

## **Sharing Student Learning from Individual Internship Experiences**

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## Sharing Student Learning from Individual Internship Experiences

One way to learn innovation management is by professional experience in this space for many years. Recognition of patterns may be acquired, based on observing and experiencing things that work and fail across many examples of changes undertaken to create value. A challenge for an academic program is: can these insights be taught? In an academic program, lectures, projects and expert seminars are traditional, where underlying principles can be explored, and reflection encouraged as sources of insight.

Individual student internships offer a valuable window into how concepts fare when tested in practice. For the range of issues associated with innovation management, however, pattern recognition and broader learning may be difficult to build from the perspective of a single, short professional experience.

This paper describes an opportunity for leveraging individual internship learnings. Every student in our program completes an internship, and each internship is different. Because the class cohort is a learning community, when every student shares key insights about an internship with classmates, the power of individual experiential learning is multiplied.

### *Introduction*

An internship is an important opportunity for students to apply concepts from coursework in actual organizations, while striving to contribute value for stakeholders. An internship also provides an immersive experience in the messiness of the real world, where a student will observe situations that highlight inevitable distinctions between theory and practice. In addition, topics and issues that may not have been part of their formal academic curriculum make each internship unique and enriching, as each student becomes deeply knowledgeable concerning both technical and social concerns specific to their internship context.

The experiential learning from internships can support three changes that have been promoted for professional education for many decades: “First, a new philosophy and new outlook which will comprehend the human and social as well as the technical. Second, the development ... of genuine competence ... [to] deal effectively with the whole problem, not merely the technical part. Third, the development of the ability to learn from experience so that in the unfolding future [students] can continue to expand their fundamental knowledge, deepen their understanding, and improve their power as professional men and women and as leading citizens.” (Dougherty, 1950, pp. 4-5)

In a professional engineering masters degree program in innovation management, we require that every student complete an internship. Although the internship experience is central in the curriculum, each internship is unique. Students arrive with a diverse set of technical backgrounds and other interests, and every student is encouraged to explore a range of possible internships. With the approval of the program director, each student makes a commitment for a summer role which will contribute to advancing technical innovation in a real organization.

Because each internship is also anticipated to have educational value, the program provides a supporting structure to help each internship experience become a student's "ultimate elective".

Since the launch of the program, formal and informal assessments of each student's learning from their own internship have been integrated into the program curriculum as part of the program design. Initially, learning assessment was primarily from written journal entries and a final paper of accomplishments and reflections. In recent years, internship presentations have become the key focus for choosing a winner for an award, and classmates as well as independent judges record key takeaways and provide ratings for every internship presentation. This provides another perspective on key student learnings from their internships, and an informal assessment of the value of shared internship learning across a student cohort.

### *Relevant literature concerning internships and innovation management*

Internships have been identified as a "high impact" educational practice. As reported by the American Association of Colleges and Universities (Kuh, 2008) internships are among a set of educational practices that benefit students pursuing degrees in a range of liberal arts and professional disciplines. In the AACU report, internships are defined as "a form of experiential learning... to provide students with direct experience in a work setting—usually related to their career interests—and to give them the benefit of supervision and coaching from professionals in the field." Students with diverse backgrounds self-report that internships contribute to their "Deep Learning" and "General, Personal and Practical Gains." The authors of the AACU report place internships among practices for "Strengthening Intellectual and Practical Skills" and "Practicing Integrative and Applied Learning."

Innovation management education for engineers is a superset of innovation education for engineers. It is a relatively new and evolving discipline, with a relatively young literature. Definitions for elements of the discipline are also evolving; for example, Bement and Dutta highlight their finding that differences between innovation and entrepreneurship may not be generally understood. (Bement and Dutta, 2014.)

An innovation education continuum has been described as "ranging from the topic of creativity on one end, through (product & process) innovation, (entrepreneurial) new venture development OR (intrapreneurial) value creation in established organizations, to enterprise management on the other", (Duval-Couetil & Dyrenfurth, 2012; Figure 3, cited in Duval-Couetil, Shartrand and Reed, 2016). While creativity and innovation may be considered "innovation process" and the final elements "innovation outcomes", all relate to innovation management as part of an innovation ecosystem, and all parts of this continuum have been the focus of worthwhile innovation management internships as considered in our study.

