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## **AC 2012-3325: THE PROCESS AND DELIVERY OF A DIRECTED PROJECT COMPONENT: LESSONS AND METHODS FROM A COLLABORATIVE DEGREE PROGRAM**

**Mr. Mark T. Schuver, Purdue University, West Lafayette**

Mark Schuver is the Associate Director for the Center for Professional Studies in Technology and Applied Research (ProSTAR) in the College of Technology at Purdue University in West Lafayette, Ind. He is responsible for the development and administration of the Weekend Master's Degree programs, the Rolls-Royce Master's Degree programs, and the growth of Professional Education programs in the College of Technology. Prior to joining Purdue in 2002, Schuver was employed by Caterpillar, Inc., for 35 years with assignments in product design, research and development, supplier management, quality management, logistics management, and various leadership positions. He holds an associate's degree in drafting technology from North Iowa Area Community College (1967), a B.S. in business administration (1990), and M.S. in management (1992) from Indiana Wesleyan University. Schuver is a member of the American Society for Engineering Education and serves on the Executive Board of the Continuing Professional Development Division. He is also a member of College/Industry Partnerships, Engineering Technology, and Graduate Studies divisions of ASEE. Schuver is a member of the National Collaborative Task Force for Engineering Education Reform and is a Lifetime Certified Purchasing Manager with the Institute of Supply Management (formerly NAPM).

**Ms. Lynda M. Coulson, Rolls-Royce Corporation**

## **The Process and Delivery of a Directed Project Component: Lessons and Methods from a Collaborative Degree Program**

A Directed Project requirement is becoming more common in today's Masters Degree Programs. Both academia and industry can derive value in requiring an in-depth study that can benefit the company's bottom line while fulfilling curriculum and learning outcomes. With a Directed Project experience, students focus in on improvement opportunities as part of their workplace environment. Students are challenged to identify and deliver possible solutions toward a defined initiative within a framework of process steps. These steps often expand the student's systematic and analytical view of working towards an optimal solution. This session will focus on the Directed Project component as part of the *Masters in Technology* degree program jointly developed by a university and multinational company. Emphasis will be given to the process model; guidance provided and project outcomes (quantifiable). Also, includes a discussion on how to identify and control project scope, collection and analysis of data, and consensus with project committee members and academic advisors. A brief look at the role of the directed project as the student progresses toward graduation; the mandatory oral defense, the life-cycle of a directed project and a comparison of directed projects pursued against other Masters of Technology degree programs.

In 2004, collaboration between a university and a multinational company was launched to enhance the development of the company's technical workforce by providing an on-site opportunity to earn a Master of Science Degree in Technology while working full time. A cohort based model with a curriculum designed to meet the specific needs of the company while addressing the graduate level academic requirements of the university was created.

An important component of the curriculum is the Directed Project (as opposed to a Thesis). The Directed Project in the traditional curriculum was designed to allow a student to demonstrate competency in the Applied Research Method. This required the student to align their project with a research interest of their advisor. The motivation for the student was to complete degree requirements for graduation and for the faculty advisor to contribute to their scholarship requirements of conference presentations or publication as part of promotion and tenure requirements.

In a non-traditional student environment, the potential for measurable benefit for the student, employer and faculty member is greatly enhanced when the project topics are focused on strategic goals of the enterprise. This opportunity resulted in a revised set of guidelines for the Directed Project Process. The following flow chart (figure 1) defines the various steps and sequence of the project:

