	371	311	352	418	
UNDERGRADUATE STUDENTS IN ONLINE PROGRAMS											
	56	12	6	2	2	1	0	0	1	1	0
GRADUATE STUDENTS IN ONLINE PROGRAMS											
	15	9	11	58	106	94	77	78	86	71	75

Table 3: Colleges From Where Students Transferred to Michigan Tech (spring, summer, fall 2018)

Albion College, MI
Aquinas College, MI
Alma College, MI
Alpena Community College, MI
Baker College-Owosso, MI

Bay Community College, MI
Calvin College, MI
Central Lakes Community College, MN
Central Michigan University, MI
Central Oregon Community College, OR
Clarke University, IA
Community College of the Air Force, AL
College of DuPage, IL
Columbia College, MO
Concordia College, WI
Craven Community College, NC
Davenport University, MI
Delta Community College, MI
Ferris State University, MI
Finlandia University, MI
Frostburg State University, MD
Gogebic Community College, MI

Grand Rapids Community College, MI
Grand Valley State University, MI
Henry Ford Community College, MI
Hibbing Community College, MN
Houston Community College, TX
Illinois Central Community College, IL
Itasca Community College, MN
Jackson Community College, MI
Johns Hopkins University, MD
Kalamazoo College, MI
Kalamazoo Valley Community College, MI
Keweenaw Bay Ojibwa Community College, MI
Kirtland Community College, MI
Lake Michigan Community College, MI
Lakeshore Technical College, WI
Lake Superior College, MN
Lake Superior State University, MI
Lansing Community College, MI
Macomb Community College, MI
Madison Area Technical College, WI
Metropolitan Community College, NE
Michigan State University, MI
Mid-Michigan Community College, MI
Milwaukee School of Engineering, WI
Minnesota State Community and Technical College, MN
Minnesota State University-Mankato, MN
Montana State University, MT
Montana Tech University, MT
Montcalm Community College, MI
Mott Community College, MI
Muskegon Community College, MI
Nicolet Area Technical College, WI
Normandale Community College, MN
North Central Michigan Community College, MI
North Hennepin Community College, MN
Northcentral Wisconsin Technical College, WI
Northern Michigan University, MI
Northland College, WI
Northwestern Michigan Community College, MI
Oakland Community College, MI
Oakland University, MI
Ocean County College, NJ

Ohio Technical College, OH Olivet College, MI Palomar College, CA Parkland College, IL Purdue University-West Lafayette, IN Saginaw Valley State University, MI Schoolcraft Community College, MI Sheridan College, WY Siena Heights University, MI Southwestern Michigan Community College, MI St. Cloud State University, MN St. Cloud Technical and Community College, MN St. Louis Community College-Meramec, MO St. Petersburg College, FL State Fair Community College, MO SW Minnesota State University, MN Tarrant County Junior College, TX Texas A&M University-Corpus Christi, TX Thompson Rivers University, Canada University of Illinois-Chicago, IL University of Illinois Urbana-Champaign, IL University of Michigan-Dearborn, MI University of Minnesota-Duluth, MN University of Minnesota-Twin Cities, MN University of South Carolina-Sumter, SC University of Wisconsin Center College-Manitowoc, WI University of Wisconsin Center College-Sheboygan, WI University of Wisconsin Eau Claire, WI University of Wisconsin-Green Bay, WI University of Wisconsin-Madison, WI University of Wisconsin-Stevens Point, WI Washtenaw Community College, MI Wayne County Community College, MI Wayne State University, MI West Shore Community College, MI Western Michigan University, MI
Total Number of Colleges: ***100***

Table 4: Number of Transfer Students (spring, summer, fall 2018) by College/School by Major

School of Business

Accounting	2
Economics	1
Engineering Management	1
Finance	3
General Business (undeclared)	2
Management	1
Marketing	3
Total	**13**
College of Engineering	
Biomedical Engineering	4
Civil Engineering	17
Chemical Engineering	15
Computer Engineering	8
Electrical Engineering	16
Environmental Engineering	3
Geological Engineering	4
Mechanical Engineering	42
Materials Science and Engineering	2
Total	**111**
School of Forest Resources and Environmental Science	
Applied Ecology and Environmental Science	4
Forestry	7
Wildlife Ecology and Management	2
Total	**13**
College of Sciences and Arts	
Anthropology	1
Biology	1
Chemistry	1
Pharmaceutical Chemistry	1

