



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Proposal to Create an Institute for Engineering Education and Practice



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Table of Contents

1.	Summary.....	3
2.	The Evolving Landscape of Engineering Education and Practice	4
3.	Proposed Institute	5
4.	Academic Rationale	5
5.	Faculty Participation	11
6.	Structure and Administration	14
7.	Resource Implications and Budgetary Impacts	16
8.	Research Funds.....	17
9.	Goals, Benchmarks and Measures of Success.....	17
10.	Consultation.....	18
11.	Governance.....	18

1. SUMMARY

The Faculty of Applied Science and Engineering (FASE) now has a critical mass of faculty who actively collaborate and are strongly engaged in cutting-edge pedagogical research and exemplary instructional practice. Bringing together this core of existing faculty will create an academic space to promote their leadership in teaching and learning, encourage related scholarship and research, and contribute to the advancement and development of engineering education as a distinctive and valued field. It is thus proposed that an *Institute for Studies in Transdisciplinary Engineering Education and Practice* (ISTe²P) be created effective July 1, 2018, as an Extra-Departmental Unit, Type A (EDU:A). This EDU:A is needed as an academic home that unites these existing faculty along with existing academic programing, to promote leadership in teaching and learning within the changing landscape of engineering education and practice.

ISTe²P will support a well-established and well-defined area of academic study. It will partner with departments and institutes from across FASE to foster scholarship in engineering education and engineering practice through a vibrant community of faculty who are:

- **Influencing and guiding pedagogical development and teaching innovation across FASE and beyond;**
- **Extending the instruction of engineering to integrate new transdisciplinary¹ competencies;**
- **Pursuing research into practices emerging from other domains² that are increasingly being applied across engineering disciplines.**

ISTe²P's mission will be to study and enhance the education of students and practices of today's engineers so as to address tomorrow's societal challenges, by:

- Engaging in the scholarship of teaching and learning;
- Translating research into advances in the delivery of learning experiences and the design of academic programing;
- Providing leadership through the development of new models of effective teaching;
- Extending the understanding of transdisciplinary competencies and translating this knowledge into curricular and co-curricular learning experiences;
- Investigating new practices emerging from other domains to support their incorporation into curricula and engineering practice;
- Partnering in the delivery of existing graduate and undergraduate academic programing in technical communication, leadership, business, design, and engineering education;
- Bringing together colleagues within and beyond FASE to promote community and promote scholarly conversation.

¹ Engineers who are creative, professional, ethical, effective communicators, team players and systems thinkers demonstrate transdisciplinary competencies that amplify their technical knowledge and strengths. These are the competencies possessed by individual engineers that ISTe²P will seek to develop.

² Examples of these domains in relation to ISTe²P include design, leadership, education, communication and business. Additional domains such as sustainability, globalization and entrepreneurship may eventually be added as colleagues become affiliated with ISTe²P.

This will enable ISTe²P to:

- Promote and strengthen cross-departmental collaboration.
- Help FASE to become a recognized innovator in engineering education.
- Promote U of T's reputation as a global leader in education and related research.

2. THE EVOLVING LANDSCAPE OF ENGINEERING EDUCATION AND PRACTICE³

Major shifts are occurring in the teaching and practice of engineering. The quest to address complex societal needs is broadening the scope of engineering practice to integrate domains such as design, leadership, education, business, sustainability, globalization and entrepreneurship. These shifts are in turn expanding the competencies required of engineers to make full and productive use of their technical strengths. Transdisciplinarity – competencies that transcend the boundaries between disciplines to produce synergies^{4,5} – is becoming increasingly essential to engineering graduates.

The nature of post-secondary educational pedagogy is also evolving. Major catalysts for change include the need to generate and incorporate evidence-based teaching methods; the role of STEM education in promoting innovation and prosperity; and the influence of emerging educational technologies that are commoditizing education yet making more effective instructional strategies and designs possible.

Although engineering education has been formally recognized in the United States as a distinct area of academic study since the late 1890s, and globally there are many related academic units and programs, Canada has lagged behind. Momentum, however, is growing: the Canadian Engineering Education Association was established in 2010 with the mission to “enhance the competence and relevance of graduates from Canadian Engineering schools through continuous improvement in engineering education and design education”. Through FASE, U of T launched the Collaborative Specialization in Engineering Education in 2014 – the only PhD-level engineering education designation in Canada – as an intra-Faculty program that provides a multidisciplinary experience for students enrolled in and completing the degree requirements of participating doctoral degree programs.

