McMaster University

Engineering Entrepreneurship and Innovation

Entrepreneurship Program

W. Booth School of Engineering Practice and Technology
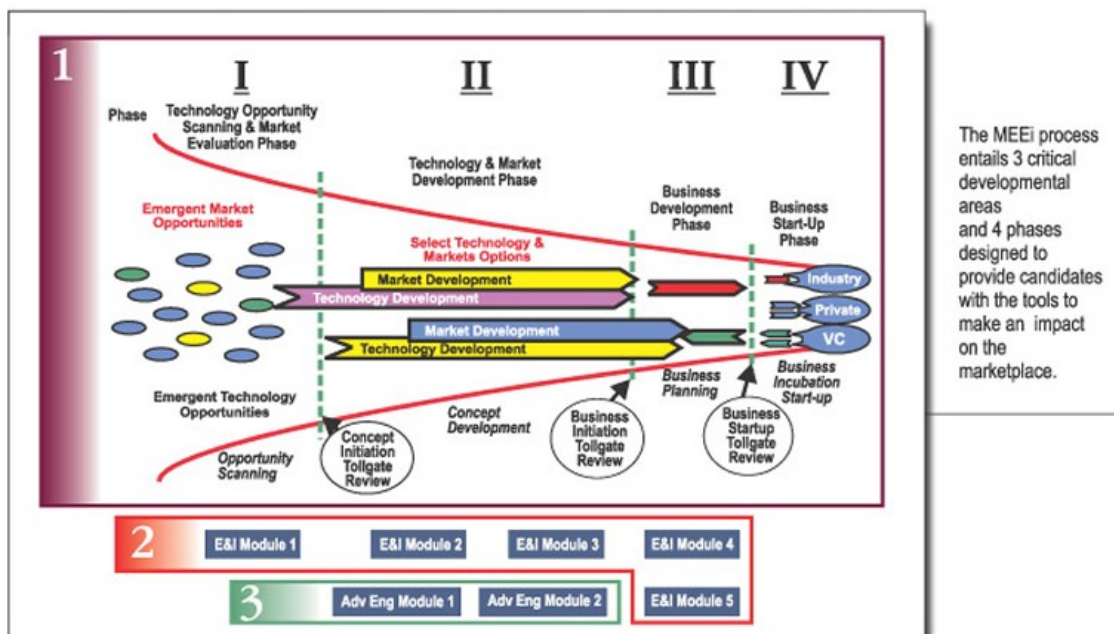
The Enterprise Project Tollgate Process

March 2016

Master of Engineering Entrepreneurship & Innovation
Master of Technology Entrepreneurship & Innovation

Contents

Enterprise Project Tollgate Process

The MEEI and MTEI programs use a phase and gate commercialization process called the Enterprise Project Development Process. The Enterprise Project Development Process is similar to processes used in industry for new product development or new business creation. The idea is to manage the risks and the resources while you are establishing your business. As shown in the figure below, there are four main phases in the new business creation process used by the MEEI and MTEI programs. The essence of this commercialization process is to set deliverables for each phase. Then at the end of each phase, the information collected is evaluated and a decision is made to either: continue to the next phase, get more information from the current phase, or terminate the business venture.

The Advisory Committee reviewing the deliverables at each tollgate of the Enterprise Project evaluates the quality of the analysis, and the level of judgment exercised, to arrive at the deliverables for the previous phase. Advisory Committee decisions are Go/No Go decisions that reflect the Advisory Committee's assessment of whether or not the information describing the business case has been thoroughly researched and whether or not the tools taught have been satisfactorily executed. The Advisory Committee does not assess business viability. This assessment is the responsibility of the candidate(s) who can seek input from the Advisory Committee members independently.

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As a project moves through the process, assumptions are tested for validity so that the information for each set of deliverables is refined and enhanced. This continuous refinement of the understanding of the enterprise project moves the

project concept from the status of an untested idea at the beginning of the process to an implementable business at the final gate.