Even with this inclusive view of innovation management, however, specific literature on internships and innovation management education for engineers is limited. Concerning the significance of internships on entrepreneurship education, the recent work of Duval-Couetil et al begins by noting that "to date, few researchers have examined to what extent differing program models and experiential activities impact students' perceptions of their entrepreneurial

knowledge, skills, and self-efficacy.” (Duval-Couetil, Shartrand and Reed, 2016.) Although internships are not discussed in detail in their paper, “interned or worked start-up” does show a positive association with student self-ratings of “overall entrepreneurial ability” and “ability to start a business now” in their study of three different undergraduate programs (Ibid, Fig 8 and Fig 9).

Because internships exemplify experiential learning, there is much relevance in David Kolb’s work, which provides extensive background on experiential learning and its foundations. (Kolb, 2015) Kolb concludes discussions of the work of scholars, including John Dewey, Kurt Lewin and Jean Piaget, with a set of propositions shared by major traditions of experiential learning:

1. Learning is Best Conceived as a Process, Not in Terms of Outcomes
2. Learning Is a Continuous Process Grounded in Experience
3. The Process of Learning Requires the Resolution of Conflicts between Dialectically Opposed Modes of Adaptation to the World
4. Learning is an Holistic Process of Adaptation to the World
5. Learning Involves Transactions Between a Person and the Environment
6. Learning is the Process of Creating Knowledge

In summary, Kolb offers: “Learning is the process whereby knowledge is created through the transformation of experience” and proposes a four-steps experiential learning cycle, including:

1. Concrete experience;
2. Reflective observation;
3. Abstract conceptualization;
4. Active experimentation.

Some undergraduate engineering internships have applied reflection to truly learn from experience, as described by Kolb and others. For example, Doel describes integrating a written student log into a professional development course linked to an internship experience. (Doel, 2009.) Kolb’s model has also been explicitly related to undergraduate engineering internships by Tener et al. (Tener et al, 2001), who compare reported learning experiences in a study of 170 construction internships to the steps in Kolb’s learning cycle. Tener et al. conclude “prevalent learning modes during construction internships are found to be active experimentation and reflective observation.”

In his “Towards an Epistemology of Practice”, Raelin (Raelin, 2007) provides an extensive review of ways “practice can contribute to our knowledge base interactively with and distinctly from class room education”. He considers “the critical nexus between work-based and classroom-based learning.” He expands upon “the value of critical reflective practice as a middle ground” and offers a model that holds that “learning often arises from an interactive contention among a community of inquirers. Indeed, students as co-inquirers with their teachers have the capacity to construct knowledge if given both the learning resources and encouragement to do so.” (Raelin, 2007 p. 504)

Raelin describes “tentativeness” as a principle of practice-based learning, in contrast to academic “knowing in advance of practice.” Under the principle of tentativeness, “practitioners take in experience and reflect on the lessons available in front of their eyes. They compare their

experience to existing theory and determine its applicability. If experience is not conjunctive with theory, ongoing reflection with others can produce new theory.” (Raelin, 2007, p. 506)

Reflection is valuable for professionals, as well as student interns. Raelin cites Donald Schon (Schon 1983) who coined the term, “reflection-in-action,” and describes the value of “a learning environment which permits and encourages practitioners to test their mental models.” (Raelin, 2007) Oeij et al. argue that “Donald Schon’s reflective practitioner actually outlines an explicit model of the steps that project leaders in practice apply largely unaware” and illustrates with examples of leadership in innovation projects. (Oeij et al., 2017).

As described by Dyer, Gregersen and Christensen in “The Innovator’s DNA”, the skills of “true innovators” are also particularly relevant for innovation management education. Five “discovery skills” are identified as distinguishing the most innovative executives: questioning, observing, experimenting, networking and associating (Dyer, et al, 2009).

### *A framework for organizing mental models of contributors to innovation*

In an earlier study of experts (Fisher, Biviji and Nair, 2011), we proposed an aggregate expert mental model of innovation and its implications for innovation education for engineers. A “fishbone” diagram elaborates on the factors contributing to innovation, from the perspective of experts (Figure 1) and a “reverse fishbone” considers the implications for innovation education. (Figure 2).

The fishbone framework for organizing mental models of contributors to innovation (Figure 1) is integrated into the program to inform and organize student observation about innovation and innovation management in the classroom and beyond (Fisher, Biviji and Nair, 2014). Because the internship is a significant focus of the program, as part of a final internship report summarizing learning from contributions and reflections, students also populate the framework with learnings from their experience in different organizations.