Collectively, the shifting landscape and developing state of engineering education programs in North America and abroad offer a crucial opportunity for FASE to create an institute for engineering education. This Institute will enable pioneering initiatives in engineering education and support scholarship and teaching that positions the Faculty to navigate, lead, and prosper in this evolving environment.

³ See the [Report of the Working Group to Establish an Institute for Engineering Education](#) for a detailed description of the evolving landscape of engineering education and practice.

⁴ Transdisciplinary professional learning and practice, edited by Paul Gibbs, Springer 2015

⁵ <http://www.jscimedcentral.com/TranslationalMedicine/translationalmedicine-spid-collaboration-science-translational-medicine-1024.pdf>

3. PROPOSED INSTITUTE

Creation of ISTe²P will be groundbreaking in Canada and will provide a structure to help put engineering education in Canada on the global leading edge. With a distinct identity synthesized from a solid interdisciplinary academic foundation, ISTe²P will integrate and augment initiatives already begun in FASE and the University, bringing a Canadian perspective to this field and building on our Faculty's culture of excellence and preeminent global position. FASE and U of T are in a position to take yet another leadership role in post-secondary education.

This academic community will be a place of synthesis for creating and applying new knowledge that reinforces the collaborative nature of engineering. Already embedded in multiple areas across FASE, the Institute will bring together existing units, existing faculty and existing programing, to enhance teaching and learning competencies for the benefit of students, faculty and the broader community. Although several categories of Extra-Departmental Units (EDUs)⁶ were rigorously debated, only an EDU Type A can hold the critical mass of budgetary appointments needed to promote this scholarship, offer the current academic programing, and provide a platform for a leading presence in this growing field.

4. ACADEMIC RATIONALE

ISTe²P will foster scholarship and teaching in engineering education and leadership in educational practice. It will be based in and led by FASE, whose Dean will assume active administrative and budgetary responsibilities for the EDU:A. Other divisions, such as the Ontario Institute for Studies in Education (OISE), Faculty of Arts and Science (FAS), and the Rotman School of Management, may become associated with ISTe²P by virtue of the involvement of their individual faculty members.

ISTe²P's mission will be executed by an initial contingent of nine existing budgetary appointments, an existing budgetary cross-appointment, and non-budgetary cross-appointments both from within and beyond FASE. It will offer existing and new undergraduate and graduate courses, the existing undergraduate certificates in Leadership and in Communication, the existing Collaborative Specialization in Engineering Education, and will support the delivery of other courses and learning activities (see Section 4.2.2 for a list of existing courses).

ISTe²P's scholarship and research will focus on emerging practices, transdisciplinary competencies, and the scholarship of teaching and learning. The resulting knowledge will be synthesized, translated, and mobilized into innovative teaching and academic programing. This programing will promote integrative transdisciplinary learning through active and technology-

⁶ See the *University of Toronto Guidelines for Academic Units* at <http://vpacademic.utoronto.ca/wp-content/uploads/2015/08/edu-guidelines.pdf> for characteristics of the four types of EDUs, and Appendix 3: Administrative Structures Considered.

enriched pedagogy, and prepare students to identify, learn, and apply the engineering principles, practices and competencies needed to resolve global challenges.

4.1 Alignment with Academic Plans and Existing Academic Foundation

With a strong track record in teaching core academic competencies, FASE's Academic Plan⁷ also emphasizes diverse pursuits such as entrepreneurship, leadership, global citizenship, community service, and the creation of facilities such as the new Centre for Engineering Innovation and Entrepreneurship (CEIE) that "support innovative learning pedagogies, increase opportunities for experiential learning and offer purpose-built space for student clubs and teams."⁸ In particular, the Academic Plan identifies a number of strategic goals that will be directly or indirectly supported through the creation of ISTe²P:

- Further integrate professional competencies, such as leadership and communication, into undergraduate and graduate curricula.
- Enrich the quality of undergraduate academic experience by increasing flexibility in the undergraduate curriculum, continuing to develop progressive opportunities for students to pursue their professional interests, and integrating professional competencies throughout the curriculum.
- Link the quality of student learning and education and their improved future performance with teaching effectiveness. Support teaching initiatives and opportunities that will improve professional development as educators.
- Continue to inspire the Faculty's culture of teaching excellence and support teaching initiatives that improve student experience, support their connections with course content, increase in-class engagement and strengthen their understanding of course relevance.
- Support the development of faculty members as outstanding engineering educators and researchers.
- Support our students through strategic efforts to build upon educational extracurricular and co-curricular experiences.