In Phase-1 of the process, the entrepreneur is trying to evaluate the opportunity without investing significant time or resources. An understanding of the problem to be solved, the nature of the solution, and the customer groups that can benefit from this solution, are key deliverables. In addition to using secondary market research data, it is expected that the students will talk to industry experts to better understand the market niche or the industry they are targeting. The preliminary work associated with this phase will also focus on the competitive situation in the envisioned market(s), the business model and value proposition. The preliminary technical plan should include analysis of intellectual property issues associated with the solution and sketch out the plan for achieving proof-of-concept with technology. At the end of the first phase, the student goes through the Concept Initiation Tollgate. The specific deliverables for this tollgate are found in Appendix-1.

In Phase-2, the entrepreneurs have to validate the assumptions they made in the Concept Initiation Tollgate and perform both technical and market feasibility analysis. The main objective is to validate that there are customers willing to pay for your product and/or service. From the market development side, it is expected that thorough market research will be carried out to explore different customer groups, determine what is the market size? Who are the main competitors? Etc. From the technical perspective, the students are expected to prove that the core technology works and that there is no further invention required. Moreover, using the voice of customer, a clear understanding of how customer needs will map onto the technical characteristics of the product/service has to be developed. When the market development activities and the technical POC are done, the financial case is developed and the Business Initiation Tollgate is carried out. The specific deliverables for this tollgate are found in Appendix-2.

In Phase-3 of the process, the knowledge accumulated in the second phase provides the context for an analysis of potential business models and the selection of a business start-up strategy. Remaining project assumptions are tested and the outcomes are used to formulate the strategic go-to-market approach. The strategic decision process should lead to the development of a fully articulated business plan. The expectation is that the business is either ready to enter the market and raise funds, or the venture is terminated, at the conclusion of the Business Startup Tollgate. The specific deliverables for this tollgate are found in Appendix-3.

Appendix-1

Tollgate 1: Concept Initiation Tollgate

In Concept Initiation Tollgate, a convincing case should be made to the Advisory Committee that there is a business opportunity worth pursuing. The Advisory Committee is evaluating the analysis carried out so far and the exercise of appropriate business judgments in the development of the assumptions, data, and conclusions that constitute the business case thus far.

Candidates use the tools learned in Module 1, in addition to talking to industry experts to:

- Articulate what is the problem they are trying to solve or the market gap that they are trying to fill
- Explain what the proposed solution is and what your unique selling point is.
- Explain what the solution will look like, what are the benefits to customers and what are the main features and attributes of the solution?
- Using secondary market research, identify the different customer groups that can potentially benefit from the proposed solution and how they make their purchase decisions, estimate what is the market size, how can you reach your customer, and what are the most common business models in your targeted industry.
- Identify the competition for the proposed solution, what companies? What technologies?
- Present a clear technology development plan. A clear approach should be presented to demonstrating that the core technology can provide the "essence" of the proposed solution. The planning of the required activities should identify all of the resources needed to carry out the proof of concept activities.
- Carry out a preliminary analysis of the supply chain for the solution. Who would supply the needed components and what would it take to transform the components into a solution for the customer. Estimate the cost associated with producing the solution for the customer.
- Carry out a detailed intellectual property analysis. Identify the novelty associated with the idea/technology and how might it be protected. Identify any intellectual property that might prevent the offering of this solution to the customer. Identify the approach to acquiring access to any intellectual property that will be required to bring the solution to the customer.
- What are the major milestones for the next phase? What skill sets are required to achieve the milestones and who will carry out the required work?