A dozen thoughtful experts contributed ideas to the aggregate expert model diagram. One of the experts, with thirty years of corporate innovation management experience, observed that there are two important dimensions for decision making that distinguish innovation management decisions from other business decisions: the context for the decision and the nature of the decisions to be made. In innovation management, you have less information about the context and the decisions are fewer, but more impactful. He mused “How do you prepare people when there is no context to evaluate the information you are receiving, and there are only one or two decisions you have to (identify and) get right (to move forward)? Innovation done well is experimenting and knowledge developing, it’s not really anything else, ... it’s all about time to learning and how do you optimize yourself and your team to learn as much as possible in less time and cheaply and quickly as possible.” (Charlton, 2010.)

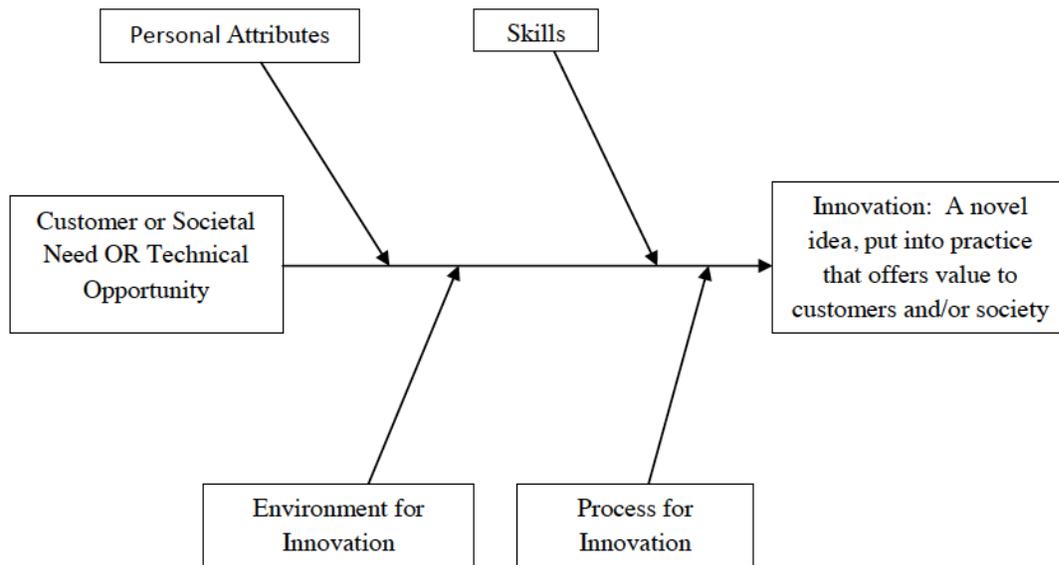


Figure 1: Framework for Organizing Mental Models of Contributors to Innovation

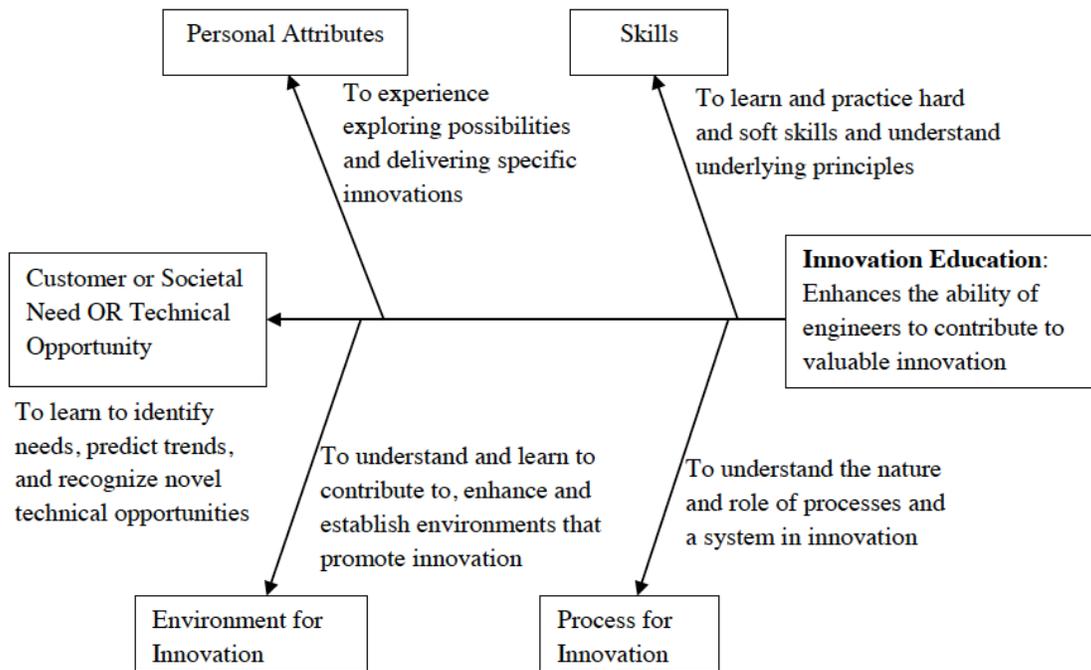


Figure 2: Implications for Innovation Education for Engineers

### *Background on the E&TIM program and the learning community*

The Engineering & Technology Innovation Management professional masters program is an interdisciplinary degree offered by the College of Engineering at Carnegie Mellon University (CMU). Coursework includes required classes in fundamentals of innovation management (Managerial and Engineering Economics, Strategy and Management of Technological Innovation, a project course applying innovation management concepts). Two semesters of “Innovation Management in Practice” seminars are also required, featuring expert and practitioner perspectives on case studies and important topics. Distribution requirements are fulfilled with elective courses chosen from technical and innovation management disciplines appropriate for individual students’ background and interests.

Each student in the program arrives with strong undergraduate preparation in a technical discipline; a wide range of different fields in engineering and science are represented in a single class. Approximately 40% of each recent class have also pursued a second engineering masters degree in one of the traditional engineering departments at CMU (Biomedical, Chemical, Civil and Environmental, Electrical and Computer, Materials Science, or Mechanical) as part of a dual degree program.

E&TIM students begin their studies as a cohort with the spring semester. The program follows a calendar year schedule, with most core courses and the first “Innovation Management in Practice” seminar class completed the first semester. This calendar has been designed to prepare students for a required summer internship midway through the program.

As part of the “Innovation Management in Practice” seminar class, students are introduced to the mental models of innovation experts and the Framework for Organizing Mental Models of Contributors to Innovation described above. This framework provides scaffolding for learning about innovation management throughout the program and beyond. (Fisher, Biviji and Nair, 2014.)