Computer Science	14
Theater and Electronic Media Performance	1
English	2
Exercise Science	1
General Sciences and Arts (undeclared)	3
Mathematical Sciences	5
Biochemistry and Molecular Biology (Biology)	3
Biochemistry and Molecular Biology (Chemistry)	1
Medical Laboratory Science	4
Psychology	3
Software Engineering	5
Sports and Fitness Management	1
Total	**47**
School of Technology	
Construction Management	3
Computer Network and System Administration	2
Electrical Engineering Technology	1
Mechanical Engineering Technology	12
Total	**18**

Priorities

As the task force was charged with assigning priority to each initiative we have recommended, the committee engage in a lean-based activity as it was not immediately apparent how to prioritize the nine recommendations. After discussing priority, it was decided to present all nine recommendations as the committee would be hard pressed to determine priority based on our limited knowledge of other university priorities. It was the determination of the TFI to attempt a relative prioritization of these initiatives, which we did through a Google poll. The following chart represents the median of the committee members' responses when asked to rank ease of implementation and impact of initiative on a ten point scale. An overlay, borrowed from lean practices, divided these points into four categories, priority, action, consider and eliminate (PACE). As the results of this activity show, it is the opinion of the committee that all of these initiatives should be considered for action with four or more reaching "priority" status.

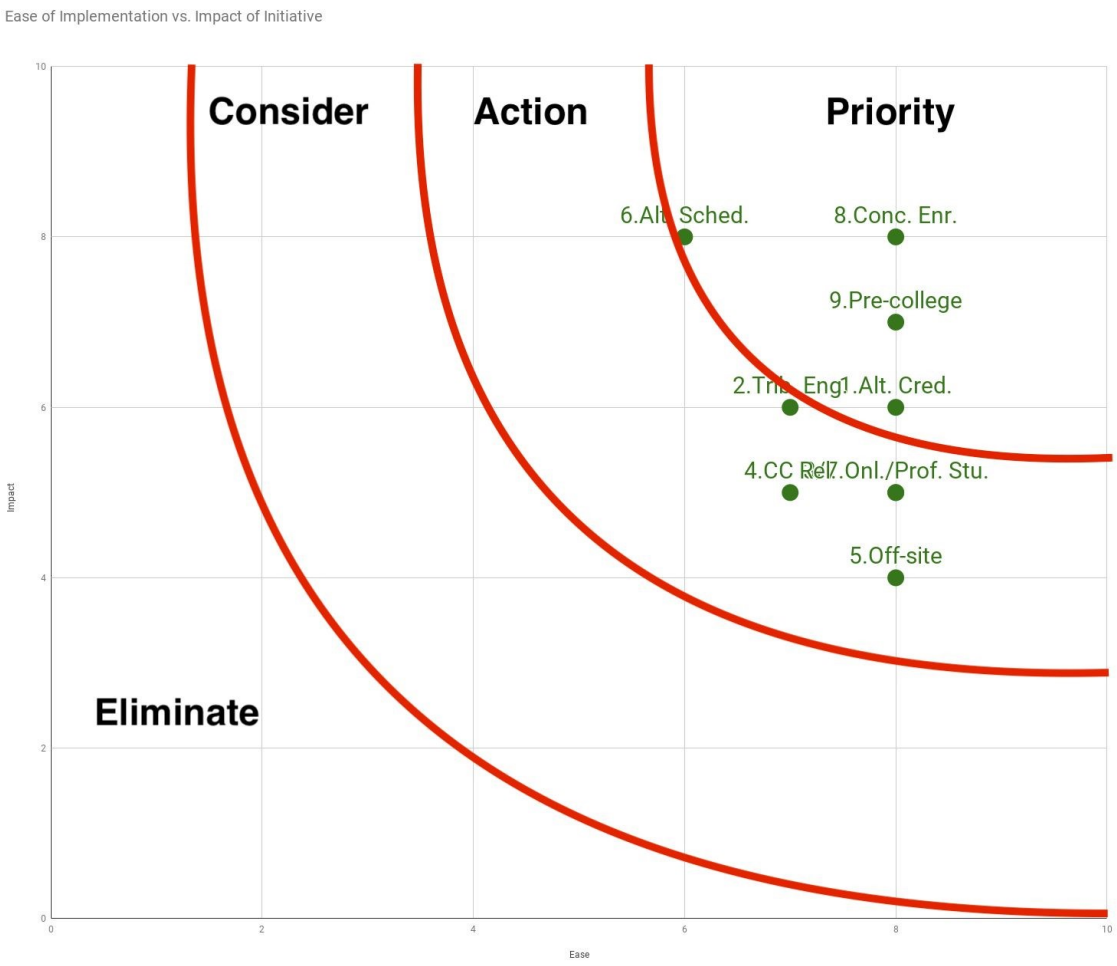

Figure 2: PACE diagram showing the initiatives described above. Initiatives 3 and 7 are combined into a single point (Onl./Prof Stu.).