Further, creation of ISTe²P will support implementation of elements within the Strategic Mandate Agreement between the Ministry of Advanced Education and Skills Development and the University of Toronto. This agreement outlines the role the University currently performs in the postsecondary education system and how it will build on its current strengths to achieve its vision and help drive system-wide objectives articulated by the Ministry's Differentiation Policy Framework; performance in terms of this agreement will increasingly influence University funding. The 2014-2017 agreement identifies related institutional priorities that will be supported by ISTe²P:

- Enrich teaching and learning for students through increased opportunities for experiential learning.

⁷ http://www.engineering.utoronto.ca/files/2016/12/AP-Progress-Report-2016_Final1.pdf

⁸ Faculty of Applied Science and Engineering Annual Report 2016, p. 13.

- Grow the implementation of high impact teaching practices across the Faculty.
- Enhance technology assisted learning and online offerings.
- Expand entrepreneurship opportunities for students to help support job creation, innovation, and economic development in Ontario.

Finally, ISTe²P will provide a formal academic home for collaboration to support a strong existing suite of internationally recognized initiatives, helping to preserve their distinct strengths, reputations and identities:

- The Engineering Communication Program (ECP, established 1995), which works with faculty and students across all departments to integrate technical communication into the undergraduate and graduate curriculum.
- The Institute for Leadership Education in Engineering (ILead, established 2010), which provides leadership education in the undergraduate and graduate curriculum.
- The Collaborative Specialization in Engineering Education (launched in fall 2014), which is offered to Master's and PhD students registered in FASE and OISE degree programs.

FASE is in a strong position to lead within the area of engineering education and practice, drawing not only from the breadth of its teaching activities but the diverse mix of teaching- and tenure-stream faculty who have contributed to teaching excellence within the Faculty. There exists a strong potential for influencing engineering Faculties across Canada and further enhancing FASE's strong reputation for leadership. To this end, an institute encompassing research and dissemination would aid in fostering the culture and providing the resources for such an undertaking:

- Internally, ISTe²P's scholarship will enhance student learning and develop models of effective teaching, help make full and effective use of new teaching infrastructure in the delivery of education, and create a foundation for new academic programing.
- Externally, mobilization of ISTe²P's research and scholarship will promote scholarly conversation to help shape the evolving nature of engineering practice, develop the underlying competencies, and understand the identity of Canadian engineers.

4.2 Academic Focus

4.2.1 Research Mandate

ISTe²P's research will pursue the creation, translation and mobilization of knowledge relating to emerging practices, transdisciplinary competencies, and the scholarship of teaching and learning. Execution will be supported through the thesis research of PhD-stream students in the Collaborative Specialization in Engineering Education; currently 15 are registered with the number growing. Collaboration with students, alumni, librarians, industry, and government will be essential so as to ground this research in terms of the changing nature of our students and the many career paths they now take after graduation. ISTe²P's research findings **will help to guide what we teach, how we teach, and our understanding of the evolving identity of**

engineers and the very nature of the engineering profession itself. Specifically, ISTe²P will enable research along the following themes:

- **Instructional Methods and Tools:** ISTe²P will pursue research on pedagogy, andragogy, learning, instructional design, assessment methods and learning technologies to create knowledge to support the development of teaching methodologies and innovative educational tools. Foci will span from the design of digital tools for on-line and technology enhanced learning and assessment, to tools and techniques to support active and cooperative in-person learning. Methods will be developed and applied to assess the effectiveness of these teaching tools and techniques.
- **Domains at the Interface of Engineering:** ISTe²P's faculty will investigate how knowledge and practices from other domains are being integrated into the practice of engineering. This research will help generate theoretical conceptualizations and empirical case studies to help guide the integration of these domains into engineering contexts. For example, research will explore engineering-based leadership, focusing on how it is applied in industry, engineering-intensive companies, and in broader society. Another theme will be exploring how design is practiced across fields beyond engineering to identify approaches and processes that can enhance engineering design, and how engineering design is, in turn, influencing approaches used in these fields. This research will also help identify essential transdisciplinary competencies to support their integration into engineering curricula, instruction and assessment.
- **Research Translation into Curricular Design:** Research findings on pedagogy, transdisciplinary competencies and emerging practices will be synthesized into the design on new learning experiences and the development of models of effective teaching. Courses will be designed to enable and evaluate integrative transdisciplinary learning through active and/or technology enriched pedagogies. This learning may, for example, be problem-based rather than content-based, and might focus around solving global challenges. These pilot courses will serve as a “test-bed” to develop and evaluate new holistic models of teaching and learning that integrate technical knowledge with competencies and practices using enriched pedagogy.
- **Impact:** ISTe²P's research and scholarship will promote educational leadership. The impact will be manifested through publications, conference presentations, involvement in scholarly societies and translation into teaching and learning. ISTe²P will become renowned for engineering education research and practice, nationwide and worldwide. Impact will also be achieved by educating Canada's next generation of engineering educators and researchers. Overall, ISTe²P's impact will enhance FASE's visibility in engineering education, thereby contributing to building the Faculty's and University's reputations for scholarly leadership.