Concept Initiation Tollgate Criteria

MEEI/ MTEI Tollgate I Review Evaluation Criteria			
Name of the Student:_____			**Date:**_____
Assessed Area	**Criteria**	**Done (Yes/No)**	**Comments**
The Business Opportunity	The Problem: Clearly articulated customer problem or market opportunity with quantification		
	The solution that alleviates the customer pain is outlined and technically sound		
	The unique sell point is clearly identified		
	The value Proposition articulated		
The Technology	Description of the technology that underlies the solution is articulated		
	Architectural diagram of how the solution works is provided		
	The core technology is identified		
The Customer	The target customers are clearly identified		
	Validation that the customer agree with the problem/pain point & that they would buy the solution		
	To what degree is the product or service a compelling purchase for the customer		
	Market research is conducted to collect VOC		
Market	Identified and described the total target market areas appropriately		
	The customer groups are identified		
	The total market size for the service/product is well quantified		
Competiton	Does the student know of all competing technologies		
	How will the venture respond to competitors' actions when venture enters the market place		
	Did the student identify the sources of competitive advantage?		
Technology Development Plan	High level product concept is articulated		
	R&D/technical advancement necessary to proof the concept		
	Is there a promissing current status of technology		
	Is there a clear technology roadmap		
	Resources identified to create a prototype/proof of concept in 6-8 months		
	Good technology implementation in place		
	Plan for testing technology with customers		
Intellectual Property	IP issues clearly understood		
	IP protection plan articulated		
Presentation Skills	Structure - was it logical, did the audience know the structure, were points appropriately linked and/or summarized.		
	Timing - did they deliver a presentation of the correct length		
	Pace - was information given at an appropriate rate		
	Visual/other aids - were they of a business standard and used appropriately		
	Clarity of speech - rate of speech, loudness.		
	Personal Presentation		
	Use of eye contact/movement		
	Audience Engagement		
Dealing with Question	Ability to respond appropriately - clear answers that effectively address the question		
Overall Comments			

EVALUATORS:	Signature		Date
Enterprise Advisor			
Technical Mentor			
Business Mentor			
Business Development			

Appendix 2

Tollgate 2: Business Initiation Tollgate

At the "Business Initiation Tollgate", it is demonstrated that the proposed solution would serve identified customers and that the underlying technology for the solution can deliver the required essential characteristics of the solution for the customer. In Phase-2, the assumptions associated with the description of the opportunity in Phase 1 are tested by gathering the "Voice of the Customer" and translating this voice into testable solution characteristics. The results of this testing are used to validate that the solution would serve customers and that the technology can be used to deliver this solution.

Candidates use the tools and concepts learned in Modules 2 and 3 and their information from potential customers and technology experts to:

- Review the concepts and assumptions from the "Concept Initiation Tollgate",
- Use primary market research including voice of customer, to identify
  - The targeted customer groups,
  - The value proposition to the different customer groups,
  - The market size for the product and/or service using both, a top-down approach, and a bottom-up approach to market sizing,
  - The price of the product and/or service,
  - The competitive situation with a detailed analysis of competitive technologies and of the organizations that provide competitive products/services.
  - An analysis of the expected response of the competition, and the planned action to address competition,
- Present a proof-of-concept
  - Show how the technology can deliver a solution that can meet the voice of the customer
  - The results of testing the product and/or service POC with lead customer(s)
  - Is there any expected intellectual property? Any intellectual property issues that need to be resolved?
  - Identify the resources (skills, people, time, and cost) needed to carry out full development of the product,
  - Identify the project risks and risk management strategies,
- Develop bottom-up financial projections which project income from revenue from sales and the projected "cost of revenues/cost of goods sold". investment in development with the projected income stream.

Business Initiation Tollgate Criteria

	MEEI/MTEI Tollgate II Review Evaluation Criteria		
Name of the Student:_____		**Date:**_____	
Assessed Area	.	**Done (Yes/No)**	**Comments**
Market Development	Is the target market defined? Is the segment at which the product/ service will be targeted identified?		
	Have the intended target customers been contacted to acquire requirements?		
	Is there a detailed market research study conducted		
	Has the market size been estimated using top-down and bottom up methodology?		
	Has the product/service price been estimated and is there analysis to show % of customers willing to buy?		
	How the product/service will be positioned in the eyes of the customers/users versus competitive products		
Proof-of-Concept	Clear product/service definition articulated?		
	Are the product's or service's features, requirements and specifications defined? - specifying the product/service requirements and features		
	Concept testing - Has the customer/user reaction to the proposed new product/ service been gauged for buy in?		
	Are the technical activities necessary to achieve the attributes identified?		
	Are the skills and resource (equipments, materials, ..etc) sets needed to achieve the proof-of-concept identified?		
	Key risks and hurdles identified?		
Competition	Are competitive / alternative offerings clearly identified?		
	Has benchmarking been conducted?		
	Is response to competitors/alternatives anticipated?		
	Are the strengths and weaknesses of proposed offering identified?		
Financial Plan	Has a financial plan for the offering been developed?		
	Have resources outlay and financial projection been identified?		
	Has business sustainability been addressed satisfactorily?		
	Is the endeavour economically viable?		
Presentation Skills	**Structure** - Was it logical? Did the audience know the structure? Were points appropriately linked and/or summarized?		
	Timing - Did they deliver a presentation of the correct length?		
	Pace - Was information given at an appropriate rate?		
	Visual/other aids - Were they of a business standard and used appropriately?		
	Clarity of speech - rate of speech, loudness,		
	Personal Presentation		
	Use of eye contact/movement		
	Audience Engagement		
Dealing with Questions	**Ability to respond appropriately** - clear answers that effectively address the question?		
Overall Comments			