We consider each E&TIM class to be a learning community. In considering “high impact” educational practices, “Learning Communities” are recognized by the AACU; their “key goals are to encourage integration of learning across courses and to involve students with ‘big questions’ that matter beyond the classroom. Students take two or more linked courses as a group and work closely with one another and with their professors.” Students with diverse backgrounds self-report that learning communities, like internships and other high impact practices, contribute to their “Deep Learning” and “General, Personal and Practical Gains.” The authors of the AACU report place learning communities among practices for “Fostering Broad Knowledge of Human Cultures and the Natural World” and “Practicing Integrative and Applied Learning.” (Kuh, 2008)

### *Background on E&TIM student internships*

A required internship has been a defining element of the Engineering & Technology Innovation Management masters program since the program launched in 2007. The expectation that students will “prepare for and learn from” a real-world experience has provided powerful motivation and significant value for students in the program as they each:

- Prepare for an individual internship search
- Explore internship opportunities
- Secure an internship
- Contribute to an internship organization
- Complete an internship project, and
- Report on internship accomplishments and reflections.

Through a set of journal entries and a final report, students capture their accomplishments, observations and reflections concerning their internship search and internship experience.

Student internships in this program are quite diverse. Internship host organizations have included large organizations and startups, NGOs and non-profit organizations, regional and international agencies, technology transfer organizations and university research labs. Interns have served in technical roles, as well as in marketing, product management and other business roles. Geographically, approximately half of interns have stayed close to the university, while the other half have worked in other regions of the U.S., Europe and Asia. The diversity reflects different student backgrounds and interests as well as internship opportunities.

Each student’s relationship with their internship organization is established with an understanding that there would be a final report and presentation to classmates within the program. Internship sponsors are offered the opportunity to review this material in advance, to ensure that any proprietary information associated with the internship has been omitted or appropriately masked.

Starting in 2014, the addition of a judged presentation to classmates and independent judges has put special emphasis on:

- Sharing one or more specific learning and its impact (on the business, the technology, the student, or the world) during the internship and going forward after the internship, and
- Learning from every other classmates’ internship experiences and reflections.

### *The internship presentation: guidelines and assessment*

In preparing short presentations on their internships, students move beyond a focus on specific technical or managerial accomplishments and emphasize specific learnings that have been important to them and that they anticipate would be important for their classmates. This paper examines the internship presentations for the E&TIM classes of 2014 and 2015.