4.2.2 Education Mandate

ISTe²P will partner in the delivery of existing courses and certificates, and provide a home for the graduate students in the Collaborative Specialization in Engineering Education. Further, ISTe²P will collaborate to help integrate the instruction of transdisciplinary competencies and emerging practices into targeted programing so as to help develop truly distinctive educational experiences. Finally, ISTe²P will help influence and encourage pedagogical scholarship, teaching innovation and the development of high impact instructional practices. Specifically, ISTe²P's education mandate will cover the following themes:

- **Existing programing:** ISTe²P will work with ECP, ILead, and the Collaborative Specialization in Engineering Education to support and help build on existing instructional activities. ISTe²P faculty will also deliver courses as part of the First Year and the Business minor, and support the undergraduate certificates in Leadership and in Communication. Together, these offerings include 20 undergraduate, 13 graduate, and 36 co-instructed courses:

Undergraduate Courses

- 1) APS281H1: Language and Meaning
- 2) CIV282H1: Communication I
- 3) ESC203H1: Engineering and Society
- 4) MSE298H1: Communications I
- 5) CIV382H1: Communications II
- 6) MSE390H1: Communications II
- 7) APS320H1: Representing Science on Stage
- 8) APS321H1: Science and Technology in the Popular Media
- 9) APS322H1: Language and Power
- 10) APS324H1: Engineering and Social Justice (new in Winter 2018)
- 11) APS325H1: Engineering and Science in the Arts
- 12) APS343H1: Engineering Leadership
- 13) RE300H1: – Fundamentals of Accounting and Finance
- 14) JRE410H1: Markets & Competitive Strategy
- 15) JRE420H1F/S: People Management & Organizational Behaviour
- 16) APS442H1 The Cognitive and Psychological Foundations of Effective Leadership
- 17) APS444H1 Positive Psychology for Engineers
- 18) APS445H1 The Power of Story: Discovering Your Leadership Narrative
- 19) APS446H1 Leadership in Project Management

Co-Instructed Courses^a and Supported^b

- 1)**First Year:** APS111^a, APS112^a, APS113^a.
- 2)**Engineering Science:** ESC101^a, ESC102^a, ESC297^a, ESC301^a, ESC496^b, ESC499^a, AER407^b, BME489^b, BME498^b
- 3)**CHE:** CHE204, CHE230^a, CHE299^a, CHE326^b, CHE430^b
- 4)**CIV:** CIV201^b, CIV220^b, CIV331^b, CME368^b, CIV382, MIN466^b, MIN430^b, MIN467^b
- 5)**ECE:** ECE297^a, ECE496^b
- 6)**MIE:** MIE221^b, MIE240^a, MIE243^b, MIE301^b, MIE315^b, MIE350^b, MIE490^b, MIE491^b
- 7)**Faculty Wide:** APS490^a

Graduate Courses

- 1) APS1011H: Concepts and Applications of Authentic Leadership
- 2) APS1010H: Cognitive and Psychological Foundations of Effective Leadership
- 3) APS1019H: Leadership in Project Management
- 4) APS1027H: Engineering Presentations
- 5) APS1029H: The Science of Emotional Intelligence and its Application to Leadership
- 6) APS1026H: Positive Psychology for Engineers
- 7) APS1030H: Engineering Careers – Theories & Strategies to Manage your Career for the Future
- 8) APS1203H: Engineering Teaching and Learning
- 9) APS1204H: Instructional Design in Engineering Education
- 10) APS1205H: Engineering Education Research Seminars
- 11) APS1206H: Engineering Education Research Seminars
- 12) APS1501H: Leadership and Leading in Groups and Organizations
- 13) APS1502H: Leading Engineering Design Projects