EVALUATORS:	Signature	Date
Enterprise Advisor		
Technical Advisor		
Business Mentor		
Enterprise Development Manager		

Appendix 3

Tollgate 3: Business Startup Tollgate

At the "Business Startup Tollgate", the basis for developing a business based on opportunity is analyzed and a plan (business plan) for implementation is presented. The path to monetizing the business opportunity should lead to a workable plan to achieve the required investments and implementing the systems to serve customers. A "Go to Market" strategy that describes the approach and the channels that will be used to reach customers must be part of this plan.

Candidates use the tools and concepts from Modules 4 and 5 to:
- Analyse the business case.
- Present different potential business strategies for start-up and use a structured decision process to select the strategic approach to business start-up.
- Based on the selected strategy, present the entire business plan and deal structure.
- Present a clear "Go to market" strategy that describes how awareness of the new product/service will be created in the market and the channels that will be used to get the product/service to customers.
- Identify specific lead users, partners and alliances.
- Describe how they will sell their first customer
- Revisit the competitive analysis
- Update the financial plan and develop monthly based cash flows for the first year.

Business Startup Tollgate Criteria

<table>
<tr><td colspan="2">MEEI/MTEI Tollgate III Review
Evaluation Criteria</td><td></td><td></td></tr>
<tr><td colspan="2">Name of the Student:_____</td><td colspan="2">Date:_____</td></tr>
<tr><td>Assessed Area</td><td>.</td><td>Done (Yes/No)</td><td>Comments</td></tr>
<tr><td rowspan="3">Business Strategy</td><td>Has a SWOT analysis been made to identify best approach to maximize opportunity and reduce threat?</td><td></td><td></td></tr>
<tr><td>Has a clear, logical alternative strategic choice of go to market been chosen?</td><td></td><td></td></tr>
<tr><td>Has the student applied the Decision Matrixanalysis to chose the best strategic approach that would maximize the sustainable competitive advantage?</td><td></td><td></td></tr>
<tr><td rowspan="7">Business Plan</td><td>Description of the company vision, mission and objectives & business concepts, and value proposition articulated?</td><td></td><td></td></tr>
<tr><td>Have the management team and their capabilities been described?</td><td></td><td></td></tr>
<tr><td>Is the core technology underlying the product/service at hand, protected and unique?</td><td></td><td></td></tr>
<tr><td>Is there a product/service acquisition plan and resource plan?</td><td></td><td></td></tr>
<tr><td>Are competitive / alternative offerings clearly identified</td><td></td><td></td></tr>
<tr><td>Are the financial plan and funding requirement developed?</td><td></td><td></td></tr>
<tr><td>Has the organizational, legal and deal structure been developed?</td><td></td><td></td></tr>
<tr><td rowspan="4">Go-To-Market Plan</td><td>Acquiring the product - Is the product or services sourcing/ manufacturing plan developed?</td><td></td><td></td></tr>
<tr><td>Marketing & selling the product- Have the sales and marketing plan, resources outlay and financial projection been identified?</td><td></td><td></td></tr>
<tr><td>Partners & Suppliers – Is there a partnership and alliance strategy in place?</td><td></td><td></td></tr>
<tr><td>Lead Customers - Are lead customers for product/service on board?</td><td></td><td></td></tr>
<tr><td rowspan="8">Presentation Skills</td><td>Structure - was it logical, did the audience know the structure, were points appropriately linked and/or summarized.</td><td></td><td></td></tr>
<tr><td>Timing - did they deliver a presentation of the correct length</td><td></td><td></td></tr>
<tr><td>Pace - was information given at an appropriate rate</td><td></td><td></td></tr>
<tr><td>Visual/other aids - were they of a business standard and used appropriately</td><td></td><td></td></tr>
<tr><td>Clarity of speech - rate of speech, loudness,</td><td></td><td></td></tr>
<tr><td>Personal Presentation</td><td></td><td></td></tr>
<tr><td>Use of eye contact/movement</td><td></td><td></td></tr>
<tr><td>Audience Engagement</td><td></td><td></td></tr>
<tr><td>Dealing with Question</td><td>Ability to respond appropriately - clear answers that effectively address the question</td><td></td><td></td></tr>
<tr><td>Overall Comments</td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>EVALUATORS</td><td>Signature</td><td>Date</td></tr>
<tr><td>Enterprise Advisor</td><td></td><td></td></tr>
<tr><td>Business Mentor</td><td></td><td></td></tr>
<tr><td>Technical Mentor</td><td></td><td></td></tr>
<tr><td>Bus Dev officer</td><td></td><td></td></tr>
</table>