Students were provided in advance with the criteria that were to be used to assess internship presentations. The introduction to the internship presentation guidelines noted: “This is your opportunity to teach an important lesson in innovation management that you learned from your internship.”

All presentation materials were submitted one week in advance of the first set of presentations. Due to class scheduling constraints, the presentations themselves took place in two sessions, one week apart.

After each presentation, both independent judges and peers assessed what they had just heard, using the following survey prompts:

1. Rate how well the presenter told a story. Was it dynamic and engaging? Was there an easily identifiable impact, lesson or takeaway? Did the presenter adhere to the time limit? (On a scale of 1 to 5, with 5 being the best)
- 2. What is the most important takeaway you learned from this presentation? (Open response)**
- 3. Rate how important you think the key lesson identified above is to our students for their future. (1 = not important; 5 = very important)**
4. Please enter any other specific feedback for the presenter here: (Open response)

In this paper, we will focus on the responses to questions 2 and 3 (in **bold**, above.)

### *Student ratings of internship presentation important takeaways: results and discussion*

The number of students who participated in the internship presentations was twenty-three in 2014 and twenty-six in 2015. Both years, presentations were divided across two evening sessions. After every presentation, each member of the audience responded to a four-item survey (see prompts above.) Judges responses to the same prompts were kept separate from student responses.

Open responses were provided for the question “What is the most important takeaway you learned from this presentation?” For the subsequent question, “Rate how important you think the key lesson identified above is to our students for their future” the mean rating by students in 2014 was 3.7 and the mean rating by students in 2015 was 3.9. For another perspective, the mean rating from the independent judges in 2014 was 4.1; the mean rating from independent judges in 2015 was 3.8.

In 2014, the range of mean ratings for importance of key lesson by the students for individual presenters was 3.2 – 4.2; in 2015, the range of mean ratings for importance of key lesson by the students for individual presenters was 3.2 – 4.5.

Although based on a limited number of students, these quantitative results suggest that every student provided a presentation of value to their classmates. This was accomplished even though students and internships were quite diverse. The value attributed to each other’s work reflects each student’s preparation for this assignment, including:

- Completing an individual internship and a report on internship accomplishments and reflections
- Participating in a learning community with classmates studying Engineering & Technology Innovation Management for more than half a year, including shared core classes, a shared study and meeting space, and a shared framework for innovation (Fig. 1)
- Exchanging expectations and progress towards exploring and securing internships with classmates, as part of program workshops
- Reflecting on the nature and relevance of lessons offered by a dozen experts and practitioners representing different perspectives on the innovation ecosystem, as part of the “Innovation Management in Practice” seminar class.

### *Winning insights from internship experiences for innovation management*

As has been noted by an expert innovator, “the key aspect of a good environment for innovation is the emphasis on learning by closing the loop on things that are tried, success or failure.” (Fisher, Biviji and Nair, 2011) Sharing key aspects of diverse internship experiences among a class cohort can model elements of this aspect of a good environment for innovation within an innovation management academic program. It also provides rich learning opportunities for classmates who pursued diverse individual roles in a range of organizations, capturing many different insights. Since 2014, a competition for the “Outstanding Internship Presentation” award has become a forum for this sharing.

In 2014, the award was given to an international student whose presentation focused on his work proposing a social innovation initiative for an established U.S. manufacturing company. As reflected in audience takeaways, the key insights included: “Social innovation can be valuable in emerging markets. It is important to not only listen to your boss but also to step up and propose new ideas. You must sell your idea and win over others.”

In 2015, the award was given to a student with many years of technical experience, whose summer role was as a Marketing Manager for a materials company. As reflected in audience takeaways, the key insights included: “Management is all about asking the right question, including the question about whether and why someone is using the product in a totally unexpected way. Work backward from customer to technology.”

In each of these award-winning talks, the speaker framed his presentation so that the audience developed a clear understanding of the personal, professional and organizational context for the takeaways offered.

### *Overall internship presentation takeaways from students: analysis, examples and discussion*

In preparing this paper, the “fishbone” organizing structure (Fig. 1) was used to organize “most important takeaways” captured by students listening to their classmates’ presentations. For each presentation in 2014 and 2015, one or two representative “takeaways” from a classmate were selected from the overall set captured in real time during the presentations. Subsequently, these

representative “takeaways” were coded and aligned with the corresponding element of the innovation fishbone diagram, including: A) Triggers; B) Personal Attributes; C) Skills; D) Process for Innovation; and E) Environment.