- **Design and delivery of new programming:** ISTE²P will contribute to the design of new courses relating to engineering education, emerging engineering practices, and transdisciplinary competencies. These may include new courses on business, communication, leadership, instructional design, education research methodologies, and the development of education technology. ISTE²P affiliated faculty may also help support development of curricula for future minors such as the proposed Engineering and Public Policy minor. Courses or instructional modules may be designed to introduce engineering concepts to non-engineering majors. For example, transdisciplinary courses that bring together engineering and non-engineering students to address local urban issues or global challenges may be created. At the graduate level, ISTE²P will become the lead unit for the existing Specialization in Engineering Education and will within its first 10 years, design and propose for approval a broader Graduate Program in Engineering Education and Practice.
- **Support the instruction of engineering through the infusion of transdisciplinary competencies:** ISTE²P faculty already support the instruction or co-instruction of communication and teamwork in a wide range of courses. These include first year design courses, core technical courses, thesis courses, and a multidisciplinary capstone course. During the first five years, ISTE²P faculty will grow the instruction of team skills into a larger number of technical courses. Instruction of leadership in the multidisciplinary capstone course will also be supported. Similarly, instruction of the other transdisciplinary competencies and practices emerging from other domains (e.g., leadership, education, communication, business and design) will be infused and combined with technical knowledge in selected courses to create more holistic learning experiences.

Instruction of transdisciplinary competencies will also be extended beyond the classroom. ILead is currently providing co- and extra-curricular learning opportunities that enable and amplify the development and refinement of leadership competencies. These offerings will be sustained and enriched to leverage additional learning in

conjunction with internships, research, entrepreneurial design project experiences and other experiential learning opportunities. A priority in the first five years will be the development of curricular and co-curricular instruction to more comprehensively support and promote work-integrated learning.

- Influence and guide pedagogical development and teaching innovation across FASE and beyond:** ISTe²P faculty will help build and grow FASE's strengths in the areas of technology-enhanced learning, cooperative learning, experiential learning and active learning, along with the assessment of learning outcomes. Another focus will be the development of digital learning tools to enhance and enrich undergraduate education and extend FASE's online offerings. These initiatives will be pursued in conjunction with ISTe²P-related research or as products of the mobilization of this research.

Instructional workshops and seminars will be offered with faculty, librarians and students to solidify and grow the community of colleagues engaged in the scholarship of teaching and learning. This will also increase opportunities for research collaboration and co-supervision of graduate students. Finally, ISTe²P will help to foster FASE initiatives such as the Hart Teaching Innovation Professorships and TEAL Fellows program. Overall, ISTe²P will become a renowned hub for engineering education activities, research and workshops nationally and worldwide.

5. FACULTY PARTICIPATION

FASE currently has a critical mass of faculty who are heavily engaged in instructional practice and the scholarship of teaching and learning. As an EDU:A, ISTe²P will provide an academic home for these faculty that allows budgetary appointments and cross-appointments. This will include at the outset the budgetary appointment of 10 existing teaching stream faculty (nine full appointments and one cross-appointment) who will be actively engaged in the Institute.

Faculty with Proposed Budgetary Appointments to ISTe²P

Name	Home Unit (%) prior to establishment of ISTe ² P	Home Unit (%) after establishment of ISTe ² P	Appointment Category (Stream and Rank)	Appointment to other units (%)	Graduate Faculty Membership, Unit & Status (Associate or Full)
Primary Appointments					
Chong, Alan	Engineering Communication Program (100%)	ISTe ² P (100%)	Associate Professor, Teaching-Stream	n/a	none ^a

Name	Home Unit (%) prior to establishment of ISTe ² P	Home Unit (%) after establishment of ISTe ² P	Appointment Category (Stream and Rank)	Appointment to other units (%)	Graduate Faculty Membership, Unit & Status (Associate or Full)
Marzi, Elham	FASE (100%)	ISTe ² P (100%)	Assistant Professor, Teaching-Stream	n/a	none ^a
Irish, Rob	Engineering Communication Program (100%)	ISTe ² P (100%)	Associate Professor, Teaching-Stream	n/a	none ^a
Romkey, Lisa	CTL (100%)	ISTe ² P (100%)	Associate Professor, Teaching-Stream	n/a	none ^a
Sheridan, Patricia	FASE (100%)	ISTe ² P (100%)	Assistant Professor, Teaching-Stream	n/a	none ^a
Tallman, Ken	Engineering Communication Program (100%)	ISTe ² P (100%)	Associate Professor, Teaching-Stream	n/a	none ^a
Tihanyi, Deb	Engineering Communication Program (100%)	ISTe ² P (100%)	Associate Professor, Teaching-Stream	n/a	none ^a
Variawa, Chirag	FASE (100%)	ISTe ² P (100%)	Assistant Professor, Teaching-Stream	n/a	none ^a
Weiss, Peter	Engineering Communication Program (100%)	ISTe ² P (100%)	Associate Professor, Teaching-Stream	n/a	none ^a
Budgetary Cross-Appointments					
Olechowski, Alison	FASE (49%) MIE (51%)	ISTe ² P (49%)	Assistant Professor, Teaching-Stream	MIE (51%)	Associate, MIE

a: Teaching Stream faculty will apply for SGS Associate Membership once ISTe²P is established