Appendix 4

Academic Requirements and Logistics Associated with the Enterprise Project Tollgate Process

Tollgate Process Owner: Industry Project Coordinator

Candidates are expected to pass through the three tollgates as part of the degree requirements. Tollgate performance is not graded "pass/fail", but rather "Go/No Go". Candidates that are "cleared to graduate" must sequentially achieve a "Go" decision at all three tollgates in the process. A "No Go" decision at a tollgate review indicates that the Advisory Committee believes that some of the required information is missing, or that the business case has not been appropriately analyzed according to the requirements of the gate in question. If the former case, the committee will ask candidates to resume work on the activities of the previous phase so that the required information can be assembled. In the latter case, the Advisory Committee will request a revised analysis of the business case and will provide candidates with direction with respect to the nature of the analysis to be carried out.

Progress through the Enterprise Project will proceed according to best practices in risk management. This means that Tollgates will be carried out sequentially and that the advice of Advisory Committee members will be valued in directing the work between Tollgate reviews.

In general, Tollgate reviews for more than one tollgate at a time will not be permitted. Candidates are responsible for planning their progress through the Enterprise Project process and for ensuring that their progress is consistent with their scheduling objectives. Rare exceptions to this rule might be permitted when:

- Special circumstances exist that were beyond the control of the candidate.
- There is a consensus among the Advisory Committee members that a
  - multiple Tollgate review is appropriate.
- The Candidates interaction with the Advisory Committee members has been
  - consistent and ongoing over the course of the Enterprise Project.
- Exceptions have been discussed and agreed at a Staff Meeting.

Tollgate Evaluation Policy

1- Each project team shall have a Tollgate Advisory Committee (TAC), constituted of:

   a. A Faculty Advisor[1]

   b. A Technical Mentor[2]

   c. A Business Mentor[3]

   d. A second Faculty Member from the Entrepreneurship program.[4]

   e. An Industry Project Coordinator (IPC)[5]

   All members of the committee must be present for the meeting for quorum.

2- The second Faculty member (or the IPC if present) shall act as the *Process Chair* of the tollgate:

   a. Guiding students through the enterprise development tollgate process, review and provide feedback

   b. Ensuring the smooth flow of the meeting, including the presentation, the Q&A, the closed-door discussion and the final decision and communication to the students within the allotted time.

   c. Communicating the decision of the TAC to the students

3- The teams must have the tollgate meeting scheduled and the meeting notices circulated at least two weeks prior to the tollgate date.

4- Teams will submit their slide deck to the Administrative Assistant for distribution to the TAC at least 2 days prior to each tollgate meeting. For tollgate 3, the team must also submit their business plan at least 1 week prior to the meeting. The Administrative Assistant will distribute the business plan to the TAC.

5- After the Tollgate presentation, the members of the TAC will ask questions of the team as they deem fit and appropriate

6- After all the questions have been asked or the maximum time for Q&A has been exhausted, whichever comes first, the student team will be excused and a closed-door discussion between the members of the TAC will ensue. The maximum

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[1] A Faculty Advisor must be a full-time faculty at McMaster, teaching one of the core modules of the MEEI/MTEI programs

[2] Should be a demonstrably technical expert in the subject matter of the project of the advised team

[3] Should be a demonstrably business expert in the subject matter of the project of the advised team

[4] Must be another full-time faculty at McMaster, teaching one of the core modules of the MEEI/MTEI programs

[5] Must be a full-time or part-time staff member of the Entrepreneurship program having an in-depth and up to date understanding of the tollgate requirements; will normally be present at all Tollgates and will function as the process chair. Absence will be permitted only with the agreement of the faculty members of the TAC and under circumstances not related to normally encountered scheduling issues.

time limits will be 45 minutes for presentations, 45 minutes for Q&A, 30 minutes for committee deliberation including final decision.