#### A) Triggers (Customer (or Business) or Societal Need OR Technical Opportunity)

Engaging with customers is critical to successful innovation management, and this realization has been powerful for multiple innovation management interns.

Example Customer Need takeaways:

“Learn about your customers – each one is different.”

“Understanding users’ needs and wants is fundamental. Profit maximization is often not at the top of the list.”

“See if someone is using a product in an unexpected way and ask why.”

“Value creation trumps novelty in innovation.”

Even when pursuing innovation to address societal needs, understanding stakeholders is critical.

Example Societal Need takeaway:

“Know your clients’ needs and value structure or you will fail to help them.”

Although “Value creation trumps novelty in innovation”, technology opportunities may also trigger innovation. “One must be able to spot and seize emerging opportunities, e.g. moving from micro to nano particles.”

A significant technical development can trigger valuable opportunities in multiple disparate markets.

Example Technical Opportunity: Machine learning and predictive analytics were at the heart of innovation management internships ranging from: customer analysis at a major telecom company; appliance energy utilization; energy market prediction; an invention in the laboratory that was in the earliest stage of a virtual reality product design and prototyping; to: social innovation concerning stopping human trafficking.

The implications of data quality and data sources for machine learning span all these topics.

#### B) Personal Attributes

Through personal engagement in innovation management projects, interns recognized and developed the personal attributes necessary for success.

Example Personal Attributes takeaways:

“Be passionate about what you do; when you realize it has a high impact you will be more successful.”

“You will never know your limits until you test them.”

“Be comfortable with ambiguity and be able to adapt and learn.”

“Division of labor is tough. Sometimes leadership is about taking a step back.”

“In consulting, lead by example. Show people what can be done.”  
“Be humble, assertive and authentic with customers”  
“Take control of your own learning. Adapt to work with people in dispersed locations.”  
“It’s important to take responsibility when your boss doesn’t know how to proceed. Be creative.”  
“Leverage the situation you have. Give yourself goals.”

### C) Skills

The importance of both hard skills and soft skills in innovation management were highlighted during internships, including skills associated with “innovator’s DNA” (Dyer et al, 2009).

Example Skills takeaways:

“Six sigma is a tool to ensure efficiency.”  
“FMEA is a tool for risk management which is a crucial part of innovation management.”  
“Agile methods are superior to waterfall for software development”  
“Overanalyzing can be inefficient – prototyping might be better”  
“Visualization of data is powerful for communicating.”

“Don’t be afraid to ask questions. People love to talk about their work, and this helps in building relationships, too.”

“It’s often not what you ask for, but how you ask.”

“Get things done by inspiring people”

“Know your audience”

“It’s essential to understand who you are working for AND with”.

### D) Process for Innovation

Internship takeaways concerning the innovation process bridged diverse contexts for specific innovation management internships.

Example Process for Innovation takeaways:

“A framework brings clarity. It does not constrain innovation. To the contrary, it makes innovation more efficient and helps evaluate the work.”

“Design research is essential when the designers are not the users.”

“Systematic problem solving and agile methodologies are not limited only to the software industry but are applicable to every industrial sphere.”

“The value of risk management applies to innovation, too.”

Different student interns engaged with diverse projects at the same point in the lifecycle of a innovation, offered common observations and insights about innovation process and systems. For example, students who completed internships in domains ranging from Healthcare to Energy both offered the reflection that an “idea” is insufficient – a major challenge is crossing the value of death and commercialization. The challenges of commercialization and scale up were encountered in many different examples, including from the perspective of an intern who worked

as an analyst at an incubator organization to help invest resources wisely across multiple startups.

#### E) Environments for Innovation

Internship presentations give students a sense of a wide variety of work environments and cultures. Startups, large companies, intergovernmental agencies and non-profits have all been represented among internship organizations, giving students excellent opportunities to learn from peers who had experienced very different situations.

Example takeaways from Start-up Environments:

“Startups allow one to work on projects ground up, which is work experience of particular value. However, it is tough to define roles”.

“In start-ups things change very dramatically and quickly, sometimes it is overwhelming.”

“Hierarchy/boundaries/responsibilities play an important role; many startups do not do this very quickly.”

Example takeaways from Large Company Environments:

“Big companies may look to gain innovative technologies by acquiring start-ups.”

“Medical device innovation is complicated because of FDA regulation.”

“Organizational culture is critical to company success.”

“Selling your concept is very hard in a large, conservative company.”