This cohort of core faculty will be supplemented with the cross-appointment of tenure- and teaching-stream faculty from within FASE who are also engaged in the scholarship of teaching and learning as follows.

Faculty with Non-Budgetary Cross-Appointments to ISTe²P

Name	Home Unit (%)	Appointment Category (Stream and Rank)	Appointment to other units (budgetary %)	Graduate Faculty Membership, Unit & Status (Associate or Full)
Behdinan, Kamran	MIE (100%)	Professor	ISTe ² P (0%)	Full, MIE
Evans, Greg	CHE (100%)	Professor	ISTe ² P (0%)	Full, CHE
Foster, Jason	CIV (100%)	Associate Professor, Teaching-Stream	ISTe ² P (0%)	none
Karney, Bryan	CIV (100%)	Professor	ISTe ² P (0%)	Full, CIV
Kilkenny, Dawn	IBBME (100%)	Assistant Professor, Teaching-Stream	ISTe ² P (0%)	Associate, IBBME
McCabe, Brenda	CIV (100%)	Professor	ISTe ² P (0%)	Full, CIV
McCahan, Susan	MIE (100%)	Professor	ISTe ² P (0%)	Full, MIE
Norval, Graeme	CHE (100%)	Associate Professor, Teaching-Stream	ISTe ² P (0%)	none
Reeve, Doug	CHE (100%)	Professor	ISTe ² P (0%)	Full, CHE
Sleep, Brent	CIV (100%)	Professor	ISTe ² P (0%)	Full, CIV
Stickel, Micah	ECE (100%)	Associate Professor, Teaching-Stream	ISTe ² P (0%)	none

It is expected that additional teaching- and tenure-stream faculty in specific engineering and non-engineering disciplinary subfields who are engaged in pedagogical research **may choose** to engage in the work of the unit through non-budgetary cross appointments after ISTe²P is established.

ISTe²P will also provide a structure and mechanism for the full or joint appointment of future teaching- and tenure-stream faculty whose expertise transcends FASE's existing departments and institutes. Cross-appointments and possibly future hires will help sustain the critical mass of colleagues with shared expertise and interests so as to foster a vibrant community and avoid colleagues working in isolation. Externally, faculty members in OISE have indicated interest in non-budgetary cross-appointments and increased involvement of FASE in the integration of engineering in education of future kindergarten to grade 12 teachers through their Master of Teaching program. Further, adjunct appointments of "engineers in residence" from companies and government are envisioned to help contextualize the instruction of transdisciplinary competencies within FASE.

6. STRUCTURE AND ADMINISTRATION

As an EDU:A, ISTe²P will be subject to the *Policy for Approval and Review of Academic Programs and Units* (June 24, 2010), with the authority to hold primary academic appointments (e.g., majority budgetary appointments of 51% or more), cross-appointments (e.g., minority budgetary appointments of 49% or less), and status-only and adjunct appointments; administer research programs and serve as the administrative home for research accounts; and administer and be responsible for the Institute's budget.

ISTe²P's initial structure will be built around its foundation of existing pillars. The Engineering Communication Program (ECP) will be administratively housed entirely within ISTe²P yet persist as a distinct pillar, in order to preserve its identity and international reputation. Specifically, budgetary appointments of all ECP-affiliated faculty members will be in ISTe²P. ILead will be a second pillar and continue as an EDU:C that is primarily affiliated with ISTe²P. All ILead-affiliated faculty and staff members will have appointments in ISTe²P and it will be their academic and administrative home. Further the Directors of ECP and ILead will serve on the Steering Committee and be appointed as Associate Directors of ISTe²P. They will also report to the Director of ISTe²P, if their primary appointment is in ISTe²P.