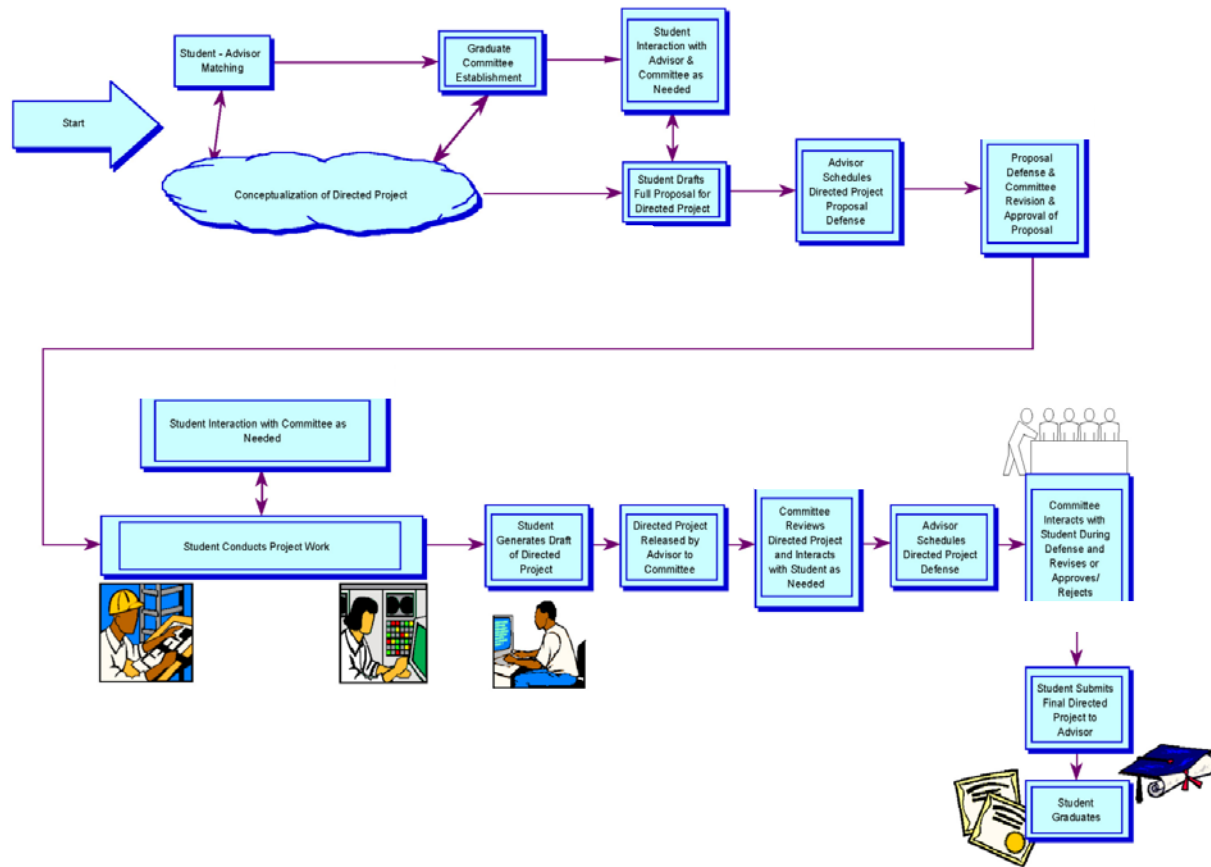


Figure 1

The recommended Directed Project outline is defined in Attachment A.

Several modifications were made to the instructions for each process step in the Directed Project:

- 1) The selection of the project topic was mandated to be jointly done by the student and his manager with a focus on what would benefit the student's organization in a measurable way.
- 2) The advisor matching process was facilitated by a surrogate who had knowledge of research interest of all faculty members in the college. The faculty could guide the structure and scope of the project as well as assist in vetting a second university committee member and a required company committee member.
- 3) The project was designed to solve a company technical, business or operation problem, recommending and demonstrating an optimal solution.
- 4) A key requirement was to make every effort to structure the benefit of the project to have a measurable financial impact on the company operations.
- 5) Advisors would be financially compensated for their service on the committee. They were also challenged to identify critical issues in this relationship that could help in focusing their research interest to help solve current problems in industry.
- 6) Arrangements were made to invite company stakeholders to the oral defense.

- 7) Company committee members were briefed in a communication session which defined their responsibilities. Expectations of the company committee member are:
  - a. Be available to counsel student as needed in their area expertise
  - b. Assist in providing valid subject matter for topic
  - c. Provide guidance in identification and verification of return on investment (ROI) potential
  - d. Provide consultation during execution of the project (estimate 1 hour per week)
  - e. Evaluate the quality of the result relative to the proposal
  - f. Participate with the committee in the directed project oral defense
  - g. Support and assist the student in the implementation of the project to realize benefit

It is important that the advisor assist in managing the scope of the project such that it is substantive enough to allow student to demonstrate the Applied Research Method but still be able to complete the project to the point where a business case for implementation can be developed.

It is the role of the company committee member to ensure that the project receives the support needed to implement it and yield the predicted Return on Investment. When a ranking company representative is not engaged, these projects may go in storage after graduation with no hope of deriving the benefits.

The company committee person can also gain support for data collection which is part of the process. This may require disruption of a normal business or operational process that can be justified by the predicted future benefit.

It is important to note that there existed an “umbrella agreement” between the company and the university which included language for managing confidentiality, non-disclosure and intellectual property rights including guidelines for potential publication of project results. This language was included in the specific Letter of Agreement for the program. In addition, a process to ensure that each faculty/advisor involved signed a document acknowledging awareness and compliance with the agreement was implemented.

Some lessons learned include timing of the project commencement, facilitation assistance from committee members, the students’ perception of the directed project after graduation and its value to stakeholders.

The mandatory oral defense creates a rich dialogue which typically results in several ideas for future projects.

As the cohort group comes to the end of the program, the estimated benefits are tracked and summarized by the company program manager to determine what the overall savings are. An example from an early cohort yielded an average of \$6 million dollars of annualized savings which equates to an average per student of approximately \$240,000. When taking into account what the company invested in the program, this example yields a 10 to 1 return. This is a very tangible benefit which comes in addition to developing their employees for the future.

The benefit to the university is that the relationship develops which can lead to sponsored programs, other educational products and staying engaged on what looming issues are facing industry.

Examples of projects from this relationship include: “A Valuation Method for Intellectual Property”, “Inventory Control System Development”, “A Study of Residual Stress Influence on Component Behavior through Machining and Shot Peening Operations”, Achieving Reliable Fluorescent Penetrant Inspection Following Abrasive Blasting of Cast Nickel Superalloys”, Business Case for Addressing Cabin Odor” and “Variation Study of Human Controlled Processes Compared to Computer Controlled Processes”.

Since students come from operations, product design, research and development, product support/customer service, the projects selected reflect that diversity.

The directed project approach is unique given its focus on solving existing problems, improving existing processes or creating new processes that will enhance an organizations function in a way that impacts the financial results in a positive way.

Relative to the overall program, it is also important to note, that although the curriculum was slightly modified, the courses selected came from courses already created in the university’s traditional and non-traditional student programs. Consequently the learning outcomes for the course work are of the same rigor and content previously approved by faculty.

<sup>1</sup> Dyrenfurth, M. J., Newton, K. A., Schuver, M. T. and Elliott, S., ROI: Return on Investment as a Factor in Designing Graduate Research Projects for Mutual Benefit, 2009 ASEE Annual Conference Proceedings of the American Society for Engineering Education. (2009)

## Attachment A: Recommended Directed Project Outline

Cover Page

Abstract

Table of Contents

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