Example takeaway from an Intergovernmental Agency Environment:

“To make collaborative innovation, it is necessary to consider the interest of each party”

Example takeaway from a Nonprofit in a developing country:

“Innovation can be socially beneficial even when it is not pushing new technology into the world, but bringing existing technology to people in a new region”

Innovation occurs in organizations, each of which has its own culture and environment. A student working in a well-established energy company described a very different situation regarding innovation than the situation described by a student working in an intergovernmental agency in the same industry. Many challenges and opportunities mapped to the organizational environments, rather than to the industry. In the well-established energy company, a challenge and opportunity was to shift resources in a project portfolio to include starting some higher risk, higher potential initiatives. In the intergovernmental agency, one challenge and opportunity was crossing the “valley of death” between project demonstration and market development; another challenge was bridging between the different nations involved.

Because of the importance of understanding customers and contexts for innovation, some innovation management internship roles may involve significant work in the customer or client environment. These environments may represent entirely different situations.

Example takeaway from an intern conducting product research with the elderly in a home:

“The journey is the reward.”

### *Discussion of internship takeaways*

Because interns have a newcomers' perspective on organizations and specific projects, some of their internship takeaways are particularly valuable for students. When the students are reflecting on their own experiences, they may offer insights that would be missed from the perspectives of expert innovators. Students also may be more willing to embrace learning from failure, which can be particularly powerful.

Example internship takeaways for discussion:

“Your manager won’t know all the stakeholders; connect him to the right ones.”

“It’s very different to write code for someone else. Frequent interactions are important to make progress for your company and yourself.”

“It is as important to manage client expectations as much as it is to manage a project.” (The context offered for this last takeaway was a somber story of major downsizing following a customer miscue.)

On the job, it is not obvious to embrace failure. However, learning from failure and challenging situations is crucial for innovation. (Bement and Dutta, 2014.) A summer internship is a valuable opportunity for rapid learning including both accomplishment and failure, and for personal reflection on next directions.

In a classic Peanuts cartoon, Charles Schulz captures the importance of experiential learning. When Charlie Brown asks his little sister, Sally, about two lists she is making, she explains, “I’m making two lists of all the things I’ve learned in life; the longer list is things I’ve learned the hard way.”<sup>3</sup>(Charles Schulz in Twerski, 1988, p. 12) “Learning the hard way” is colloquially associated with lived experience. As Sally suggests, this is an especially rich approach.

### *Implications for innovation management education*

In “How Learning Works”, Ambrose et al. (Ambrose et al., 2010) describe seven principles that “explain and predict a wide range of learning behaviors and phenomena and hence aid the design of courses and classroom pedagogy.” The concluding chapter offers the recurring themes among the corresponding strategies for effective teaching, including “collecting data about students, modeling expert practice, scaffolding complex tasks, and being explicit about objectives and expectations.” The chapter proposes that teachers apply the principles and strategies to their own teaching practice – as teaching can be improved by coupling practice and feedback.

Insights from internships in a professional program can be a rich source of feedback for program faculty concerning the preparation they are offering students for bringing concepts into practice. Student internship presentations, and their classmates’ takeaways and assessments, can test and refine an educator’s model of Innovation Education for Engineers. Figure 2, based on the mental models of expert contributors to innovation, can provide scaffolding for this task (Fisher, Biviji and Nair, 2011).

Because the internships are mid-program, students themselves also have an opportunity to respond to their internship reflections by choosing electives that tailor their final curriculum to address their own objectives and expectations that have been revised through their real-world experience.

### *Final thoughts*

A variety of approaches to learning contribute to an innovation management masters program curriculum, include courses organized around lectures and reading discussion, courses designed around team projects, and seminars with experts and practitioners. The “ultimate elective” is each student’s summer internship, halfway through the calendar year program. The positioning is to enable students to both prepare for and learn from their internship.

Starting in 2014, an internship presentation to classmates as well as independent judges has been an important part of our program. The award established for “Outstanding E&TIM Internship Presentation”, is named in memory of Raunaq Singh Gandhok, a member of the E&TIM Class of 2013. In Raunaq’s own internship report, he had written: “It is advisable to have an open mind...the beauty of it is to get exposed to different technologies and businesses all along the way.” His quote captures the spirit of learning that is essential for innovation management, and is inscribed on the award plaque.

The internship presentation process has deepened student insight into their own internship, as they strive to teach classmates key findings from their lived experience. Moreover, everyone in the cohort multiplies the power of their single internship by considering the parallel experiences of classmates who pursued different paths. Finally, the key learnings that the students present, as captured in the takeaways of their classmates, have been insightful for both the students and the program faculty.