6.1 Director

An Interim Director will be appointed to oversee the launch of the Institute. Once the EDU is established, the Dean, FASE will work with a search committee to bring forward the Director of ISTe²P for a five-year term, renewable once. The Director will be the Institute's chief executive officer and accountable directly to the Dean, FASE for its overall direction. While the Director may elect to delegate authority to other academic administrators in the Institute, he/she will retain responsibility for the overall direction of the Institute and in particular for authority over the budget and recommendations for appointments and, where applicable, promotions. More specifically, the Director will:

1. Develop and implement policy and practices for ISTe²P that reflect its vision and mandate.
2. Assume responsibility for all administrative decisions within his/her jurisdiction and authority.
3. Promote the teaching, research and scholarship of ISTe²P's faculty and ensure an equitable distribution of work; and promote the career development of administrative staff.
4. Make recommendations for appointments. In the case of primary appointments, the Director will be responsible for all aspects of the appointment including tenure, promotion, assignment of workload and the annual merit process.
5. Assume responsibility for the financial management of all the Institute's resources, including all operating and restricted funds. This includes establishing and managing budgets, revenue and expenditure decisions; safeguarding all assets; monitoring and annual financial reporting to the lead Dean; adhering to all financial management policies and procedures as described in the *Guide to Financial Management*; and

overseeing any individuals within the EDU who are responsible for financial management activities.

6. Manage ISTe²P's external relations effectively and efficiently, both within the University and in the wider community, to facilitate support for its educational and research activities.

A review of the Director will be undertaken in line with the University's *Policy on Appointment of Academic Administrators* (October 30, 2003), normally near the end of his/her term. The Dean, FASE will also commission period reviews of the Institute and its programs, normally every five years, and aligned with the end of the Director's term. This review will normally assess the Institute's sustainability, performance and achievements relative to the goals set out at its establishment. Possible outcomes of the review could include closure.

6.2 Associate Directors

Associate Directors will be appointed by the Dean, FASE, with input from the Director, for a three- to five-year term, renewable once. Initially, the existing Directors of ECP and ILead, and one additional faculty member from within ISTe²P will be appointed as the Associate Directors. Their role will be to support the Director in his/her responsibilities, specifically to:

1. Provide administrative support to the Director.
2. Provide acting leadership for the Institute as needed.
3. Maintain and attract new partnerships.
4. Organize workshops and other activities to facilitate and create new collaborations to research the practice of engineering that is shared across disciplines.
5. Assist in the development of new courses and other academic programing.
6. Coordinate Institute resources to maximize benefit to co-existing units such as ILead and ECP.
7. Coordinate with the Faculty's Office of Advancement and Alumni Relations to attract funds from alumni and donors.
8. Maintain and grow Institute membership, including new faculty and student involvement.

6.3 Administrative Staff

The Institute will initially have two full-time administrative staff who may be hired or transferred from affiliated units within FASE. These staff will support the administration of the existing academic programing and support the Directors and Associate Directors in the execution of ISTe²P's mission. Initially the FASE will provide central support for the administration of: retention and promotion, research grants and contracts, information technology, communications, external relations, purchasing and human resources.

6.4 Steering Committee

The Director and Associate Directors will work as a Steering Committee to help inform the direction of the Institute. The inaugural Steering Committee will consist of three to five Institute

members (both faculty and graduate students) from within FASE and from cognate units linked to the Institute through its programs and research, with two-year rotating terms.

Two to three members will be invited from other FASE academic units not otherwise represented on the Steering Committee (e.g., the University of Toronto Institute for Aerospace Studies, the Institute of Biomaterials and Biomedical Engineering, the Division of Engineering Science, and all five departments in the Faculty). Two graduate student members will be invited, ideally a master's student and a doctoral student. The Director and Associate Directors will sit on the Steering Committee, as will the Vice-Dean, Research, and the Vice-Dean, Graduate, and invitations will be made to other senior administrators from the Faculty.

6.5 Advisory Board

The Dean, FASE, with input from the Interim Director and Associate Directors, will appoint an Advisory Board to provide non-binding advice to the Director. Formal invitations will be sent pending approval of EDU:A status. The Advisory Board will consist of three to five leaders from industry, government and academia; members may serve for a period of up to three years.

Advisory Board members will fill one or more of the following roles: (1) provide input to the Steering Committee on Institute activities and initiatives, (2) identify valuable new initiatives to members of the Institute, and (3) review the Institute's annual report and plan. Continued service on the Advisory Board will require tangible contributions in one or more of these areas. In exchange, Board members will acquire knowledge through ISTE²P's research and teaching activities and have opportunities to meet and network with people who share their interests.