7- All the members of the TAC will be afforded enough time to express their opinions on both the particular and general aspects of the presentation and the progress of the students

8- The final evaluation for Go/no-Go decision will be done by the two faculty members only, taking into account the input of the rest of the members of the TAC.

9- The evaluation can range from: No-Go, to Conditional Go to Go.

10- The decision by the two faculty members must be unanimous. In case of disagreement, it is the more unfavorable decision that primes. For example, if Faculty No. 1 votes for a Go and the Faculty No. 2 votes for a no-Go or a conditional Go, then it's Faculty No. 2 vote that primes.

11- Every Decision Notice will require both names and signatures of both Faculty members.

12- The signatures on the Tollgate Criteria will serve for attendance and comments purposes only and will not be required for the purpose of the Decision.

13- The decision of the committee will be communicated to the team/student by the process chair. The academic advisor will have the tollgate checklist and can provide details of the results to the team if they are requested.

14- There must be a minimum time of at least one (1) month between each tollgate meeting.

15- Tollgate meeting blackout dates will be observed August 15 – 31 and December 15 – 31. No tollgates will be scheduled during the blackout dates.

16- **Special Situations:**

a. In case of the absence of one of the mentors, the meeting must be attended by their representative or delegate.

b. In case of the absence of the second Faculty member, then the Go/no-Go decision will be made by the attending Faculty member and the IPC, if present. This solution is only in effect until a third Faculty member is in place within the Entrepreneurship program.

MEEI/MTEI Enterprise Project Tollgate Procedures

For the MEEI and MTEI students to complete their enterprise project they must pass **three** tollgates to fulfill the requirement of his/her Master's degree.

Administrative Process to be taken at each tollgate:

1. **Candidate(s)** decide to proceed with tollgate scheduling with the support of their Enterprise Advisor who will seek input from the Industry Project Coordinator.

2. **Candidate(s) will arrange a date that is convenient with:**

   a. Enterprise Advisor
   b. Technical Mentor
   c. Business mentor
   d. Industry Project Coordinator, if available.
   e. A second Faculty Member from the Entrepreneurship program

The Graduate Administrative Assistant will have "Tollgate Reserved Dates" for Faculty Members and the Industry Project Coordinator. The Graduate Administrative Assistant should be copied on all emails related to the scheduling of a Tollgate.

3. **Candidate(s)** will ensure that the Non-disclosure agreements for both the technical mentor and business mentor are on file in the School administrative office.

4. **Candidate** will reserve a conference room through Graduate Administrative Assistant.

5. **Graduate Administrative Assistant** will prepare the formal "Notice of Meeting" and e-mail to all participants.

6. **Graduate Administrative Assistant**, in advance of the meeting, will prepare:

   a) Formal tollgate review forms
   b) Decision form.
   Complete tollgate package for each member of the Advisory Board includes:

   i) The notice of meeting form
   ii) Tollgate form
   iii) Decision form

7. **Industry Project Coordinator** communicates the result of the tollgate to the Graduate Administrative Assistant, along with documentation for any follow-up work if a "Conditional Go" is determined by the committee. The Graduate Administrative Assistant will prepare the "result letter" to be signed by the Enterprise Advisor. The Graduate Administrative Assistant will ensure delivery of the result letter to the candidate(s).

FOR SEP ADMINISTRATIVE OFFICE USE:

**Documentation that should be in formal student file in W Booth School
Administrative office:**

1. Email from Industry Project Coordinator supporting the student to seek Tollgate
   review.
2. Official 'notice of tollgate' to student and advisory board members
3. Executed tollgate review criteria form with signatures of advisory board
4. 'Decision' form signed by both faculty members
5. Copy of 'Result of Tollgate' letter provided to the student.

Paper copy and e-copy of student's tollgate presentation and report applicable to the
tollgate.