Presentations to share student learning from individual internship experiences provide multiple ways to build on learnings. Beyond what each student learns from their own internship experience and report, they learn from their focused preparation to present key takeaways to their classmates and judges, and from feedback they receive. As students capture and evaluate the key takeaways from their classmates’ internships, they appreciate insights from diverse experiences related by peers and may look to apply these insights in their own lives. In addition, through the presentations and peer evaluations of key takeaways, program faculty gain a powerful opportunity to understand what learnings from internships are most significant to students, and to consider ways in which program curriculum might continue to evolve in response.

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### *Appendix:*

#### Sample E&TIM Program Internship Documents

#### Internship Requirements

##### Spring requirements:

1. Secure an internship to meet program requirement and your own expectations to apply skills, advance your education and contribute to an organization. (Guidance and support available from program staff.)
2. Meet with program director to discuss internship offers and complete internship form for approval (Timed to inform fall course registration.)
3. Start an internship journal with expectations for your internship.
4. Submit pre-internship journal entry.

##### Summer requirements:

5. Be a valued contributor to your internship organization
6. Work to achieve your educational objectives during your internship
7. Maintain a journal that will provide a primary reference for your internship report and presentation in the fall.
8. Submit midsummer update.

##### Fall requirements:

9. Internship Report, including:
  - a. Summary of background and contribution
  - b. Reflection on original plan, experience, and
  - c. Appendix
10. Internship Presentation

#### **SUMMARY OF INTERNSHIP**

##### I. ONE LINE SYNOPSIS OF INTERNSHIP

How will you describe this internship on your resume? (Suggestion: write this last)

##### II. BACKGROUND

What organization was your internship with?

What is the organization's business?

Established business; New directions and plans

Where were you in the organization? What was your assignment?

### III. YOUR CONTRIBUTION

What did you accomplish?

How did you accomplish it?

What were the underlying technical concepts most important to your contribution?

What will be the follow up to the work that you did?

### REFLECTION ON INTERNSHIP

#### IV. YOUR ORIGINAL PLAN

What was the role you were you hired to do?

What background prepared you for this role? (Your technical education? Your previous work experience? Elements of this program?)

How did this role contribute to your education?

#### V. YOUR EXPERIENCE

What quote or story best captures your internship experience?

Who were the stakeholders most important to your work? How did you interact with them?

How did you revise plans during the course of the internship – and what drove changes?

How did the organization measure your success in this role? How do you know this?

How do you measure the success of this internship experience?

#### VI. BUILDING ON YOUR INTERNSHIP EXPERIENCE

What aspects of innovation management were handled particularly well in your experience? What can you teach others about this?

What difficult challenges to innovation management did you encounter? What would you like to learn more about handling?

Looking forward, what role in innovation management do you aspire to fill?

## **INTERNSHIP REPORT APPENDIX MATERIAL**

Key charts, reports or other artifacts from your internship, edited with careful respect for your employer's confidentiality.

Fishbone diagram of Innovation and/or Innovation Education, populated with learnings from your internship.

### **Guidelines for the 2015 E&TIM Internship Presentations**

In addition to a 4-6 page paper describing your internship (background, contributions and reflections, as outlined in the E&TIM Internship Assignment), each student will make a 7 minute presentation to the Innovation Management in Practice Class, followed by questions and short discussion.

Draft presentations are due September 14 for all students; presentations are scheduled for September 23 and September 30.

An outstanding presentation does a good job of engaging your audience and telling your story. Please include the context for your presentation: identify where you were an intern and your assignment in the organization. Approach your presentation by considering how to help your story connect to your audience.

An internship is an opportunity to learn about business and technology, and also about yourself and the world. For your presentation, please focus on communicating a small number of significant and impactful learnings from one or more of these categories. Did you have any unexpected learnings? These can be particularly powerful.

In addition to describing one or more thing that you learned during your internship, please describe the impact of your learnings (on the business, the technology, on yourself, or on the world) during your internship and going forward after your internship.

Finally, help your audience understand how your presentation might have future impact for them.

Please keep your presentation within the allowed time limit – no more than seven minutes.

Note: Judges will be present for the Internship Presentations. One E&TIM 2015 Internship Presentation will be honored as the recipient of the Raunaq Singh Gandhok Outstanding Internship Presentation Award at the 2015 Celebration of E&TIM in December.