7. RESOURCE IMPLICATIONS AND BUDGETARY IMPACTS

FASE will assume administrative and budgetary responsibilities for ISTE²P. Creation of this EDU:A will not have any major resource implications or budgetary impacts:

- ISTE²P's 10 budgetary faculty appointments have already been hired by FASE thus no additional funding will be required.
- ECP and ILead have existing budgets that are expected to continue to support their existing activities.
- ISTE²P will occupy available space within the new Centre for Engineering Innovation and Entrepreneurship in addition to retaining space already occupied by its faculty and co-existing units.
- At least one of the two administrative staff will be existing positions and FASE will provide central administrative support through existing staff.
- Existing funding for the Collaborative Specialization in Engineering Education will continue to provide support for graduate students.

New funding will be required for the Director along with operational support to help ISTE²P pursue its mission.

8. RESEARCH FUNDS

As an EDU:A, ISTe²P will be entitled to directly administer its research funds in accordance with the policies, guidelines and procedures of the University of Toronto. While ISTe²P will actively promote growth in research funding, initially it will not create infrastructure to administer this funding. This administration will be done centrally by FASE or, when more appropriate. the home department of cross-appointed principal investigators. Most of the existing research funding for engineering education research is currently held by tenure stream faculty. It is envisioned that these faculty will choose to administer these funds through their home department or ISTe²P, depending on the nature of the project and in particular the extent to which it supports graduate students enrolled in the PhD programs of their home department. Teaching-stream faculty will be encouraged to apply for research funding and seek special permission to serve as principal investigators or co-apply with a tenure-stream colleague. As research activity grows, it may eventually become more effective for ISTe²P to establish dedicated administrative support for research.

9. GOALS, BENCHMARKS AND MEASURES OF SUCCESS

ISTe²P will track its progress towards achieving its vision (see Section 1) by measuring what it has delivered five and 10 years from its establishment in terms of:

Innovative Teaching Initiatives

- 1) Number of courses adopting new in-person and digital tools and techniques
- 2) Number of new courses designed and delivered
- 3) Number of courses that integrate transdisciplinary competencies

Excellence in teaching

- 1) Student enrolment in courses
- 2) Student evaluation of programming
- 3) Number of courses delivered
- 4) Student enrolment and completion rates
- 5) Number of courses co-taught

Educational Leadership

- 1) Number of faculty co-instructing or applying instructional strategies encouraged by ISTe²P
- 2) Attendance at seminars and workshops
- 3) Number of future educators who graduate from our Faculty, and propagate their knowledge and experience at other institutions
- 4) Community size (number of appointed or cross-appointed faculty, postdoctoral fellows, and graduate students appointed to ISTe²P)
- 5) Community breadth in terms of membership within and beyond FASE
- 6) Number of collaborative initiatives and activities

Engagement and Impact from Scholarly Discourse

- 1) Reputation in Canada and internationally
- 2) Recognition as a thought leader, based on the level of engagement with, and consultation requested from, academic units beyond FASE
- 3) Engagement in the educational divisions of scholarly societies and education associations
- 4) Perception of alumni and employers that U of T is producing better engineers

Discipline Based Scholarship

- 1) Number of research publications and presentations
- 2) Level of research funding
- 3) The adoption of instructional knowledge and techniques beyond FASE
- 4) Contributions at conferences
- 5) Number of research collaborations and studies with colleagues in other Faculties or external to U of T (nationally and internationally)

Measures of success for individual activities are provided in the [Report of the Working Group to Establish an Institute for Engineering Education](#), along with associated metrics, goals and milestones.

10. CONSULTATION

Extensive consultation was and will continue to be undertaken in support of the development of this proposal. This consultation included a survey of faculty members, discussions with students, discussions with impacted faculty members, presentations at Department meetings, two discussions at Faculty Council, two presentations at FASE Chairs and Directors, discussion with the Head Librarian in the Engineering and Computer Science Library, discussions with potentially interested U of T faculty beyond FASE, and some consultation with the broader engineering education community in Canada. A complete list is provided in Section 7 of the Report of the Working Group to Establish an Institute for Engineering Education.

11. GOVERNANCE

	Date Completed
Consultation with Vice-Provost, Academic Programs	September 2017
Decanal and Provostial sign off	October 2017
Faculty governance approval	December 12, 2017
Submission to Planning and Budget Committee of Governing Council	January 10, 2018
Submission to Academic Board of Governing Council	January 25, 2018
Submission to Governing Council	February 14, 2018